



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

PERMIT DETAILS

Area Permit Number: CPS 8182/1
File Number: DER2014/000004-1
Duration of Permit: 12 February 2021 to 12 February 2028

PERMIT HOLDER

Acts Global Churches Limited

LAND ON WHICH CLEARING IS TO BE DONE

Lot 120 on Deposited Plan 37198, Glen Iris
Lot 36 on Plan 2571, Glen Iris

AUTHORISED ACTIVITY

The Permit Holder shall not clear more than 0.24 hectares of native vegetation within the areas cross-hatched yellow on attached Plan 8182/1a.

CONDITIONS

1. Period in which clearing is authorised

The Permit Holder shall not clear any native vegetation after 12 February 2023

2. Avoid, minimise and reduce the impacts and extent of clearing

In determining the amount of native vegetation to be cleared authorised under this Permit, the Permit Holder must have regard to the following principles, set out in order of preference:

- (a) avoid the clearing of native vegetation;
- (b) minimise the amount of native vegetation to be cleared; and
- (c) reduce the impact of clearing on any environmental value.

3. Dieback and weed control

When undertaking any clearing or other activity authorised under this Permit, the Permit Holder must take the following steps to minimise the risk of the introduction and spread of *weeds* and *dieback*:

- (a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
- (b) ensure that no *dieback* or *weed*-affected soil, *mulch*, *fill* or other material is brought into the area to be cleared; and
- (c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

4. Direction of clearing

The Permit Holder shall conduct clearing in a slow progressive manner from a west to east direction to allow fauna to move into adjacent native vegetation ahead of the clearing activity.

5. Fauna management – western ringtail possum

- (a) In relation to the areas cross-hatched yellow on attached Plan 8182/1a, the Permit Holder must engage a *fauna specialist* to inspect that area, including all trees and tree hollows present, within 24 hours prior to, and for the duration of clearing, for the presence of western ringtail possum(s) (*Pseudocheirus occidentalis*).

- (b) In relation to the areas cross-hatched yellow on attached Plan 8182/1a, the Permit Holder must not clear any *dreys* identified within these areas.
- (c) Clearing must cease in any area where fauna referred to in condition 5(a) above are identified until either:
 - (i) the western ringtail possum(s) individual has moved on from that area to adjoining *suitable habitat*; or
 - (ii) the western ringtail possum(s) individual has been removed by a *western ringtail possum specialist*.
- (d) Any western ringtail possum (*Pseudocheirus occidentalis*) individuals removed in accordance with condition 5(c)(ii) of this Permit must be relocated by a *western ringtail possum specialist* to *suitable habitat*.
- (e) Where fauna is identified under condition 5(a) of this Permit, the Permit Holder must provide the following records to the *CEO* as soon as practicable:
 - (i) the number of individuals identified;
 - (ii) the date each individual was identified;
 - (iii) the location where each individual was identified recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
 - (iv) the number of individuals removed and relocated;
 - (v) the relevant qualifications of the *western ringtail possum specialist* undertaking removal and relocation;
 - (vi) the date each individual was removed;
 - (vii) the method of removal;
 - (viii) the date each individual was relocated;
 - (ix) the location where each individual was relocated to, recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees; and
 - (x) details pertaining to the circumstances of any death of, or injury sustained by, an individual.

6. Offset – Revegetation Plan

Within 12 months of the commencement of clearing, the Permit Holder shall implement and adhere to the revegetation commitments in ‘Revegetation Management Plan – Crown Reserve 46225 (Lot 6055), Australind’ dated November 2020, including but not limited to the following actions;

- (a) commence *revegetating* and *rehabilitating* the area hatched red on Plan 8182/b/1 by;
 - (i) undertaking an extensive *pre-planting* weed control program and site preparation; and
 - (ii) deliberately *planting* native vegetation ensuring only *local provenance* seeds and propagating materials are used to *revegetate* and *rehabilitate* the area;
- (b) establishing four 5 x 5 metre quadrat monitoring sites within the *revegetated* and *rehabilitated* area;
- (c) fencing the *revegetated* and *rehabilitated* area;
- (d) implementing hygiene protocols by cleaning earth-moving machinery of soil and vegetation prior to entering and leaving the site;
- (e) undertaking weed control activities to maintain a minimum 80 per cent weed-free state by the end of the project maintenance period;
- (f) achieve the following completion criteria after the four-year monitoring period for the area *revegetated* and *rehabilitated* under this Permit;

Criterion	Aspect	Completion criteria	Monitoring
1	Species richness	A minimum of 75 per cent of the species planted to occur within the revegetation site at the end of the project maintenance period	The species survival rate within the revegetation site will be assessed annually during autumn for a period of no less than four years

2	Vegetation structure	Vegetation structure within the revegetation site to consist of a 30 per cent cover of upperstorey species, 40 per cent cover of midstorey species and 30 per cent cover of groundstorey species at the end of the project maintenance period	Vegetation structure to be assessed annually during autumn for a period of no less than four years
3	Weed Cover	No more than 20 per cent weed cover within the revegetation site at the end of the project maintenance period	Weed cover to be assessed annually during spring for a period of no less than four years
4	Survival rate to be achieved	A plant survival rate of at least 70 per cent of the planted density is achieved within the revegetation site the end of the project maintenance period	The number of surviving plants in the revegetation site will be monitored annually during autumn for a period of no less than four years
5	Stem Density/composition	The revegetation site contains a minimum plant density of 1 plant/2m ² at the end of the project maintenance period	Stem density to be assessed annually during autumn for a period of no less than four years

- (g) undertake remedial actions for the area *revegetated* and *rehabilitated* where monitoring indicated that revegetation has not met the completion criteria, outlined in 6(f); including
- (i) revegetate the area by deliberately *planting* native vegetation that will result in the minimum target in 6(f) and ensuring only *local provenance* seeds and propagating material are used;
 - (ii) undertake further weed control activities; and
- (h) monitoring is to be undertaken by an *environmental specialist*.

7. Offsets – Reserve 46225

The Permit Holder shall:

- (a) within 12 months of achieving the completion criteria outlined in 6(f), provide the *CEO* a copy of the executed change in purpose of the area cross-hatched red on attached Plan 8182/1b, being Reserve 46225, to a Conservation Reserve, to be managed by the Department of Biodiversity, Conservation and Attractions.

8. Records to be kept

The Permit Holder must maintain the following records in relation to the clearing of native vegetation authorised under this Permit:

- (a) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
- (b) the date(s) that the area was cleared;
- (c) the size of the area cleared (in hectares);
- (d) actions taken to avoid, minimise and reduce the impacts and extent of clearing in accordance with condition 2 of this Permit; and
- (e) actions taken to minimise the risk of the introduction and spread of *weeds* and *dieback* in accordance with condition 3 of this Permit.
- (f) fauna management measures in accordance with condition 5 of this Permit.

- (g) in relation to the revegetation of areas pursuant to condition 6 of this Permit:
 - (i) a description of the *revegetation* and *rehabilitation* activities undertaken;
 - (ii) the size of the area *revegetated* and *rehabilitated* (in hectares); and
 - (iii) the date that the area was *revegetated* and *rehabilitated*.
- (h) actions taken to execute a change in purpose of the area hatched red on attached Plan 8182/1b, being Reserve 46225, to a Conservation Reserve in accordance with condition 7 of this Permit.

9. Reporting

- (a) The Permit Holder must provide to the CEO on or before 30 June of each year, a written report:
 - (i) of records required under condition 8 of this Permit; and
 - (ii) concerning activities done by the Permit Holder under this Permit between 1 January and 31 December of the preceding calendar year.
- (b) If no clearing authorised under this Permit was undertaken between 1 January to 31 December of the preceding calendar year, a written report confirming that no clearing under this permit has been carried out, must be provided to the CEO on or before 30 June of each year.
- (c) Prior to 12 November 2027, the Permit Holder must provide to the CEO a written report of records required under condition 8 of this Permit where these records have not already been provided under condition 9(a) of this Permit.

DEFINITIONS

The following meanings are given to terms used in this Permit:

CEO means the Chief Executive Officer of the Department responsible for the administration of the clearing provisions under the *Environmental Protection Act 1986*;

dieback means the effect of *Phytophthora* species on native vegetation;

drey means the nest of a western ringtail possum (*Pseudocheirus occidentalis*)

environmental specialist means a person who holds a tertiary qualification in environmental science or equivalent, and has experience relevant to the type of environmental advice that an environmental specialist is required to provide under this Permit;

fauna specialist means a person who holds a tertiary qualification specializing in environmental science or equivalent, has a minimum of two years field experience in fauna identification and surveys of fauna native to the region being inspected or surveyed and holds a valid fauna licence issued under the *Biodiversity Conservation Act 2016*;

fill means material used to increase the ground level, or fill a hollow;

local provenance means native vegetation seeds and propagating material from natural sources within 100 kilometres and the same Interim Biogeographic Regionalisation for Australia (IBRA) subregion of the area cleared;

mulch means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation;

planting means the re-establishment of vegetation by creating favourable soil conditions and planting seedlings of the desired species;

rehabilitate/ed/ion/ing means actively managing an area containing native vegetation in order to improve the ecological function of that area;


revegetate/ed/ion means the re-establishment of a cover of *local provenance* native vegetation in an area using methods such as natural *regeneration*, *direct seeding* and/or *planting*, so that the species composition, structure and density is similar to pre-clearing vegetation types in that area;

suitable habitat means habitat known to support western ringtail possums (*Pseudocheirus occidentalis*) within the known current distribution of the species, typically characterised by abundant foliage, presence of suitable nesting structures such as tree hollows, as well as high canopy cover and continuity. Known habitat includes peppermint (*Agonis flexuosa*) dominated woodlands, jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*) forests, riparian vegetation with a canopy of Bullich (*Eucalyptus megacarpa*) or flooded gum (*Eucalyptus rudis*), karri (*Eucalyptus diversicolor*) forests, sheoak (*Allocasuarina fraseriana*) dominated woodlands, and other stands of myrtaceous trees growing near swamps, watercourses or floodplains;

weed/s means any plant –

- (a) that is a declared pest under section 22 of the *Biosecurity and Agriculture Management Act 2007*; or
- (b) published in a Department of Biodiversity, Conservation and Attractions Regional Weed Rankings Summary, regardless of ranking; or
- (c) not indigenous to the area concerned.

western ringtail possum specialist means a *fauna specialist* who has a minimum of two years field experience in western ringtail possum (*Pseudocheirus occidentalis*) identification, surveys of western ringtail possums and capture and handling of western ringtail possums and holds a valid fauna licence issued under the *Biodiversity Conservation Act 2016*.

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Ryan Mincham
MANAGER
NATIVE VEGETATION REGULATION

*Officer delegated under Section 20
of the Environmental Protection Act 1986*

20 January 2021

Plan 8182/1a

115°40'48.000"E




33°20'24.000"S

33°20'24.000"S

115°40'48.000"E

CPS layers

 CPS areas approved to clear

base layers

 Road Centrelines

Map Layers

 Land TenureLGATE - 226

 Local Government Authorities



MGA Zone 50
Geocentric Datum of Australia 1994



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Officer delegated under section 20 of the
Environmental Protection Act 1986



GOVERNMENT OF
WESTERN AUSTRALIA

Plan 8182/1b

115°44'6.000"E



115°44'6.000"E

CPS layers

 CPS subject to conditions

Map Layers

 Land TenureLGATE - 226

 Local Government Authorities



MGA Zone 50
Geocentric Datum of Australia 1994

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Officer delegated under section 20 of the
Environmental Protection Act 1986



GOVERNMENT OF
WESTERN AUSTRALIA



1. Application details

1.1. Permit application details

Permit application No.: 8182/1
Permit type: Area Permit

1.2. Applicant details

Applicant's name: Acts Global Churches Limited
Application received date: 28 August 2018

1.3. Property details

Property: Lot 120 on Deposited Plan 37198, Glen Iris
Lot 36 on Plan 2571, Glen Iris
Local Government Authority: City of Bunbury
Localities: Glen Iris

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	Purpose category:
0.24		Mechanical Removal	Car park construction

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 20 January 2021

Reasons for Decision: The clearing permit application, received on 28 August 2018, has been assessed against the clearing principles, planning instruments and other matters in accordance with section 51O of the *Environmental Protection Act 1986*, and it was concluded that the proposed clearing is at variance with Principle (a), (b) and (e) and is not likely to be at variance with the remaining clearing Principles.

Through assessment it has been determined that;

- the application area contains approximately 0.24 hectares of vegetation which comprises significant foraging habitat for Carnaby's cockatoo (*Calyptorhynchus latirostris*), Baudin's cockatoo (*Calyptorhynchus baudinii*) and forest red-tailed black-cockatoo (*Calyptorhynchus banksii* subsp. *naso*);
- the application area contains 0.24 hectares of significant habitat for Western ringtail possum (WRP) (*Pseudocheirus occidentalis*); and
- the application area is a significant remnant of vegetation within an extensively cleared landscape.

The Delegated Officer has considered the applicant's measures to avoid and minimise impacts, including a reduction if the amount of proposed clearing from 1.3 hectares to 0.24 hectares. Notwithstanding, the Delegated Officer is of the view that a significant residual environmental impact remains in the form of impacts to the habitat of three species of black cockatoos, significant WRP habitat and clearing of a significant remnant of vegetation in an extensively cleared landscape. In accordance with the Western Australian Environmental Offsets Policy (2011), these impacts should be offset.

The Delegated Officer considered the quantification of the offset required in accordance with the Department of Agriculture, Water and the Environment's Offset Assessment Guide. The applicant has committed to revegetate an area of 1.1 hectares within 10 kilometres of the application area, to achieve a similar vegetation type to that impacted upon from the clearing.

The Delegated Officer is satisfied that the environmental impacts associated with this project have been appropriately avoided and minimised, and the significant residual impacts have been offset.

2. Site Information

Clearing Description

The application is to clear 0.24 hectares of native vegetation within Lot 120 on Deposited Plan 37198 and Lot 36 on Plan 2571, Glen Iris, for the purpose of constructing parking for a future school development (Figure 1).

Vegetation Description

The application area intersects the mapped Swan Coastal Plain 'Southern River' vegetation complex described as open woodland of *Corymbia calophylla* (Marri) - *Eucalyptus marginata* (Jarrah) - *Banksia* species with fringing woodland of *Eucalyptus rudis* (Flooded Gum) - *Melaleuca raphiophylla* (Swamp Paperbark) along creek beds (Hedde et al., 1980).

The applicant commissioned Strategen to undertake a flora and vegetation survey that identified one vegetation type within the application area, described as:

- *Eucalyptus marginata*, *Banksia littoralis* and *Agonis flexuosa* woodland with occasional *Banksia ilicifolia* over *Acacia saligna* open shrubland over *Xanthorrhoea preissii*, *Jacksonia horrida*, *Macrozamia riedlei*, *Hibbertia hypericoides*, *Daviesia divaricata*, low open shrubland over *Ehrharta calycina* and *Conostylis aculeata* grassland (Strategen Environmental, 2019).

Vegetation Condition

The condition and description of the vegetation within the application area was determined via a flora and vegetation survey undertaken by Strategen Environmental in March 2019 (Strategen Environmental, 2019). The vegetation within the application area was identified as being in a degraded to good (Keighery, 1994) condition, described as:

- Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery, 1994); to
- Degraded: Structure severely disturbed; regeneration to good condition requires intensive management (Keighery, 1994).

Soil type

One soil type has been mapped by the Department of Primary Industries and Regional Development (DPIRD) across the application area described as:

- Spearwood S2c Phase: Lower slopes (1-5%) of dune ridge with bleached or pale sands with a yellow-brown or pale brown subsoil (like S1c), that usually occurs on the eastern edge of the Spearwood dunes (Schoknecht et al., 2004).



Figure 1: Revised application area (area cross-hatched blue)

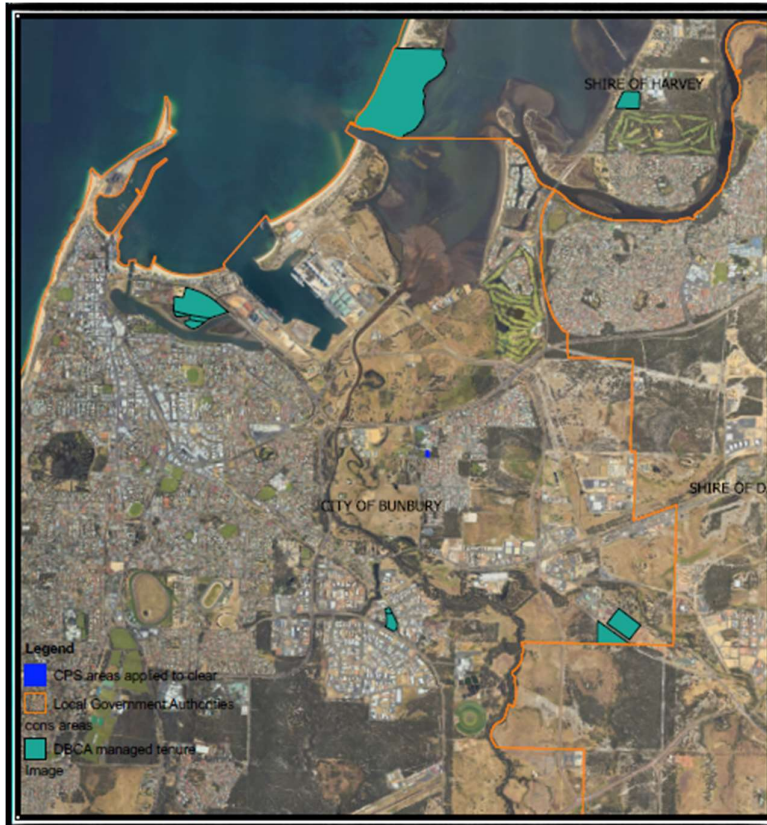


Figure 2: Location of application area in relation to conservation estate

3. Minimisation and mitigation measures

The applicant initially applied to clear 1.3 hectares of native vegetation. A preliminary assessment of the original application identified the following environmental impacts:

- The application area contains significant habitat for the Western Ringtail Possum (*Pseudocheirus occidentalis*); Carnaby's cockatoo (*Calyptorhynchus latirostris*), Baudin's cockatoo (*Calyptorhynchus baudinii*) and forest red-tailed black cockatoo (*Calyptorhynchus banksii* subsp. *naso*);
- The majority of the application area is located within a mapped occurrence of the 'Banksia Dominated Woodlands of the Swan Coastal Plain' threatened ecological community (TEC); and
- The local area (10 kilometre radius) and Southern River mapped vegetation complex retain approximately 19 and 18.4 per cent of native vegetation respectively. Noting the fauna and high biological values of the application area, the area under application is considered to be a significant remnant in an extensively cleared area.

The applicant amended the original application area from 1.3 hectares to 0.24 hectares in order to coincide with the approved plan of the development approval. Although the application area has been reduced in size, the proposed clearing is still likely to impact upon a significant remnant of native vegetation in an extensively cleared landscape that contains habitat for the WRP and black cockatoo species. The proposed clearing will also reduce the extent of the Southern River mapped vegetation complex. The applicant was required to demonstrate further mitigation and minimisation measures to address the environmental impacts associated with the proposed clearing.

As the applicant was unable to further reduce the environmental impacts through additional avoidance and minimisation measures, an offset of 1.1 hectares of revegetation was calculated to offset the significant residual impacts from the proposed clearing. The suitability of the offset is discussed further under section 5 of this report.

4. Assessment of application against clearing principles, planning instruments and other relevant matters

(a) Native vegetation should not be cleared if it comprises a high level of biodiversity.

Proposed clearing is at variance with this Principle

As illustrated in Figure 2, the application area is a remnant patch of native vegetation, whereby approximately 19 per cent (4,535.42 hectares) of native vegetation remains in the local area (10 kilometre radius). The vegetation within the application area is one of the few remnant patches of native vegetation remaining in the local area. Figure 2 shows only a very small portion of native vegetation within the local area is protected within DBCA managed land tenure. In addition, the application area occurs within the extensively cleared Southern River vegetation complex and is under the recommended 30 per cent threshold with approximately 18.4 per cent of its native vegetation remaining (Government of Western Australia, 2019). Noting this, and the high level of biological diversity that occurs within the application area (discussed further under Principle (b)), the application area is considered to be a significant remnant.

The applicant commissioned Strategen Environmental to undertake a flora and vegetation survey which was undertaken on 19 March 2019 (Strategen Environmental, 2019). The survey area included the original 1.3 hectare application area, and encompassed the revised application area. The survey identified that the vegetation within the application area has been disturbed due to historical adjacent land uses, including residential and school developments (Strategen Environmental, 2019). As a result of this disturbance, a high number of introduced species occur within the application area and the understorey lacks native species diversity (Strategen Environmental, 2019). The survey identified the vegetation within the application area as being in a degraded to good (Keighery, 1994) condition, with the majority of the vegetation in a degraded condition (Strategen Environmental, 2019). It is noted that adjacent land uses have significantly altered the vegetation condition since DEC's inspection in 2011 where the vegetation was determined to range from a very good to good (Keighery, 1994) condition (DEC, 2011).

According to available databases, there are records of 29 priority (P) flora species within the local area (10 kilometre radius). The closest of these is P4 flora species '*Acacia flagelliformis*' mapped approximately 570 metres north of the application area. This species is a rush-like, erect or sprawling shrub that flowers between May to September and grows in sandy soils associated with winter-wet areas (Western Australian Herbarium, 1998-). Noting that no wetlands or watercourses were identified within the application area, it is unlikely the application area will include occurrences of this species.

A likelihood of occurrence assessment of species known to occur in the local area, determined that the application area may provide suitable habitat for two P2 flora species, namely '*Thelymitra variegata*' and '*Grevillea rosieri*' that are both known to occur within sandy soils (Western Australian Herbarium, 1998-). The flowering time for '*Thelymitra variegata*' is between June to September and July for '*Grevillea rosieri*' (Western Australian Herbarium, 1998-). The flora and vegetation survey undertaken by Strategen Environmental did not identify any conservation significant flora within the application area (Strategen Environmental, 2019). It is noted that the survey was undertaken outside of the optimum flowering time for these species, however, given the degraded (Keighery, 1994) condition of the majority of the application area and the high number of weeds recorded, it is not likely that priority flora species or any other conservation significant flora species recorded within the local area would be present within the application area.

As discussed under Principle (b), the fauna surveys undertaken by Strategen Environmental confirmed that the application area contains significant foraging and breeding habitat for the Western ringtail possum (WRP) (*Pseudocheirus occidentalis*). The application area also contains significant foraging habitat for the forest red-tailed black cockatoo (*Calyptorhynchus banksii* subsp. *naso*), Baudin's cockatoo (*Calyptorhynchus baudinii*) and Carnaby's cockatoo (*Calyptorhynchus latirostris*).

As discussed under Principle (c), the application area is not likely to provide suitable habitat for threatened flora that have been recorded within the local area.

According to available datasets, the majority of the application area (approximately 61 per cent) is located within a mapped occurrence of the 'Banksia Dominated Woodlands of the Swan Coastal Plain' Threatened Ecological Community (TEC). This TEC is listed as 'endangered' at a federal level under the Commonwealth EPBC Act and a 'Priority 3' Priority Ecological Community (PEC) at a state level.

The approved conservation advice for this community states that "Ground-truthing (e.g. an on-ground survey) is required to verify if a particular site meets the required key diagnostic characteristics and minimum condition thresholds to be the described ecological community" (Threatened Species Scientific Committee (TSSC), 2016).

The Approved Conservation Advice for the TEC states that to be considered representative of the TEC, a remnant in the Swan Coastal Plain bioregion must include at least one of four *Banksia* species being *Banksia attenuata* (candlestick banksia), *Banksia menziesii* (firewood banksia), *Banksia prionotes* (acorn banksia) and/or *Banksia ilicifolia* (holly-leaved banksia); must include an emergent tree layer often including marri, jarrah, or tuart, and other medium trees including *Eucalyptus todtiana* (pricklybark), *Nuytsia floribunda* (WA Christmas tree), western sheoak, *Callitris arenaria* (sandplain cypress), *Callitris pyramidalis* (swamp cypress) or *Xylomelum occidentale* (woody pear); and must include an often highly species-rich understorey (TSSC, 2016). In addition, it is noted within the conservation advice that if a patch of Banksia woodland vegetation is dominated by *Banksia littoralis*, it is unlikely to be representative of the TEC and may indicate a different dampland community type (TSSC, 2016).

The Approved Conservation Advice for the TEC states that the patch of vegetation must meet the minimum patch size and condition thresholds criteria to be representative of the TEC. The approved advice states that a single patch of the TEC must be in at least a good (Keighery, 1994) condition to meet the condition threshold requirements of the TEC. The minimum patch size for a patch considered to be in a good (Keighery, 1994) condition is two hectares (TSSC, 2016).

The flora and vegetation survey undertaken by Strategen Environmental conducted an assessment of the vegetation within the survey area against the key diagnostic criteria in the approved conservation notice. The results of the assessment determined that the vegetation within the application area represents a Banksia woodland given the application area contains a canopy dominated by *Banksia prionotes* and *Banksia ilicifolia* species, has the structure of a low woodland and occurs on Bassendean sands (Strategen Environmental, 2019). However, noting the degraded to good (Keighery, 1994) condition and the small size of the application area (0.24 hectares), the vegetation proposed to be cleared does not meet the condition and minimum threshold size requirements of the TEC and therefore is not considered to be representative of this TEC. The dominance of *Banksia littoralis* also concludes that the vegetation is not consistent with the key criteria of this TEC.

Given the presence of significant habitat for a local population of WRP and the importance of the application area as a significant remnant of native vegetation surrounded by high density residential development, the application area is considered to contain a high level of biodiversity in a local context. The proposed clearing is at variance with this principle.

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna.

Proposed clearing is at variance with this Principle

A search of the Naturemap database returned 61 records of conservation significant fauna taxa within a 10 kilometre radius of the application area which comprise of 23 threatened fauna species, 24 species protected under international agreement, five specially protected fauna species and nine priority fauna species (DBCA, 2007-). The majority of these species are waterbird species that utilise wetlands that occur within the local area. Noting the absence of hydrological features within the application area, suitable habitat is not likely to occur within the application area for these fauna species. Of the species recorded, the application area may provide suitable habitat for eight terrestrial/aboreal conservation significant fauna listed under the *Biodiversity Conservation Act 2016* (BC Act) within the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* (WC Notice) including:

- Carnaby's cockatoo;
- forest red-tailed black cockatoo;
- Baudins cockatoo;
- South-western brush-tailed phascogale (*Phascogale tapoatafa* subsp. *wambenger*);
- Western ringtail possum (WRP);
- chuditch (*Dasyurus geoffroii*);
- peregrine falcon (*Falco peregrinus*); and
- brush-tailed phascogale (*Phascogale tapoatafa*).

The applicant commissioned Strategen Environmental to undertake a fauna survey of the application area on 26 September 2018 that targeted the presence and significance of habitat for four of the above conservation significant fauna species, namely the WRP and all three species of black cockatoos (Strategen, 2018a). The survey comprised of a WRP and black cockatoo habitat assessment to determine whether the application area contains significant foraging and breeding habitat for these conservation significant species (Strategen, 2018a). The project area surveyed by Strategen Environmental included the original 1.3 hectare application area, and encompasses the revised application area.

Carnaby's cockatoo, forest red-tailed black cockatoo and Baudin's cockatoo (collectively known as black cockatoos) are classified as threatened or likely to become extinct as Endangered fauna under the BC Act. Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the Carnaby's and Baudin's cockatoo are listed as Endangered and the forest red-tailed black cockatoo is listed as Vulnerable. All three species of black cockatoo forage on the seeds, nuts and flowers of a large variety of plants including Proteaceous species (*Banksia*, *Hakea*, *Grevillea*), Eucalypts, *Corymbia* species and a range of introduced species (Valentine and Stock, 2008). As described under Section 2, the application area contains *Banksia* sp. and *Eucalyptus* sp. which are the preferred food source for all three species.

A review of available databases determined that there are five confirmed roosting sites for black cockatoo species within five kilometres of the application area, with the closest site being located 240 metres north west of the application area. Five opportunistic sightings of black cockatoo species have also been recorded within five kilometres of the application area. The fauna survey recorded the presence of several Carnaby's black cockatoo individuals approximately 40 metres east of the application area, resting in *Banksia* sp. trees and feeding on their cones (Strategen Environmental, 2018a). There was extensive evidence of foraging on *Banksia* cones observed throughout the application area, with the most mature *Banksia* trees having freshly chewed cones beneath them (Strategen Environmental, 2018a). *Banksia* trees formed the predominant black cockatoo foraging habitat and were widespread across the larger survey area (Strategen Environmental, 2018a).

Loss of nesting habitat, together with foraging habitat and water sources within 12 kilometres of nesting sites is one of the key threatening processes contributing towards the decline of Carnaby's cockatoo (Saunders and Ingram, 1998; Parks and Wildlife, 2013). Noting the application area occurs in an extensively cleared area, contains high quality suitable foraging habitat that is being actively utilised, is located approximately one kilometre east of a permanent waterbody, and two suitable breeding trees occur immediately adjacent to the application area, the proposed clearing is considered to represent significant foraging habitat for black cockatoo species.

Black cockatoos breed in large hollow-bearing trees, generally within woodlands or forests or in isolated trees (Commonwealth of Australia, 2012). These species nest in hollows in live or dead trees of karri (*Eucalyptus diversicolor*), marri, wandoo, tuart (*Eucalyptus gomphocephala*), salmon gum (*Eucalyptus salmonophloia*), jarrah, flooded gum, York gum (*Eucalyptus loxophleba*), powder bark (*Eucalyptus accedens*), bullich (*Eucalyptus megacarpa*) and blackbutt (*Eucalyptus* spp.) (Commonwealth of Australia, 2012). To be suitable as a black cockatoo breeding site, trees require a suitable nest hollow or need to be of a suitable diameter at breast height (DBH) to develop a nest hollow. For most tree species, a suitable DBH is 500 millimetres (Commonwealth of Australia, 2012). The fauna survey identified the presence of 10 potential breeding trees with a DBH over 500 millimetres within the larger survey area, with two containing hollows suitable for breeding by black cockatoo species (Strategen, 2018a). Both suitable nesting trees were located outside of the revised application area, with the closest breeding tree being located approximately 20 metres east from the proposed clearing.

The South-western brush-tailed phascogale and brush tailed phascogale are classified as 'fauna that is of special conservation need as conservation dependent fauna' under the WC Notice (DEC, 2012a). The preferred habitat for both species in Western Australia is within dry sclerophyll forests and open woodlands that contain hollow-bearing trees. Noting the vegetation within the application area, suitable habitat for both species occurs within the application area. However, noting there were no hollow bearing trees observed within the application area during the fauna survey, the application area is not likely to represent significant breeding habitat for these species (Strategen, 2018a).

The WRP is classified as 'fauna that is rare or likely to become extinct as critically endangered fauna' under the WC Notice and is listed as Vulnerable under the EPBC Act. Since colonial settlement, there has been a significant decline in the species

abundance and habitat range, where up to 90 per cent have disappeared from their predicted original range (Parks and Wildlife, 2017). The highest densities of the WRP occur on the Swan Coastal Plain and in south coast areas. The Swan Coastal Plain population of WRP has undergone a substantial range contraction since the early 1990s, which is predominantly due to habitat loss and fragmentation from clearing for urban development and mining (Parks and Wildlife, 2017). Three key management zones have been identified in the WRP Recovery Plan as areas known to currently, or previously support large numbers of WRPs and are considered the most important extant populations at present. The key management zones identified currently are the 'Swan Coastal Plain zone', 'Southern Forest zone' and the 'South Coast zone' (Parks and Wildlife, 2017). The application area falls within the 'Swan Coastal Plain zone', described as the 'peppermint woodlands of and peppermint/tuart forests on the southern extremity of the Swan Coastal Plain, extending from the north of Bunbury to Augusta, but principally around Busselton' (Parks and Wildlife, 2017).

The populations of WRP that occur within the 'Swan Coastal Plain management zone' are associated with stands of myrtaceous trees (usually peppermint trees (*Agonis flexuosa*)) growing near swamps, watercourses or floodplains (Parks and Wildlife, 2017). Vegetation communities critical to WRP include long unburnt mature remnants of peppermint (*Agonis flexuosa*) woodlands with high canopy continuity, high nutrient foliage availability for food and habitat connecting patches of remnants (Parks and Wildlife, 2017). The fauna and nocturnal survey's undertaken by Strategen confirmed that all of the application area represents WRP habitat, given the semi-dominance of *Agonis flexuosa* and the well-connected canopy layer that provides connectivity between tree crowns (Strategen, 2018a; and Strategen 2018b). The application area is considered to be a remnant patch of WRP habitat surrounded by high density residential development.

Evidence of WRPs utilising the application area was identified during a previous site inspection of the site undertaken in 2011 in the form of dreys and scats (DEC, 2011). Given this, the applicant was required to undertake a targeted fauna survey to determine the size and distribution of the local WRP population, as well as the significance within the application area for the persistence of WRP in the local area. WRPs were positively identified as foraging and living within the survey area with four drey's (three recorded within *Agonis flexuosa* and one recorded in a Banksia) being recorded during the fauna survey (Strategen, 2018a). WRP scats were observed under all the dreys associated to *Agonis flexuosa* and under a large number of Banksia trees throughout the survey area (Strategen, 2018a). All four dreys have been recorded outside of the application area, with the closest drey being approximately 50 metres east of the proposed clearing.

Noting the presence of dreys and scats in the survey area, a WRP nocturnal survey was conducted by Strategen Environmental on 27 November 2018 to determine the size of the local WRP population utilising the area (Strategen Environmental, 2018b). The survey included the remainder of the school grounds and adjacent Lot 789 (Strategen Environmental, 2018b). The nocturnal survey recorded a total of six WRP individuals utilising the survey area, with two of the observations including two WRP together in one tree (Strategen Environmental, 2018b). All WRP observations were within the survey area, with no individuals observed in the school grounds and adjacent Lot 789. There were no observations identified within the revised application area, however there was one WRP sighting recorded immediately south of the proposed clearing in the narrow strip of vegetation located adjacent to Jeffrey Road reserve.

Although there were no WRP individuals or drey's recorded within the application area, the results of the fauna and nocturnal surveys indicate that the 0.24 hectare application area forms part of a patch of remnant native vegetation that provides significant habitat for a resident local population of WRP's. Noting the patch of remnant vegetation is one of the very small remnant patches of habitat remaining in an area surrounded by high density residential development, the application area is considered to be significant by enabling the persistence of the species in this locality. Therefore, the proposed clearing is likely to degrade this intact patch of remnant vegetation through WRP displacement and a reduction in the size of WRP habitat for this local population. A management condition has been imposed on the clearing permit requiring a pre-clearing inspection of the application area to identify the presence of WRP and relocation of individuals to suitable habitat should they be identified. An additional condition has been imposed to require slow, directional clearing from west to east to allow fauna to move into adjacent native vegetation ahead of the clearing activity.

Chuditch are classified as 'fauna that is rare or is likely to become extinct as vulnerable fauna' under the WC Notice. Chuditch are present in approximately five per cent of their former range, with most chuditch now found in varying densities in jarrah forests and woodlands in the south west corner of Western Australia, in woodlands, mallee shrublands and heaths along the south coast, east to the Ravensthorpe area, and at lower densities in drier woodland and mallee shrubland in the Wheatbelt and Goldfield regions (DEC, 2012b). Chuditch require large areas of intact habitat to survive and are rarely found where habitat is severely fragmented by clearing, except as transient visitors. Some scattered horizontal logs were observed within the application area during DEC's site inspection which may provide suitable habitat for this species (DEC, 2011). However, it is not likely the application area would provide significant habitat noting the predominant vegetation type under application.

The habitat type within the application area may provide suitable foraging habitat for the peregrine falcon. Although suitable habitat was identified within the application area, it is not likely the proposed clearing will significantly impact on the conservation status of this species given the species is a highly mobile avian species with an extremely wide home range and habitat suitability.

Given the application area contains significant habitat for black cockatoos and WRP's, the proposed clearing is at variance with this Principle.

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.

Proposed clearing is not likely to be at variance with this Principle

A search of DBCA's threatened flora database revealed records of six threatened flora species within the local area. Noting the habitat requirements of the threatened flora species recorded in the local area, the application area may support suitable habitat for two of the six flora species.

The closest known record of threatened flora is *Diuris drummondii*, located approximately 2.8 kilometres south west of the application. This species is a tuberous, perennial herb that grows to between 0.5 to 1.05 metres high and prefers a habitat of low-lying depressions and swamps (Western Australian Herbarium, 1998-). The record of this species was identified within black sandy loam soils. Noting the vegetation type described under Section 2', and the absence of low-lying depressions or swamps within the application area, suitable habitat for this species is not likely to occur within the application area.

Austrostipa bronwenae, *Austrostipa jacobiana* and *Eleocharis keigheryi* have been mapped approximately 3.1 kilometres, 4.8 kilometres and 9.4 kilometres south west of the application area respectively. According to available databases, the preferable habitat for all three threatened flora species is within wetland type environments. Noting the absence of wetland environments within the application area, and the differing soil type under application, it is not likely that these species would occur within the application area.

The application area may provide suitable habitat for *Caladenia huegelii* and *Drakaea micrantha* recorded 9.7 kilometres north east and 9.7 kilometres south of the application area respectively. *Caladenia huegelii* is a tuberous herb that flowers between September to October and prefers grey or brown sand, or clay loam soils (Western Australian Herbarium, 1998-). Records within the local area are from 1993 and 2010. *Drakaea micrantha* is a tuberous perennial herb that also flowers between September to October and has a preference for white-grey sand (Western Australian Herbarium, 1998-). This record was identified in 2008 recorded within Banksia woodland with low heathland and Spearwood thickets. Noting the habitat requirements of *Caladenia huegelii* and *Drakaea micrantha*, suitable habitat may occur within the application area for both species.

The flora and vegetation survey conducted by Strategen Environmental flora and DEC's site inspection did not record any threatened flora species within the application area (Strategen Environmental, 2019; and DEC, 2011). Although the flora and vegetation survey and site inspection were undertaken outside of the optimum flowering time, noting the degraded (Keighery, 1994) condition of the understorey and that no new records of these species that have been recorded within the local area since DEC's site inspection, it is not likely that these species would occur within the application area.

Given the above, the proposed clearing is not likely to be at variance with this Principle.

(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

Proposed clearing is not likely to be at variance with this Principle

The flora and vegetation survey undertaken by Strategen Environmental (2019) did not identify any state listed TEC's within the application area.

Given the above, the proposed clearing is not likely to be at variance with this Principle.

(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Proposed clearing is at variance with this Principle

The national objectives and targets for biodiversity conservation in Australia has a target to prevent clearance of ecological communities with an extent below 30 percent of that present pre-1750, below which species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia, 2001).

As indicated in Table 1, the mapped Swan Coastal Plain 'Southern River' vegetation complex retains 18.4 per cent native vegetation (Government of Western Australia, 2019). The local area (10 kilometre radius) retains approximately 19 per cent (4,535.42 hectares) native vegetation cover.

Despite the predominantly degraded (Keighery, 1994) condition of vegetation within the application area, based on the extent of vegetation remaining in the local area and that the application area contains significant habitat for WRPs and black cockatoo species, the application area is considered to be a significant remnant within an extensively cleared area.

Given the above, the proposed clearing is at variance with this Principle.

Table 1: Vegetation extents

	Pre-European (ha)	Current Extent (ha)	Remaining (%)	Current Extent in all DBCA managed lands (ha)	Extent remaining in all DBCA managed lands (proportion of Pre-European extent) (%)
IBRA Bioregion*					
Swan Coastal Plain	1,501,222	578,997.4	38.6	222,766.5	14.8
Swan Coastal Plain Complex**					
Southern River Complex	58,781.5	10,828	18.4	935.1	1.6

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Proposed clearing is not likely to be at variance with this Principle

According to available databases, there are no mapped watercourses or wetlands within the application area. The closest mapped hydrological feature is a multiple use Palusplain located approximately 90 metres west of the application area. A major perennial river known as the 'Preston River' is mapped approximately one kilometre west of the application area.

The flora and vegetation survey and site inspection undertaken by DEC officers in 2011 did not identify any drainage lines or wetlands within the application area, and the vegetation type identified within the application area is not considered to be riparian (Strategen, 2019; and DEC, 2011).

Given the above, the vegetation within the application area is unlikely to be growing in, or in association with a watercourse or wetland environment, and the proposed clearing is not likely to be at variance with this Principle.

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Proposed clearing is not likely to be at variance with this Principle

As described under Section 2, the application area is mapped within the mapped soil type 'Spearwood S2c Phase' which is described as lower slopes (1-5%) of dune ridge with bleached or pale sands with a yellow-brown or pale brown subsoil (like S1c), that usually occurs on the eastern edge of the Spearwood dunes (Schoknecht et al., 2004). The sandy soils within the application area are highly susceptible to wind erosion.

Noting the sandy soils within the application area, the proposed clearing may increase the risk of land degradation in the form of wind erosion between the period of clearing and development. However, given the small size of the application area and the proposed end land use, the risk of appreciable land degradation is likely to be minimal.

The risk of land degradation in the form of water erosion as a result from the proposed clearing is considered to be low, given the highly permeable soils within the application area which typically have high infiltration rates and given the absence of hydrological features within the application area.

Salinity levels within the application area is mapped at between 500 and 1000 milligrams per litre total dissolved solids. Noting these low salinity levels, the proposed clearing is unlikely to result in land degradation as a result of salinity.

Given the above, the proposed clearing is not likely to be at variance with this Principle.

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Proposed clearing is not likely to be at variance with this Principle

According to available databases, there are no mapped conservation areas within or adjacent to the application area. The closest conservation area is an un-named reserve located approximately 1.9 kilometres south west of the application area. The Leschenault Peninsula Conservation Park (A class Reserve) is mapped approximately four kilometres north of the application area.

Noting the application area and the conservation areas that occur within the local area are separated by high density residential development, it is not likely the proposed clearing will impact upon the environmental values of this reserve, nor will it fragment an ecological corridor necessary for the movement of fauna between conservation areas.

Given the above, the proposed clearing is not likely to be at variance with this Principle.

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

Proposed clearing is not likely to be at variance with this Principle

As discussed under Principle (f), the closest mapped hydrological feature to the application area is a multiple use Palusplain located approximately 90 metres west of the application area. No drainage lines or wetlands were identified within the application area during the flora and vegetation survey and DEC's site inspection (Strategen, 2018a; DEC, 2011).

Given the distance to the closest wetlands or watercourses, and the presence of permeable soils within the application area, the proposed clearing is not likely to impact on the water quality of the above mentioned wetlands via sedimentation or other hydrological changes.

Groundwater salinity within the application area is mapped at between 500 and 1000 milligrams per litre total dissolved solids, which is considered marginal. Noting this, and the extent of the application area, it is not likely the proposed clearing will deteriorate the quality of surface and/or groundwater via increased salinity.

Given the above, the proposed clearing is not likely to be at variance with this Principle.

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Proposed clearing is not likely to be at variance with this Principle

As discussed under Principles (g) and (i), the soils mapped within the application area are sandy soils and are considered to be highly permeable. Noting this, the extent of the proposed clearing and the lack of hydrological features within the application area, the proposed clearing is not likely to result or exacerbate the incidence or intensity of flooding.

Given the above, the proposed clearing is not likely to be at variance with this Principle.

Planning instruments and other relevant matters.

The applicant was granted development approval by the City of Bunbury for the proposed development (car park – stage 1, Jeffrey Road) on 31 July 2018 (Acts Global Churches Limited, 2019). The applicant amended the original application from 1.3 hectares to 0.24 hectares on 17 April 2019 to coincide with the approved plan of the development approval which is for the first stage of the development being for the construction of a car park.

No Aboriginal sites of significance have been mapped within the application area.

The clearing permit application was advertised on the DWER website on 3 October 2018 with a 21 day submission period. No public submissions were received in relation to this application.

5. Assessment of suitability of proposed offset

Comments After taking into account the applicant's avoidance and mitigation measures, the significant residual environmental impact to native vegetation identified through this assessment is based on the application area comprising 0.24 hectares of vegetation which is significant foraging habitat for black cockatoos, significant habitat for WRP and is significant remnant of native vegetation in an extensively cleared landscape.

To counterbalance the residual environmental impact of the proposed clearing, the applicant proposed an offset comprising 1.1 hectares of revegetation within 10 kilometres of the application area. The offset site is located within Crown Reserve 46225 (Lot 6055), Australind. The offset planting will comprise of species similar to those impacted upon within the clearing area and will be managed by the Permit Holder for a period of at least 4-5 years before the offset site is ceded to the Department of Biodiversity Conservation and Attractions (DBCA) who have agreed to manage the offset area subject to conditions. The offset site is currently vested with the Department of Planning, Lands and Heritage (DPLH) and as a part of a regional parks program will be transferred and vested with DBCA and managed for conservation. The offset site is currently in a degraded to completely degraded (Keighery, 1994) condition and consists of some scattered native vegetation. Based upon the applicant's criteria for the revegetation, the condition of the offset site is anticipated to be improved from its current condition to a good (Keighery, 1994) condition.

DBCA have provided endorsement of the offset and associated revegetation plan and will inspect the revegetation site to ensure completion criteria have been met prior to the site being ceded to DBCA for reservation into conservation estate. DPLH have also provided consent for the commencement of revegetation activities at the offset site subject to:

- The activities being conducted in accordance with a DBCA approved revegetation plan;
- Notification being provided to DPLH prior to entry on to the lands;
- DBCA having the opportunity to issue and procedures or conditions prior to entry (Accendo, 2020)

Assessment of the suitability of the applicant's proposed offset was undertaken using the former DotEE's Offset Assessment Guide. This calculation indicated that the minimum spatial offset to be achieved through revegetation is approximately 1.1 hectares.

6. References

- Accendo (2020) Revegetation management plan – Crown Reserve 46225 (Lot 6055), Australind (DWER Ref: A1956503)
- Acts Global Churches Limited (2018) Application and supporting documentation provided for clearing permit application CPS 8182/1, Acts Global Churches Limited (DWER Ref: A1714708).
- Acts Global Churches Limited (2019) Notice of determination on application for application for development approval for car park – Stage 1 (Jeffrey Road). City of Bunbury, Western Australia (DWER Ref: A1782680).
- Commonwealth of Australia (2001) National Objectives and Targets for Biodiversity Conservation 2001-2005, Canberra.
- Commonwealth of Australia (2012) EPBC Act referral guidelines for three threatened black cockatoo species, Canberra.
- Department of Biodiversity, Attractions and Conservation (DBCA) (2007-) Naturemap: Mapping Western Australia's Biodiversity. Department of Parks and Wildlife, Perth. <http://naturemap.dpaw.wa.gov.au/default.aspx> (Accessed December 2018).
- Department of Environment Conservation (DEC) (2011) Site Inspection Report for Clearing Permit Application CPS 4384/1, Lot 36 and 120 Vittoria Road, Bunbury. Site inspection undertaken 27 June 2011. Department of Environment and Conservation, Western Australia (DEC REF: A410619).
- Department of Environment Conservation (DEC) (2012a) Fauna Profile: Brush-tailed Phascogale (Phascogale tapoatafa). Department of Environment Conservation, Western Australia.
- Department of Environment and Conservation (DEC) (2012b) Chuditch (Dasyurus geoffroi) Recovery Plan. Wildlife Management Program No. 54. Department of Environment and Conservation, Perth, Western Australia.

Department of Environment and Conservation (DEC) (2012c) Quenda *Isoodon fusciventer* (Shaw 1797). Department of Environment and Conservation, Western Australia. Accessed via https://www.dpaw.wa.gov.au/images/documents/conservation-management/pests-diseases/quenda_2012.pdf

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Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.

Saunders, D.A. and Ingram, J.A. (1998) Twenty-eight years of monitoring a breeding population of Carnaby's cockatoo. *Pacific Conservation Biology*, 4: 261-270.

Schoknecht, N., Tille, P. and Purdie, B. (2004) Soil-landscape mapping in South-Western Australia – Overview of Methodology and outputs' Resource Management Technical Report No. 280. Department of Agriculture.

Strategen Environmental 2018 (a) Fauna survey and EPBC Act Referral Advice. Grace Christian School. October, 2018. Strategen Environmental, Western Australia (DWER Ref: A1782675).

Strategen Environmental 2018 (b) Nocturnal Western Ringtail Possum Survey. Grace Christian School. December 2018. Strategen Environmental, Western Australia (DWER Ref: A1782675).

Strategen Environmental (2019) Grace Christian School. Flora and Vegetation Assessment. May 2019. Strategen Environmental, Western Australia (DWER Ref: A1800888).

Threatened Species Scientific Committee (2016). Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain Ecological Community. Canberra: Department of the Environment and Energy. Available from: <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/131-conservation-advice.pdf>

Western Australian Herbarium (1998-) FloraBase - The Western Australian Flora. Department of Parks and Wildlife. <http://florabase.dpaw.wa.gov.au/> (Accessed 27/06/2019).

GIS Databases:

- Aboriginal Sites of Significance
- Department of Biodiversity, Conservation and Attractions, Tenure
- Conservation managed reserves
- Hydrography, COG Hydro
- Hydrography, General Hydro
- Hydrography, Wetlands
- Land degradation risk categories
- SAC bio-datasets