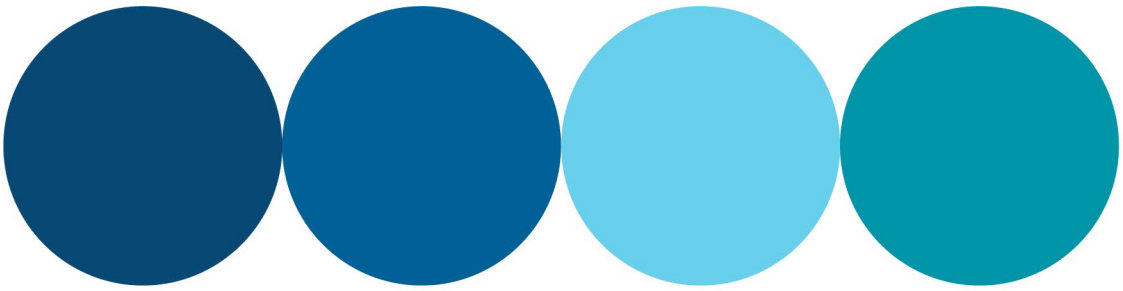
Alkimos Seawater Desalination Plant

Draft Offset Strategy

September 2022



WATER CORPORATION

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1 Introduction

Water Corporation has developed this Offset Strategy as part of the Environmental Review Document (ERD) – Public Review for the proposed Alkimos Seawater Desalination Plant (ASDP) project, Revision 6 (Water Corporation, August 2022).

The ASDP ERD indicates a significant residual impact may result through the implementation of the Proposal on the Flora and Vegetation and Terrestrial Fauna Environmental Factors.

The purpose of this Offsets Strategy is to identify and quantify the potential significant residual impacts to the Flora and Vegetation and Terrestrial Fauna Environmental Factors and outline the preliminary approach to counterbalance these impacts consistent with the Western Australian (WA) Environmental Offsets Policy (Government of Western Australia, 2011) and Commonwealth EPBC Act environmental offsets policy (Australian Government, 2012).

This Offset Strategy is limited to the consideration of Flora and Vegetation and Terrestrial Fauna Environmental Factors.

The objectives of this strategy are to:

- Describe the potential significant residual environmental impacts to State listed environmental values and Matters of National Environmental Significance (MNES) through an assessment of the environmental factor guidelines Flora and Vegetation and Terrestrial Fauna.
- Estimate the quantity of offsets that may be required to meet regulatory guidelines using the WA Environmental Offsets Template (Government of Western Australia 2014b) and/or the Commonwealth Offsets Assessment Guides (Australian Government 2012b).
- Identify the proposed strategy to counterbalance the Proposal's significant residual environmental impacts in accordance with State and Commonwealth environmental offsets policy and guidance.

This strategy has been developed to meet the offset requirements prescribed under the Commonwealth and WA associated policies and guidelines as listed in Section 1.2.

The proposed offset options have been selected to be permanent, achievable and provide a long-term strategic outcome that benefits both the environment and the land manager. The Offset Strategy will be updated to meet the conditions and other associated requirements of the *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) and WA *Environmental Protection Act 1986* (EP Act).

1.1 Proposal Description

The Water Corporation of Western Australia (Water Corporation) plans to build and operate the Alkimos Seawater Desalination Plant Project (ASDP) (the Proposal). The Proposal comprises the Seawater Desalination Plant (SDP) including marine works and infrastructure, Groundwater Treatment Plant (GWTP) and an associated 33.5 km long pipeline connecting the desalination plant to the Wanneroo Reservoir with a spur pipeline to the Carabooda Tank. The Proposal comprises three areas, as shown in Figure 1.

- A 12.2 ha Marine Development Envelope (MDE) with a maximum direct impact footprint of 2.3 ha of benthic communities and habitat (BCH) within the disturbance footprint of 8.38 ha.

  Marine infrastructure will be installed using tunnel boring machines, consisting of a 2.9 km seawater intake pipeline and a separate 4.4 km of brine outfall pipeline, installed using a Tunnelling Boring Machine, with both pipelines terminating in a pair of vertical risers.
- A 29 ha Seawater Desalination Plant Development Envelope (SDP DE), with a maximum disturbance of 29 ha, including an impact footprint of 24.15 ha.

  The SDP DE includes the Seawater Desalination Plant (SDP), Groundwater Treatment Plant (GWTP), pilot plant, site earthworks, western berm construction, marine tunnel boring machine launch pit, intake / outfall structures, membrane filtration building, reverse osmosis building, water treatment facilities, water storage tanks, access roads, support buildings and ancillary infrastructure.
- A 99.3 ha Pipeline Development Envelope (PDE) with a maximum disturbance of 53.4 ha, including an impact footprint of 20.4 ha, including:

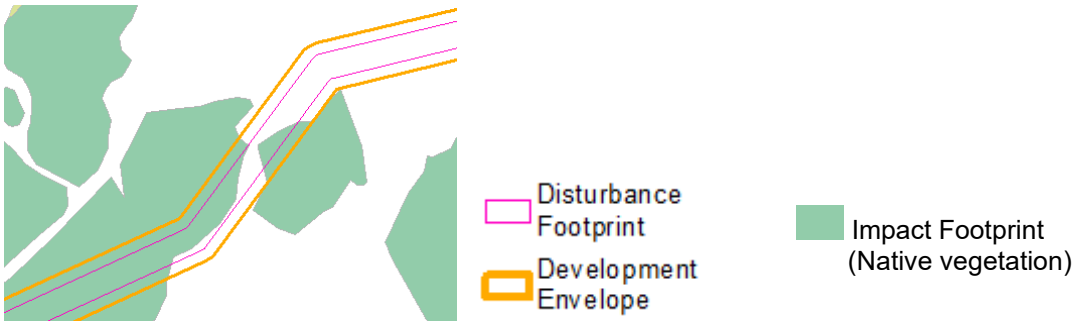
  A 33.5 km long pipeline running from the SDP DE to the Wanneroo Reservoir and into the IWSS, with a spur pipeline to the Carabooda Tank. The pipeline corridor will be 30 m wide, however the maximum impact footprint for the pipeline will not exceed 16 m.

1.1.1 Definitions

Development Envelope - the maximum area within which the proposal footprint will be located.

Disturbance Footprint - location within which the physical proposal elements will occur.

Impact Footprint – impacts to environmentally significant areas



1.2 Regulatory Requirements

1.2.1 Legislative and Policy Context

The significant residual environmental impacts of the Proposal and appropriate offsets to counterbalance these impacts were identified and assessed in accordance with the following legislation, policies and guidelines:

- *Environmental Protection Act 1986* (EP Act).
- WA Environmental Offsets Policy (Government of Western Australia 2011).
- WA Environmental Offsets Guidelines (Government of Western Australia 2014a).
- EPBC Act Environmental Offsets Policy (Australian Government 2012a), and
- Commonwealth Offsets Assessment Guide (Australian Government 2012b).

1.2.2 Environment Protection and Biodiversity Conservation Act 1999

The Water Corporation referred the Proposal to the Commonwealth's Department of Environment and Energy (DoEE – now Department of Climate Change, Energy, the Environment and Water (DCCEEW) - formerly Department of Agriculture, Water and Environment; EPBC referral no. 2019/8453) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in July 2019. The Proposal was determined to be a 'Controlled Action' by a delegate of the Commonwealth Minister for the EPBC Act as it will, or is likely to have, a significant impact on the following Matters of National Environmental Significance (MNES):

- Listed threatened species and communities (section 18 and 18A); and
- Listed migratory species (sections 20 & 20A).

On 4 March 2020, it was also determined that the Proposal could be assessed by accredited assessment under the State and Commonwealth's Bilateral Agreement.

1.2.3 Environmental Protection Act 1986

The Water Corporation referred the Proposal to the WA Environmental Protection Authority (EPA) in accordance with Section 38 of the EP Act in May 2019 (EPA Assessment 2210). The EPA set the level of assessment as an Environmental Review Document (ERD) (4 weeks public comment) and that the following were preliminary environmental factors:

- Sea
  - Marine Environmental Quality
  - Benthic Communities and Habitats
  - Marine Fauna
- Land
  - Landforms
  - Flora and Vegetation

  - Terrestrial Fauna
- Air
  - Greenhouse Gas Emissions
- People
  - Social Surroundings

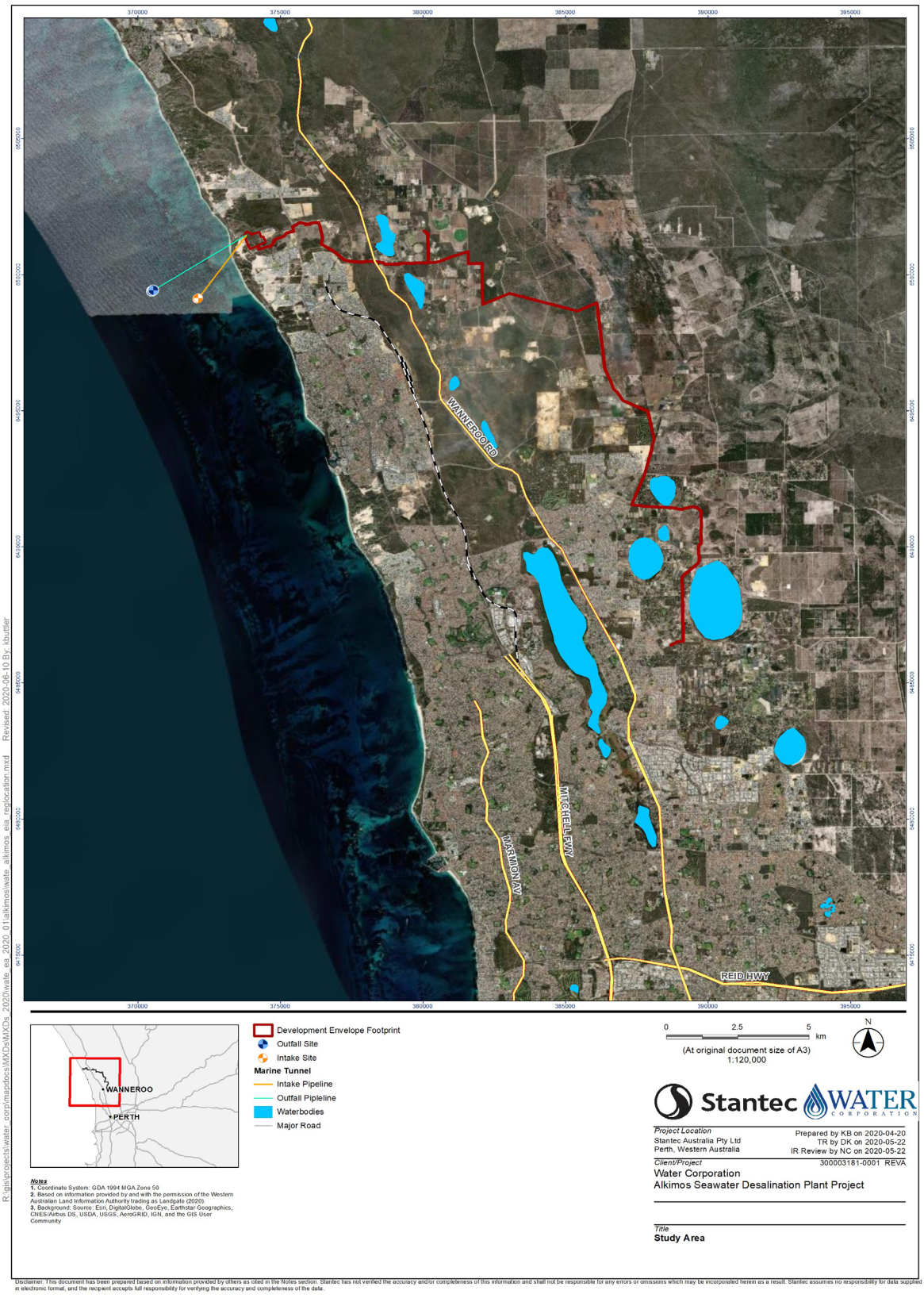


Figure 1: Proposal Overview

2 Significant Residual Environmental Impacts

Clearing of vegetation will be required to facilitate the construction of the SDP and Pipeline.

Following the application of avoidance, minimisation and mitigation measures, there are several activities associated with the Proposal that have the potential to impact the environment, including impacts to EPBC Act and BC Act listed species and communities including:

- Banksia Woodland Threatened Ecological Community (TEC) / Priority Ecological Community (PEC) (Banksia Woodlands TEC / PEC), (Includes 1.14 ha of FCT20a and FCT 28 *Banksia attenuata* woodlands over species rich dense shrublands)
- Tuart (*Eucalyptus gomphocephala*) woodlands and forest of the Swan Coastal Plain TEC (Cr),
- *Melaleuca huegelii-Melaleuca systena* shrublands on limestone ridges SCP26a (En), and
- Black Cockatoo species (Carnaby's Cockatoo *Zanda latirostris* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*).

These impacts to terrestrial conservation values as a result of construction of the Proposal are summarised in Table 2-1, including impact to areas identified as Bush Forever sites and areas of Public Purposes (reserved for conservation).

Table 2-1: Area of Terrestrial Conservation Values Impacted by the Proposal

Vegetation / Habitat / Conservation Area	Listing		Proposal Total Impact
	EPBC Act	BC Act	
Banksia Woodlands of the Swan Coastal Plain	TEC (Endangered)	PEC (P3) FCT 20a	2.32 ha (Includes 1.14 ha of vegetation consistent with FCT 20a and 28)
Tuart (*Eucalyptus gomphocephala*) woodlands and forest of the Swan Coastal Plain	TEC (Critically Endangered)	PEC (P3)	0.89 ha
Melaleuca huegelii-Melaleuca systena shrublands on limestone ridges (FCT 26a)		TEC (En)	0.73 ha
Bush Forever			9.73 ha
Impacts to Public Purposes (reserved for conservation) areas within Alkimos Water Precinct.			4.41 ha - 4.12 ha within the Area 10b, and - 0.29 ha within Area 9a and 10a.
Carnaby's Cockatoo Foraging habitat (Very High and High Quality)	Endangered	Endangered	43.3 ha
Forest Red Tailed Black Cockatoo Foraging habitat (Very High and High Quality)	Vulnerable	Vulnerable	43.3 ha
Black Cockatoo species - Significant trees			129 trees

2.1 Banksia Woodlands of the Swan Coastal Plain

The Alkimos SDP Proposal will result in the clearing of no more than 2.32 ha of Banksia Woodlands of the Swan Coastal Plain ecological community' Threatened Ecological Community (TEC) as shown in Figure 2.

Banksia Woodlands of the Swan Coastal Plain was listed in September 2016 as an Endangered TEC under the EPBC Act.

The 'Banksia dominated woodlands of the Swan Coastal Plain IBRA region' PEC is also listed as Priority 3 by the WA Department of Biodiversity, Conservation and Attractions (DBCA). The PEC differs from the TEC in that it has no minimum condition and patch size thresholds. For this plan, there are no areas of the PEC within the development envelope that extend beyond the boundary of the Banksia Woodlands TEC.

The Proposal involves the clearing of 2.32 ha of Banksia Woodland TEC / PEC vegetation within the development envelope. The composition and condition of the Banksia Woodland in the development envelope is considered to be 'Very Good to Good' condition.

1.14 ha of the total 2.32 ha of vegetation is consistent with the *Banksia attenuata* woodlands over species rich dense shrublands (Swan Coastal Plain Community type 20a) (FCT 20a). FCT 20a was endorsed as 'Endangered' by the WA Minister for Environment in 2001. However, survey results to date (Stantec, 2021) indicate this 1.14 ha of vegetation is analogous to both FCT20a and FCT28. Further surveys are required to confirm the presence of environmental values (FCT20a) likely to be significantly impacted by the proposal.

2.1.1 Significant residual impact

Following consideration of avoidance and mitigation measures to reduce impacts on flora and vegetation, Water Corporation has considered that clearing of the Banksia Woodland TEC / PEC requires provision of an environmental offset to compensate for the significant residual impacts., the Proposal.

2.1.2 Total quantum of impact

Although this TEC is a Commonwealth and State listed community, Water Corporation has used Commonwealth Offset Calculator to quantify the impact of the proposal based on the quality of the vegetation impacted by the Proposal, as shown in Table 2-2.

Table 2-2: Banksia Woodland TEC/PEC area impact calculations

Criteria	Value	Explanation
Impact area (ha)	2.32 ha	The Proposal will result in the clearing of no more than 2.32 ha of Banksia Woodland TEC / PEC within the impact footprint. - 1.14 ha of the 2.32 ha is consistent with FCT 20a.
Quality (scale 0 – 10)	10	The Value of 10 has been applied in the calculator to reflect the majority of the Banksia Woodland TEC / PEC being in Very Good condition.
Total Quantum of Offsets required	2.32 ha	Adjusted based on assessment of quality.

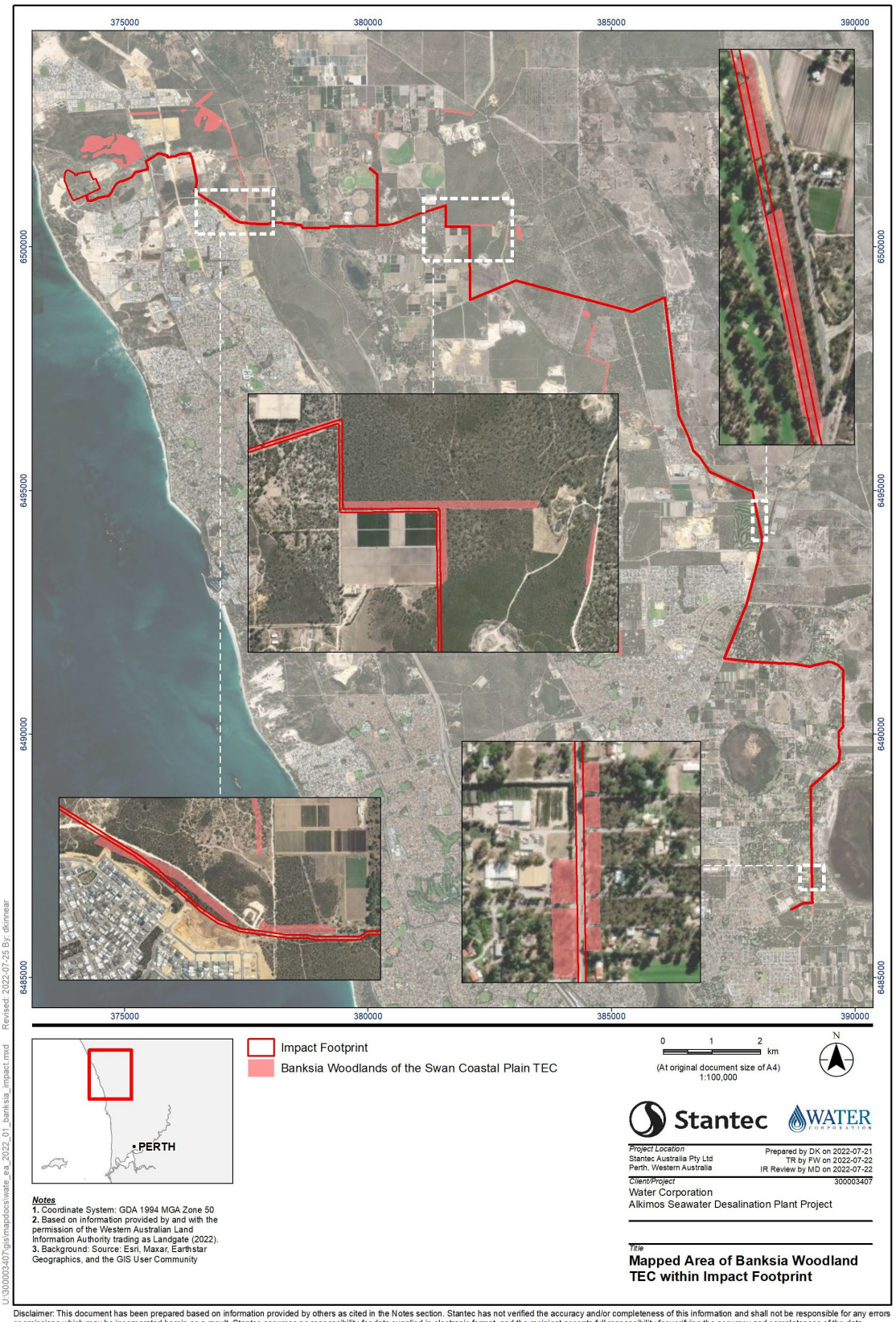


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Figure 2 – Banksia Woodland TEC within footprint

2.2 Tuart (Eucalyptus gomphocephala) woodlands and forest of the Swan Coastal Plain

The Alkimos SDP Proposal will result in the clearing of no more than 0.89 ha of Tuart Woodlands and Forests of the Swan Coastal Plain ecological community' Threatened Ecological Community (TEC) as shown in Figure 3.

The Tuart woodlands and forest of the Swan Coastal Plain is a nationally protected ecological community. It is comprised of woodlands or forests within which the presence of Tuart (*Eucalyptus gomphocephala*) trees in the uppermost canopy are the primary defining feature. The community also often contains other native trees such as Peppermint, Bull Banksia, Candlestick Banksia or Jarrah, with a substantial diversity of understorey plants.

The 'Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community' was listed as a TEC under the EPBC Act in 2019 at the level of 'Critically Endangered' as assessed using the criteria of the IUCN (2015) and guidance of TSSC (2019). This community is also listed as Priority 3 PEC under the WA *Biodiversity Conservation Act 2016*.

2.2.1 Significant Residual Impact

Following consideration of avoidance and mitigation measures to reduce impacts on flora and vegetation, Water Corporation has considered that clearing of the Tuart Woodlands TEC / PEC requires provision of an environmental offset to compensate for the significant residual impacts.

2.2.2 Total Quantum of Impacts

The composition and condition of the Tuart TEC impacted by the proposal is detailed as 'Very good to Good'.

Although this TEC is a Commonwealth and State listed community, Water Corporation has used Commonwealth Offset Calculator to quantify the impact of the proposal based on the quality of the vegetation impacted by the Proposal, as shown in Table 2-3.

Table 2-3: Tuart Woodlands TEC/PEC area impact calculations

Criteria	Value	Explanation
Impact area (ha)	0.89 ha	The Proposal will result in the clearing of no more than 0.89 ha of Tuart Woodlands TEC / PEC within the impact footprint
Quality (scale 0 – 10)	10	The Value of 10 has been applied in the calculator to reflect the majority of the Tuart Woodlands being predominantly in Very Good condition.
Total Quantum of Offsets required	0.89 ha	Adjusted based on assessment of quality.

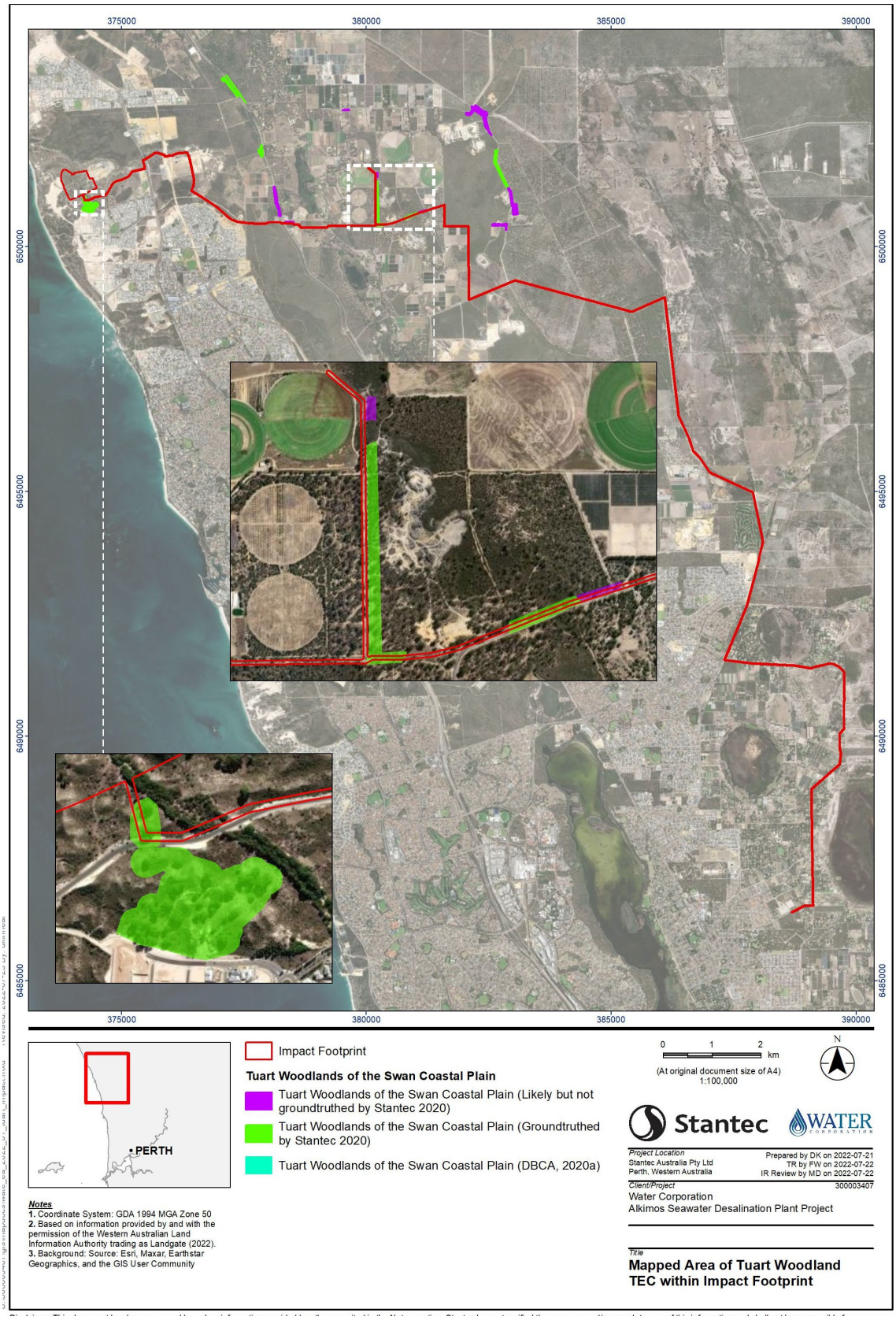

Figure **3** – Tuart TEC within footprint

2.3 *Melaleuca huegelii-Melaleuca systena* shrublands on limestone ridges

The Alkimos SDP Proposal will result in the clearing of no more than 0.73 ha of *Melaleuca huegelii-Melaleuca systena* shrublands on limestone ridges Threatened Ecological Community (TEC) as shown in Figure 4.

The *Melaleuca huegelii-Melaleuca systena* shrublands on limestone ridges community occurs on skeletal soil on limestone ridge slopes and ridge tops north and south of Perth within the Alkimos SDP development envelope.

The community comprises species-rich thickets, heaths and scrubs dominated by *Melaleuca huegelii* (chenille honeymyrtle), *Melaleuca systena* (coastal honeymyrtle) and *Banksia sessilis* (parrot bush) commonly over *Grevillea preissii* (spider net grevillea) and *Acacia lasiocarpa* (pajang). A suite of herbs commonly occurs under the shrub layer. The community is also known as “floristic community type 26a”.

This community is listed as endangered under WA Minister Environmentally Sensitive Areas list in policy. It is highly restricted and known from massive limestone ridges around Yanchep north of Perth, and south of Perth near Lake Clifton.

2.3.1 Significant Residual Impact

Following consideration of avoidance and mitigation measures to reduce impacts on flora and vegetation, Water Corporation has considered that clearing of the Melaleuca TEC requires provision of an environmental offset to compensate for the significant residual impacts on floristic community type 26a.

2.3.2 Total Quantum of Impacts

As this TEC is a state listed community, Water Corporation has used the WA Government Offset Calculator to quantify the impact of the proposal based on the quality of the vegetation impacted by the Proposal, as shown in Table 2-4.

Table 2-4: *Melaleuca huegelii-Melaleuca systena* shrublands on limestone ridges TEC area impact calculations

Criteria	Value	Explanation
Impact area (ha)	0.73 ha	The Proposal will result in the clearing of no more than 0.73 ha of *Melaleuca huegelii-Melaleuca systena* shrublands on limestone ridges TEC (FCT 26a) within the impact footprint
Quality (scale 0 – 10)	10	The Value of 10 has been applied in the calculator to reflect the majority of the TEC (FCT 26a) being in Very Good condition.
Total Quantum of Offsets required	0.73 ha	Adjusted based on assessment of quality.

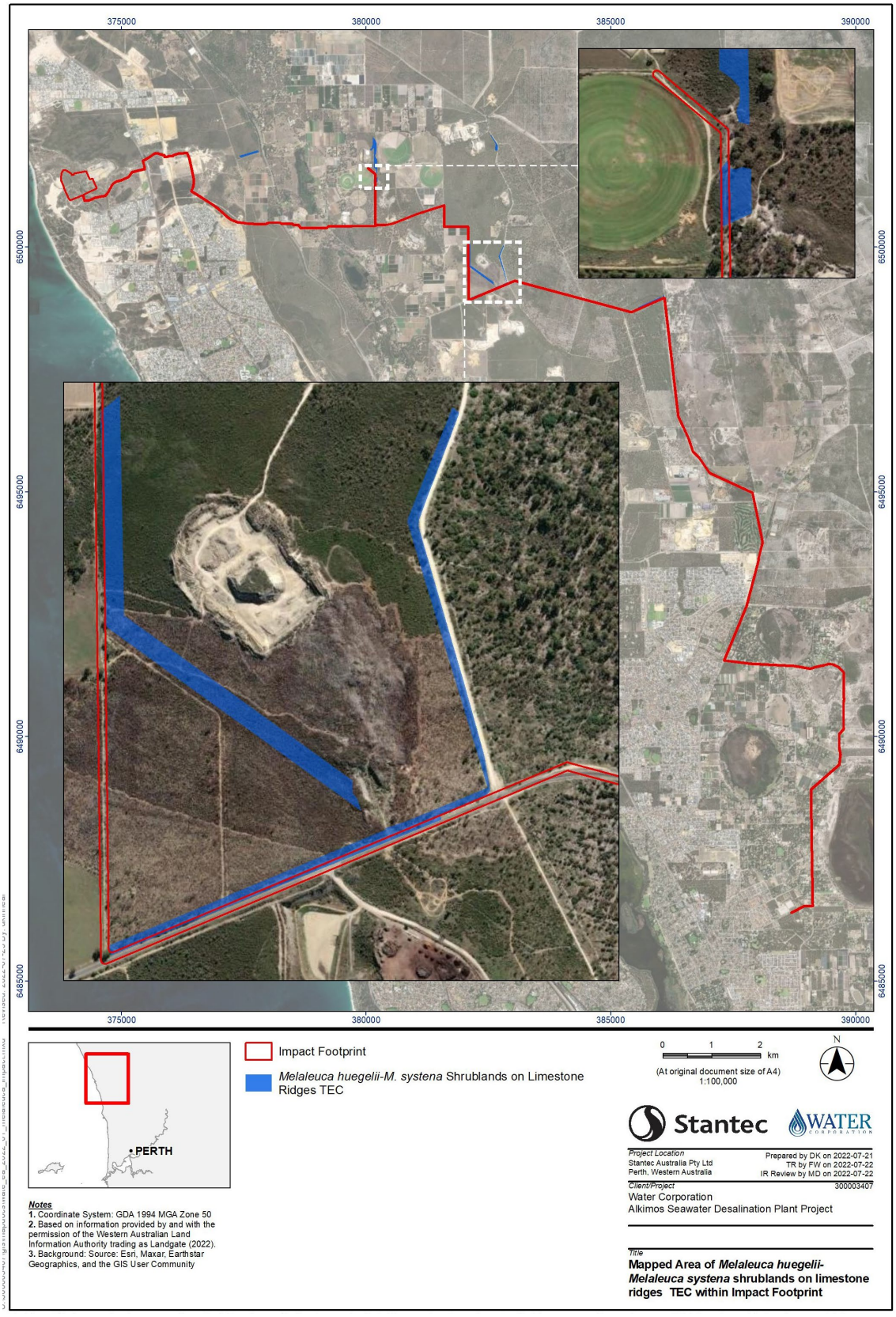

Figure 4 – Melaleuca TEC within footprint

2.4 Bush Forever and Public Purposes Areas (Reserved for Conservation)

The Alkimos SDP Proposal will result in the clearing of no more than 9.73 ha of Bush Forever and 4.41 ha of land zoned Public Purposes (reserved for conservation), as shown in Figure 5 and Figure 6.

Bush Forever is a Western Australian Government strategic plan to protect regionally significant bushland in a number of sites around the Swan Coastal Plain portion of the Perth Metropolitan with an aim to achieve a sustainable balance between conservation of our bushland and development in metropolitan Perth. The Bush Forever Policy was to be implemented as a whole of government initiative designed to identify, protect and manage regionally significant bushland.

Of the 26 vegetation complexes in the Perth Metropolitan Region, seven currently fall below the minimum 10 per cent target retention aimed at by Bush Forever. Bush Forever is the primary mechanism for implementing the Government's commitment to conserve regionally significant bushland in Perth.

Along with the existing wastewater treatment plant, the Alkimos Water Precinct also contains land zoned Public Purposes (reserved for conservation) that were defined during the Metropolitan Regional Scheme amendment 1029/33. The EPA assessment recommended that areas 9a and 10a be protected for conservation purposes to protect the integrity, function and environmental value of the bushland, including the landforms. Area 10b was subsequently added into Ministerial Statement 722 through the appeals determination process but was initially not flagged as containing any significant conservation value.

The proposed construction environmental management framework will manage issues that are likely to impact the Public Purposes (reserved for conservation) areas, such as weed management, dieback.

2.4.1 Significant Residual Impact

Following consideration of avoidance and mitigation measures to reduce impacts on flora and vegetation, Water Corporation has considered that impacts to Bush Forever and Public Purposes (reserved for conservation) Areas from the proposal requires provision of an environmental offset to compensate for the significant residual impacts.

The Bush Forever sites impacted by the project only occur along the pipeline route between the Alkimos SDP and the Wanneroo reservoir. Where the pipeline does intersect Bush Forever sites, this occurs predominantly within road reserves, tracks and cleared areas. On the one occasion where the pipeline route does bisect a vegetated portion of a Bush Forever site, the vegetation impacted is Banksia Woodland TEC (0.95 ha).

Water Corporation acknowledges that the proposed Alkimos SDP Development Envelope details 4.41 ha of overlap with the Public Purposes (reserved for conservation) areas, however, has progressed through the conceptual design process to mitigate permanent impacts and revegetate temporary impact areas. The permanent impact to Public Purposes (reserved for conservation) Area 10b will likely only result in an area of permanent impact of 1.35 ha.

2.4.2 Total Quantum of Impacts

Consideration of offsets for Bush Forever have been considered in accordance with State Planning Policy 2.8 Bushland Policy for the Perth Metropolitan Region (June 2010) as detailed in Table 2-5.

In the absence of specific guidance on offsets for Public Purposes (reserved for conservation) areas, the areas are simply quantified on a hectare basis and detailed in Table 2-5.

Table 2-5: Bush Forever and Public Purposes (reserved for conservation) Area impact calculations

Criteria	Value	Explanation
Bush Forever impact area (ha)	9.73 ha	The Proposal will result in the impact to no more than 9.73 ha within the pipeline impact footprint predominantly within road reserves, tracks and cleared areas.
Public Purposes (reserved for conservation) Area impact (ha)	4.41 ha	The Proposal will result in the impact to no more than 4.41 ha within the ASDP development envelope. - 4.12 ha within the Area 10b, and - 0.29 ha within Area 9a and 10a.

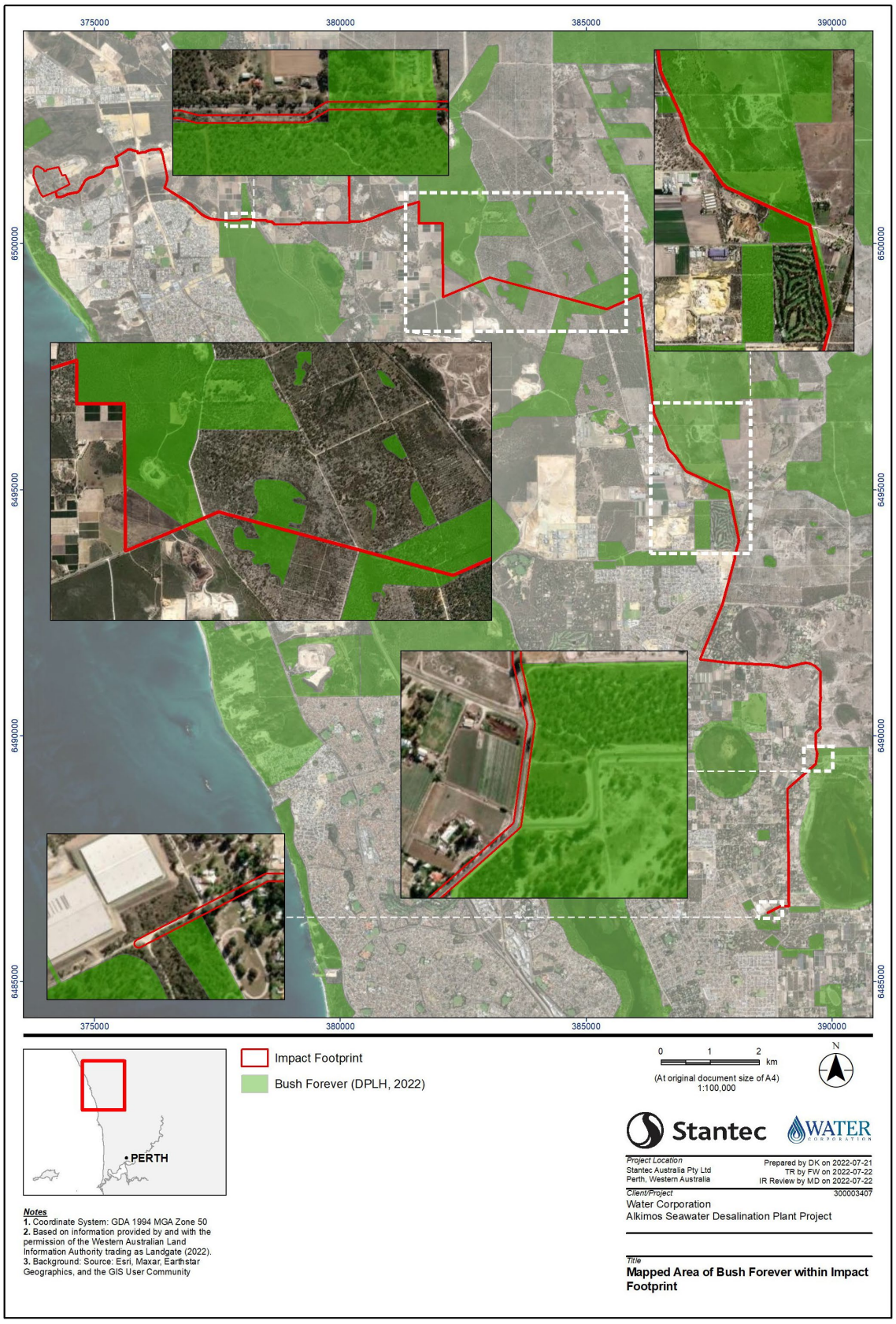

Figure 5 – Bush forever within footprint

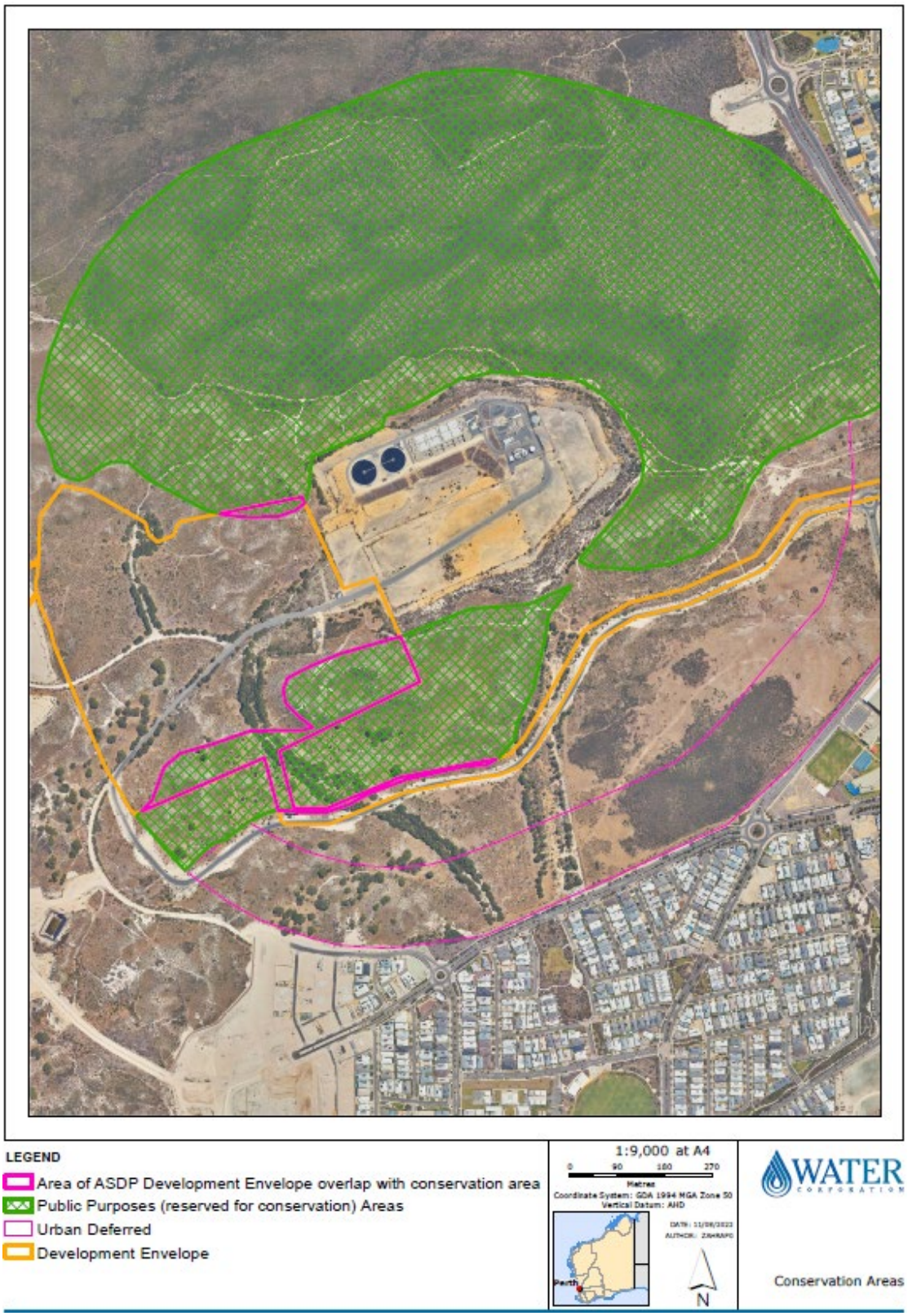

Figure 6 – Impacted Public Purposes (reserved for conservation) Areas

2.5 Black Cockatoos

The Alkimos SDP Proposal will result in the clearing of no more than 43.3 ha of Black Cockatoo foraging habitat within the impact footprint and 129 Potential Black Cockatoo breeding trees, as shown in Appendix B.

Two species of threatened black cockatoo were identified as occurring (foraging evidence) within the Proposal Area during detailed fauna assessment, Carnaby's Cockatoo (*Zanda latirostris*) and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*).

Carnaby's Cockatoo

During the breeding season, Carnaby's Cockatoo forage in native vegetation that surrounds woodlands used for breeding. Breeding habitats (or sites) encompass those areas that contain suitable breeding trees within the range of the species, and associated foraging habitat. Carnaby's Cockatoos nest in the large hollows of tall living or dead Eucalypts. Formerly breeding activity was typically restricted to Eucalypt woodlands mainly in the Wheatbelt, but recent breeding activity records indicate the species has expanded its breeding range west and southward into the Jarrah-Marri forests of the Darling Scarp and into the Tuart forests of the Swan Coastal Plain, including the Yanchep area, Lake Clifton and near Bunbury (Australian Government 2016a).

During the non-breeding season, Carnaby's Cockatoo forage extensively on the Swan Coastal Plain on Banksia woodlands, Seeding Marri and Jarrah, Pine plantations and Native and non-native plants around the Perth metropolitan area (Australian Government 2016a).

Forest Red-tailed Black Cockatoo

Forest Red-tailed Black Cockatoo are endemic to the humid and sub-humid zones of the south-west of Western Australia, generally inhabiting the Jarrah, Marri and Karri forests within the 600mm average rainfall isohyet.

Family groups and small flocks are now also observed on the Swan Coastal Plain throughout the year. The critical breeding habitat for this species is within remnant patches of old Marri (*Corymbia calophylla*) trees within the Northern and Southern Jarrah Forest IBRA sub-regions (Government of Western Australia 2017).

Roost sites are in Jarrah-Marri-Blackbutt habitat generally situated within 4 km of potential feeding sites. They are most often observed in small flocks at dawn or dusk as they leave or return to a roost site. Approximately 90% of the Forest Red-tailed Black Cockatoo diet is made up of Marri (*Corymbia calophylla*) seeds and Jarrah (*Eucalyptus marginata*) fruit, but they will also feed on Blackbutt (*Eucalyptus patens*), Karri (*Eucalyptus diversicolor*), Sheoak (*Allocasuarina fraseriana*), and other non-native species such as the Cape Lilac (*Melia azedarach*) on the Swan Coastal Plain (Government of Western Australia 2017).

Both the Forest Red-tailed and Carnaby's Cockatoos may occur on the site. However, the Forest Red-tailed is only thought to be an irregular visitor as it is understood that there is less potential foraging habitat present.

2.5.1 Significant Residual Impact

Following consideration of avoidance and mitigation measures to reduce impacts to Black Cockatoo foraging habitat and breeding trees, Water Corporation has considered that impacts to Black Cockatoos from the proposal requires provision of an environmental offset to compensate for the significant residual impacts.

2.5.2 Total Quantum of Impacts

The Proposal will also result in the clearing of up to 129 trees with a Diameter Breast Height (DBH) of 50 cm or greater potential nesting trees.

Although both Black Cockatoo species are Commonwealth and State listed matters, Water Corporation has only used the Commonwealth Offset Calculator to quantify the impact of the proposal based on the quality of the vegetation impacted by the Proposal as shown in Table 2-6.

Table 2-6: Black Cockatoo area impact calculations

Criteria	Value	Explanation
Carnaby's Cockatoo habitat Impact area (ha)	43.3 ha	The Proposal will result in the clearing of no more than 43.3 ha of foraging habitat within the impact footprint
Quality (scale 0 – 10)	10	The Value of 10 has been applied in the calculator to reflect the majority of the habitat being in high value condition.
Total Quantum of Offsets required	**43.3 ha**	Adjusted area of offset required, based on assessment of quality
Forest Red-tailed Black Cockatoo habitat Impact area (ha)	43.3 ha	The Proposal will result in the clearing of no more than 43.3 ha of foraging habitat within the impact footprint.
Quality (scale 0 – 10)	10	The Value of 10 has been applied in the calculator to reflect the majority of the habitat being in high value condition.
Total Quantum of Offsets required	**43.3 ha**	Adjusted area of offset required, based on assessment of quality
Potential Black Cockatoo breeding trees (both species)	**129 trees**	The Proposal will result in the clearing of no more than 129 potential breeding trees within the impact footprint

3 Proposed Offset Strategy

The Proposal is currently being assessed under the State and Commonwealth Government's Bilateral Agreement as an accredited assessment, led by the WA EPA.

In accordance with the Bilateral Agreement, Water Corporation understand that the submission of the Environmental Review Document to the WA EPA will initiate inter-departmental consultation between both agencies to determine the requirements for, and quantum of the offset package for the Proposal.

The Offset Strategy will then be further developed once public comments, as State and Commonwealth direction has been received and considered. The Water Corporation supports being engaged early in the process to ensure an appropriate offset package is developed that is proportionate to the residual impacts and achieves real on-ground environmental benefits and improved environmental values of the region.

Water Corporation has pursued a number of options in developing a package of offsets to counterbalance the significant residual impacts quantified in Section 2. These options are detailed in Section 3.1 and 3.2.

3.1 Land Acquisition

3.1.1 Gobby Road Site

Water Corporation is in possession of a freehold land parcel at Lot 1375 Gobby Road, Keysbrook. The site is a rectangular area of 37.12 ha that is naturally vegetated northern jarrah forest, deeply sloped, and incised with Dirk Brook.

The land parcel has substantial landscape and environmental values to offset the significant residual impacts from the Proposal on both Black Cockatoo species.

The values outlined in the Black Cockatoo habitat assessment survey report, provided in Appendix C (360 Environmental, 2021) indicate that the site:

- is within the modelled breeding distribution of the Carnaby's Cockatoo, Forest Red-tailed Black Cockatoo and Baudin's Black Cockatoo,
- contains **611 potential breeding trees** with a DBH of greater than 500 mm,
- of the **611 potential breeding trees**, 157 contain hollows that were of suitable size (>12 cm) for black cockatoo breeding and were further investigated. (55 trees were identified to contain potentially suitable hollows for use by black cockatoo breeding, 12 hollows exhibited evidence of black cockatoo breeding such as chew marks around the hollow entrance,
- **36.47 ha** of very high-quality black cockatoo foraging habitat, comprising predominantly Jarrah and Marri, and
- Is adjacent to a known black cockatoo roosting site that occurs 18 m to the south of the Survey Area in a patch of vegetation that continues into the Survey Area, therefore it is likely that the Survey Area constitutes part of this roosting site.

The Gobby Road site is within the Shire of Serpentine-Jarrahdale and therefore within the Perth Metropolitan Region. The Gobby Road site comprises different habitat and vegetation to the Alkimos Seawater Desalination Plant site, however both sites provide high quality foraging and breeding habitat for both black cockatoo species impacted by the proposal.

This survey was conducted in accordance with the DSEWPaC's (2012) *Referral Gudielines for three threatened Black Cockatoo species; Carnaby's Cockatoo, Baudin's Cockatoo and Forest Red-tailed Black Cockatoo* and DoEE's (2017) *Revised draft referral guideline for three threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black Cockatoo*.

Water Corporation proposes to use the Gobby Road land parcel to offset a portion of the impacts to both Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo foraging habitat, but in particular offsetting significantly more than the project's impact to potential breeding trees from the Proposal. The Gobby Road site meets the habitat needs and breeding tree requirements of both species, therefore is considered to be suitable to be used as an offset for both species.

Discussions are evolving with the Department of Biodiversity Conservation and Attractions (DBCA) in relation to the transfer of land tenure to the State, and subsequent transfer into the Conservation Estate.

Water Corporation is aware that Alcoa's Mineral Lease 1SA (ML1SA) covers the site, however advice from the Department of Jobs, Tourism, Science and Innovation in 2022 confirmed that this Mineral Lease does not impact private or freehold land (of which this site is freehold land owned by Water Corporation).

If necessary, a conservation covenant could be used to secure the asset in perpetuity, prior to transfer to the State.

Table 3-1 details a summary of the values to be offset, and Figure 7 details the location in relation to other State environmental assets (State Forest and National Park).

Table 3-1: Gobby Road offset

Environmental value (listing)	Proposed Offset
Carnaby's Cockatoo foraging habitat **and** Forest Red Tailed Black Cockatoo foraging habitat	**36.47 ha**
Carnaby's Cockatoo breeding trees **and** Forest Red Tailed Black Cockatoo breeding trees	**611 trees**

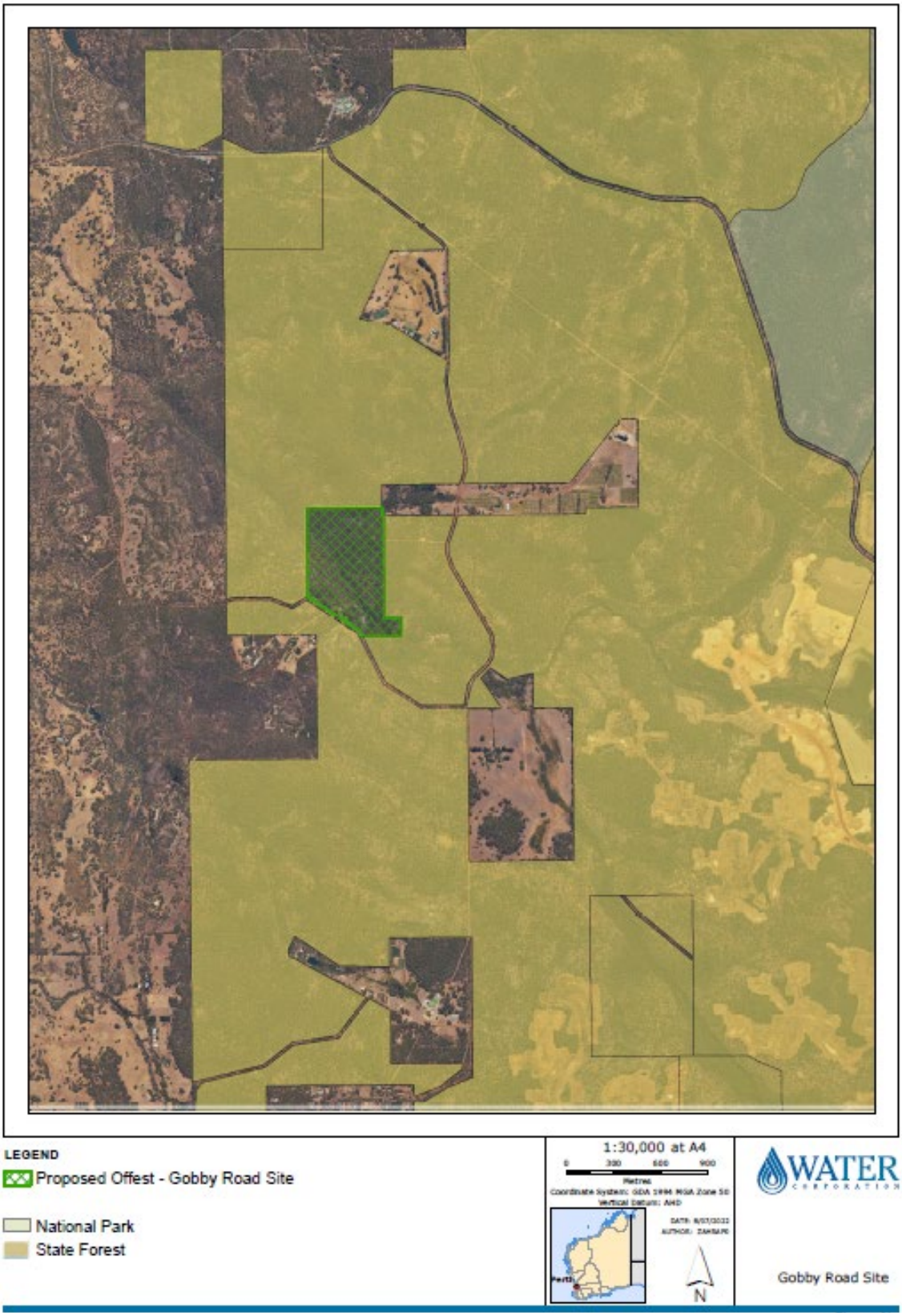

Figure 7: Lot 1375 Gobby Road, Keysbrook

3.1.2 Eglinton Site

A parcel of Water Corporation owned freehold land within the suburb of Eglinton (adjacent to Alkimos) has been identified in the investigation of potential offset sites for the Alkimos SDP project as shown in Figure 8.

The Flora and Vegetation Consolidation Report (Stantec, 2021) mapped the Eglinton site as containing Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (TEC). This vegetation comprises of an upper stratum dominated or co-dominated by one or more Banksia species was assessed against the criteria detailed within the Approved Conservation Advice (DotE 2016), to establish affinity with the Banksia Woodlands of the Swan Coastal Plain TEC.

The Flora and Vegetation Consolidation Report (Stantec, 2021) identified ten vegetation types, at least in part, to be representative of the TEC. Areas within each of these vegetation types, which were considered to represent the 'Banksia Woodlands of the Swan Coastal Plain' TEC demonstrated the key diagnostic characteristics required to initially define vegetation as the TEC (DotE 2016a), and each was considered to be in at least 'Good' vegetation condition.

The vegetation types within the proposed Eglinton offset site are consistent with those found in FCT 20a, as detailed in the Interim Recovery Plan for Community 20a (DPAW, 2016). 5.98 ha of the site is mapped as *Banksia attenuata* woodland and the remainder of the 7-ha site containing other Banksia species (*Banksia sessilis*).

The Eglinton site was surveyed as part of the Proposal and is located approximately 2.5 km East of the ASDP site. The Eglinton site abuts an existing land zoned parks and recreation, that was set reserved in the Metropolitan Scheme Amendment 1029/33 for conservation purposes to protect the integrity, function, and environmental value of the bushland. Figure 9 details the proposed Eglinton offset site which would result in a contribution to land zoned parks and recreation land adjacent to the offset site.

The Eglinton site is also close to known areas of breeding for Carnaby's Cockatoo. This proposed offset not only provides an ecological linkage between other land reserved for conservation, but also provides valuable foraging habitat through securing known foraging habitat for Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo species, further increasing the value of the offset.

Water Corporation proposes to use the **7 ha** (total area) Eglinton site, of which contains **5.98 ha** of Banksia Woodlands of the Swan Coastal Plain' TEC to primarily offset the impacts to that TEC from the project. The remaining 1.02 ha contains Northern Spearwood Shrublands and Woodlands PEC, which was included to reduce irregular boundary alignments (instead of following the TEC mapping). The quantification of offset from the Eglinton site is detailed in Table 3-2.

It was considered that the proposed offset would also address the offset requirements for FCT 20a. This is based on the presence of *Banksia attenuata* woodlands and the overlap with the Commonwealth requirement to offset Banksia Woodland TEC. Further site-specific survey work will be required to confirm the proposed offset site consistency with FCT 20a.

This site is proposed to offset the impacts to Bush Forever from the project. As detailed in Section 2.4 the pipeline predominantly intersects Bush Forever sites within road reserves, tracks and cleared areas. On the one occasion where the pipeline route does bisect a vegetated portion of a Bush Forever site, the vegetation impacted is Banksia Woodland TEC (0.95 ha). Therefore, the

Eglinton site makes an ideal offset over and above what would be required through State Planning Policy 2.8.

Similar to the impact calculations from the proposal, the State PEC was mapped at all of the locations identified as the Commonwealth Banksia Woodlands of the Swan Coastal Plain TEC and were not considered representative of any other State-listed TEC or PEC. This confirms that the proposed site would meet the offset requirements for the State and Commonwealth.

Table 3-2: Eglinton site offset

Environmental value (listing)	Proposed offset
Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community	**5.98 ha**
Carnaby's Cockatoo foraging habitat **and** Forest Red Tailed Black Cockatoo foraging habitat (High quality habitat)	**7 ha**
Bush Forever	**7 ha**

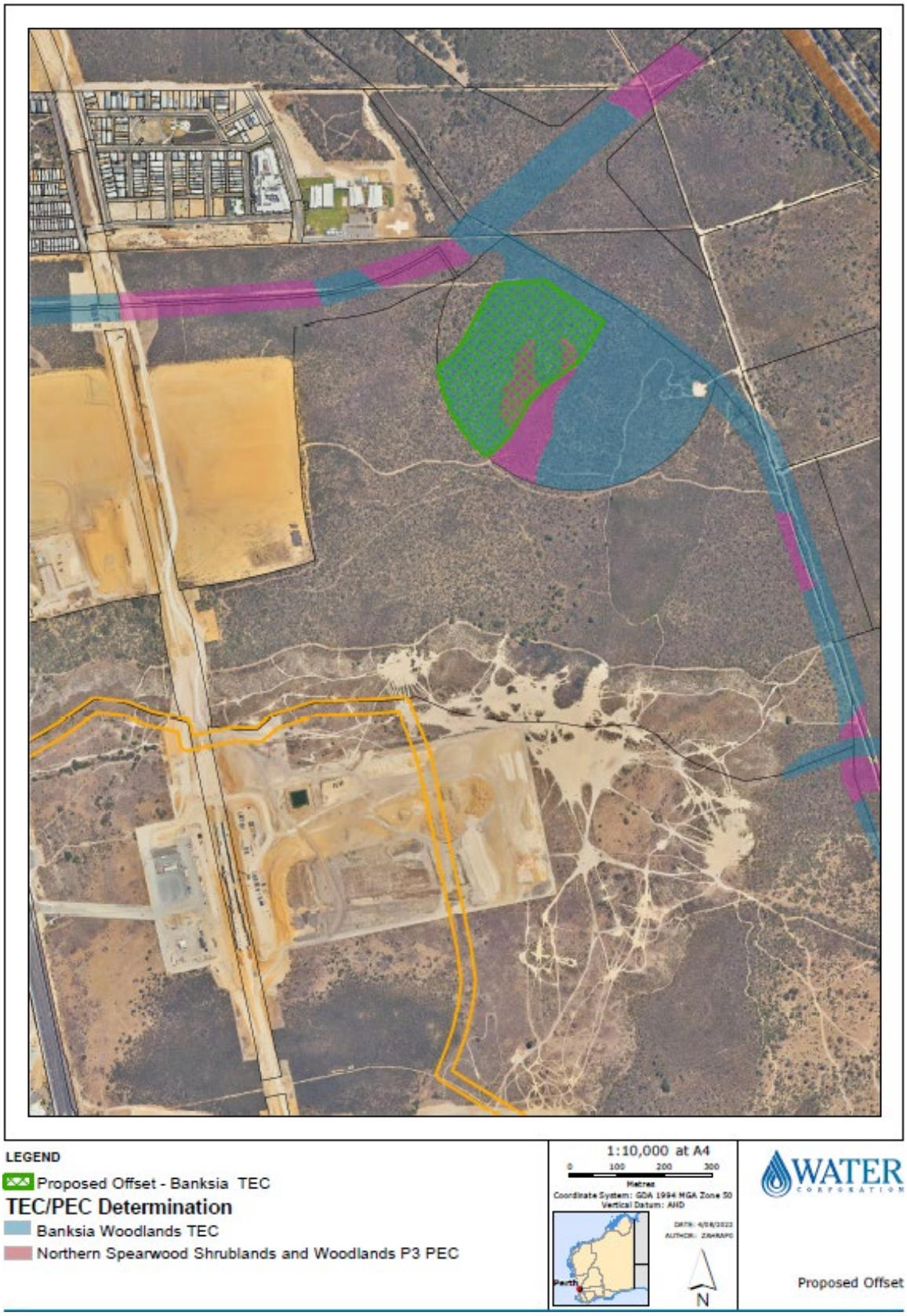

Figure 8 – Eglinton Site – TEC / PEC mapping

Figure 9 – Eglinton site – Offset site in relation to the Metropolitan Regional Scheme zoning

3.1.3 Carabooda Tank Site

A parcel of land within the Carabooda Tank Site has been identified in the investigation of potential offset sites for the Alkimos SDP project. This site is shown in Figure 10.

The Flora and Vegetation Consolidation Report (Stantec, 2021) mapped the proposed **2.2 ha** Carabooda Tank offset site as containing the State-listed *Melaleuca huegelii-Melaleuca systena shrublands on limestone ridges* Threatened Ecological Community. The confirmation of these vegetation types to represent the TEC was verified by its description, outlined in Luu (2005); the presence of outcropping limestone and its affinity with FCT 26a.

This vegetation community comprises species-rich thickets, heaths and scrubs dominated by *Melaleuca huegelii*, *Melaleuca systena* and *Banksia sessilis* commonly over *Grevillea preissii* and *Acacia lasiocarpa*.

The Flora and Vegetation Consolidation Report (Stantec, 2021) identifies two vegetation units to be representative of the TEC:

- (BsXpCqMsHh) *Banksia sessilis* and *Xanthorrhoea preissii* tall open shrubland to closed heath over *Calothamnus quadrifidus, Melaleuca systena* and *Hibbertia hypericoides* low shrubland to low open heath, and
- (MhMsDaAfGp) *Melaleuca huegelii* and *Melaleuca systena* open heath to closed heath over *Grevillea preissii subsp. preissii* low shrubland over *Desmocladus asper* sedgeland and *Austrostipa flavescens* grassland.

The MhMsDaAfGp vegetation unit was identified at the Carabooda tank site and was shown to be in 'Excellent' vegetation condition.

The Carabooda Tank offset site is located within the Water Corporation owned Carabooda Tank cadastral boundary. The Alkimos SDP project will connect to the Carabooda Tank via a spur off the main pipeline. As shown in Figure 4 this site is also within the vicinity of the impact to the Melaleuca TEC from the project.

It is noted that the entire 2.2ha of proposed offset area has not been surveyed to confirm the presence of the Melaleuca TEC, however visual assessment of the area confirmed the vegetation is identical to the confirmed TEC vegetation and will be confirmed prior to approval.

The **2.2 ha** Carabooda Tank offset site is also close to known areas of breeding for Carnaby's Cockatoo. The offset not only protects a key Threatened Ecological Community, but also provides valuable foraging habitat through securing known foraging habitat for Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo species, further increasing the value of the offset.

Table 3-3 and Figure 10 details the proposed Carabooda Tank Eglinton offset.

Table 3-3: Carabooda Tank site offset

Environmental value (listing)	Proposed offset
Melaleuca huegelii-Melaleuca systena shrublands on limestone ridges Threatened Ecological Community (FCT 26a)	2.2 ha
Carnaby's Cockatoo foraging habitat **and** Forest Red Tailed Black Cockatoo foraging habitat	2.2 ha

Figure 10 – Carabooda Tank site

3.1.4 Alkimos Site

A parcel of Water Corporation owned freehold land within the Alkimos water precinct, adjacent to the Alkimos SDP project has been identified in the investigation of potential offset sites for the Alkimos SDP project as shown in Figure 11.

A large portion of the land is currently zoned urban deferred in the Metropolitan Regional Scheme. This would indicate that it could potentially be used as future residential land.

Water Corporation is proposing to protect and rehabilitate this land primarily as an offset for the impacts to Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community' (referred to as the Tuart Woodland TEC). The presence of the Tuart Woodland TEC within the proposed Alkimos offset site was confirmed in the Flora and Vegetation Consolidation Report (Stantec, 2021). The proposed offset includes a mapped area of **4.91 ha** Tuart Woodland TEC within the total **9.01 ha** offset site as shown in Figure 11.

The Flora and Vegetation Consolidation Report (Stantec, 2021) also confirms the condition within the offset site as 1.55 ha in very good condition, 3.21 ha in good condition, and 0.15 ha completely degraded in accordance with EPA Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment, 2016.

A secondary benefit of this site would be to offset the 4.41 ha of Public Purposes (reserved for conservation) areas from the with the development envelope of the ASDP plant site as outlined in Section 2.4.

This offset site will also contribute approximately **3.63 ha** of heath and shrubland vegetation, which was mapped as very high-quality Black Cockatoo habitat (score of 10) in the Terrestrial Fauna Consolidation Report (Stantec, 2021b). A further portion of proposed offset site was also mapped in the report as 4.58 ha of 'scattered trees', however this only represents low quality foraging habitat and is not included.

The offset site will contribute to ecological linkages between other land reserved for conservation within the Alkimos Water Precinct and provide valuable foraging habitat through securing known foraging habitat for Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo species.

The quantification of the proposed offset site from the Alkimos site is detailed in Table 3-4.

Table 3-4: Alkimos Water Precinct offset

Environmental value (listing)	Proposed offset
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community'	4.91 ha
Alkimos water precinct Public Purposes (reserved for conservation) areas - defined in Metropolitan Regional Scheme Amendment 1029/33	9.01 ha
Carnaby's Cockatoo foraging habitat **and** Forest Red Tailed Black Cockatoo foraging habitat	3.63 ha

Figure 11 – Proposed Alkimos Offset site

Figure 12 – Proposed Alkimos Offset Site – Black Cockatoo habitat

3.2 On-ground Management

Water Corporation is proposing to undertake on-ground management activities to offset part of the significant residual impacts from the Proposal.

Water Corporation is currently working across government to establish a process to identify and acquire approximately **65ha** of Carnaby's and Forest Red-tail Black Cockatoo habitat. A number of sites have been initially identified and are under further consideration for suitability. Water Corporation will provide further advice on this acquisition process prior to the commencement of assessment.

This Offset Strategy proposes to undertake specific management activities on **65 ha** of land for a set period (7 to 10 years) to provide tangible improvement to environmental values.

This offset is designed to improve the quality of the existing native vegetation or reserved land, resulting in improved quality and values of those areas and providing protection into the future (through fencing etc).

To satisfy the requirements of the WA environmental offsets policy, these management measures have been set up to compensate for residual environmental impacts from the Alkimos SDP project. They have been designed to achieve long-term outcomes, additional to existing conservation programs and initiatives.

Water Corporation will work across government to confirm management activities, including:

- Fencing,
- Access tracks upgrade and maintenance,
- Signage - materials and installation,
- *Phytophthora cinnamomi* (Dieback) mapping (years 3 and 7) and management plan,
- Weed mapping,
- Weed control - materials and program implementation,
- Flora and vegetation survey,
- Rubbish removal,
- Fire management,
- Feral animal monitoring and control (cat, fox, rabbit, kangaroos and pigs),
- Fauna watering point (Black Cockatoos), and
- revegetation (re-establishment of native vegetation in degraded areas).

This Offset Strategy has been prepared to demonstrate a commitment to this activity, in conjunction with other land acquisition offsets proposed.

Water Corporation has prepared a potential scenario to attempt to quantify the offset required for each of the known impacts. These scenarios are summarised in Table 3-5 and Appendix A.

Table 3-5: On-ground Management Offset Summary

Environmental value (listing)	Proposed offset
Carnaby's Cockatoo foraging habitat **and** Forest Red Tailed Black Cockatoo foraging habitat	65 ha

3.3 Offset summary

A summary of the proposed offset strategy is detailed in Table 3-6.

Table 3-6: Offset Summary

Environmental value (listing)	Total Quantum of Impact	Land acquisition	Direct On-ground management area provided	Percentage of offset met
Banksia Woodlands of the Swan Coastal Plain	2.32 ha	7 ha Eglinton Site (**5.98 ha** Banksia TEC)	-	**100%**
Tuart (*Eucalyptus gomphocephala*) woodlands and forest of the Swan Coastal Plain	0.89 ha	9.01 ha Alkimos Site (**4.91 ha** Tuart TEC)	-	**100%**
Melaleuca huegelii-Melaleuca systena shrublands on limestone ridges	0.73 ha	2.2 ha Carabooda Tank Site (**2.2 ha** Melaleuca TEC / FCT26a)	-	**100%**
Bush Forever	9.73 ha (only 0.98 ha significant)	7 ha Eglinton Site	-	**100%**
Impacts to Public Purposes (reserved for conservation) areas areas within Alkimos Water Precinct.	4.41 ha	**9.01 ha** Alkimos Site	-	**204%**
Carnaby's Cockatoo Foraging habitat (Very High and High Quality)	43.3 ha	**36.47 ha** Gobby Road	-	39.5%
		7 ha Eglinton Site	-	5.6%
		2.2 ha Carabooda Tank Site	-	1.7%
		3.63 ha within Alkimos Site	-	1.6%
		n/a	**65 ha** (subject to agreement)	60%
			TOTAL	**108.4%**
Forest Red Tailed Black Cockatoo Foraging habitat (Very High and High Quality)	43.3 ha	**36.47 ha** Gobby Road	-	39.5%
		7 ha Eglinton Site	-	5.6%
		2.2 ha Carabooda Tank Site	-	1.7%
		3.63 ha within Alkimos Site	-	1.6%
			65 ha (subject to agreement)	60%
			TOTAL	**108.4%**
Black Cockatoo species - Significant trees	129 trees	**611 trees** Gobby Road offset		**425%**

4 Consistency with principles of WA Environmental Offset Policy

This Draft Offsets Strategy has been prepared considering the six principles of the WA Environmental Offset Policy as shown in Table 4-1

Table 4-1: Principles of the WA Offset Policy

Principle	Consideration within the Proposal
Environmental offsets will only be considered after avoidance and mitigation options have been pursued.	• The existing conservation areas immediately surrounding the SDP Development Envelope will remain largely intact. • SDP Development Envelope will avoid Banksia woodland habitat, which was is identified as high-quality foraging habitat for Black Cockatoos. • The requirement for clearing of habitat has been avoided along large sections of the pipeline by using existing linear infrastructure, following road reserves and already cleared areas and tracks. The amount of fragmentation of vegetation has also been reduced as a result. • The pipeline Development Envelope is 30 m, with only a 16 m clearing width required within this footprint, allowing key species and habitat to be avoided during final alignment. • Identified breeding trees to be retained where possible, and will be clearly marked to avoid unauthorised clearing • Clearing within authorised areas only - demarcate boundaries for approved clearing of TECs/PECs, ESAs and Bush Forever Sites.
Environmental offsets are not appropriate for all Proposals.	Water Corporation has given significant consideration to reducing the environmental impacts of this Proposal. This consideration is provided in detail with the Environmental Review Document. The location and infrastructure corridors available for Water Corporation to implement such significant public infrastructure are limited, particularly within an ever-expanding residential landscape in the northern corridor. Water Corporation has documented the environmental impacts of the proposal, and following that assessment consider that environmental offsets are appropriate for this Proposal.
Environmental offsets will be cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted.	The Water Corporation has proposed a number of direct and indirect offsets to counterbalance the significant residual impacts to: • Banksia Woodland Threatened Ecological Community (TEC) / Priority Ecological Community (PEC) (Banksia Woodlands TEC / PEC). • Tuart (*Eucalyptus gomphocephala*) woodlands and forest of the Swan Coastal Plain TEC (Cr). • *Melaleuca huegelii-Melaleuca systena* shrublands on limestone ridges SCP26a (En). and • Black Cockatoo species (i.e. Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo). These offsets have utilised the State and Commonwealth Offsets Calculators to quantify the impact and proposed offset to ensure they are proportionate to the significance of the environmental value being impacted.

Environmental offsets will be based on sound environmental information and knowledge.	Water Corporation has used suitably qualified environmental consultants to investigate and accurately document the environmental impacts of the Proposal. These investigations have been prepared in accordance with all relevant EPA guidance to ensure the report has sufficient credibility.
Environmental offsets will be applied within a framework of adaptive management.	Water Corporation operates all projects withing an adaptive management framework. Through such activities such as construction environmental management plans and regular audits to assess compliance against these management plans. This offset strategy therefore provides suitable flexibility in a challenging and complex environment to account for risks and other unintended consequences.
Environmental offsets will be focused on longer-term strategic outcomes	The proposed land acquisition offsets present a long-term strategic outcome through, the State ownership of offset sites and transfer into the Conservation Estate. On-ground management will result in improving degraded land, therefore increasing habitat, rather than protecting existing habitat.

5 References

Australian Government, 2012a, EPBC Act Environmental Offsets Policy

Australian Government, 2012b, Commonwealth Offsets Assessment Guide.

Australian Government (DSEWPaC), 2012, *Referral Guidelines for three threatened Black Cockatoo species; Carnaby's Cockatoo, Baudin's Cockatoo and Forest Red-tailed Black Cockatoo*

Australian Government, 2016a, Species Profile and Threats Database - Calyptorhynchus latirostris — Carnaby's Cockatoo, Short-billed Black-Cockatoo. 2016. Australian Government.

Australian Government (DoEE), 2017, *Revised draft referral guideline for three threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black Cockatoo*.

Australian Government 2019, Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

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Department of the Environment, 2016, Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (s 266B) Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community. Commonwealth of Australia. Available online at http://www.environment.gov.au/biodiversity/threatened/communities/pubs/131-conservationadvice.pdf.

Department of Biodiversity, Conservation and Attractions, 2020, Recovery plans and interim recovery plans https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/wa-s-threatenedecological-communities

Department of Parks and Wildlife (DPAW) 2016, Interim Recovery Plan No. 359 Banksia attenuata woodlands over species rich dense shrublands (Swan Coastal Plain Community type 20a – Gibson et al. 1994) Interim Recovery Plan 2016-2021

Government of Western Australia, 2010, State Planning Policy 2.8 Bushland Policy for the Perth Metropolitan Region.

Government of Western Australia, 2019, Environmental Protection Act 1986 (EP Act).

Government of Western Australia, 2011, WA Environmental Offsets Policy.

Government of Western Australia, 2014, WA Environmental Offsets Guidelines

Government of Western Australia, 2017, Critical breeding habitat for this species is within remnant patches of old Marri (*Corymbia calophylla*) trees within the Northern and Southern Jarrah Forest IBRA sub-regions

Stantec, 2021, ASDP - Flora and Vegetation Consolidation Report

Stantec, 2021b, ASDP – Terrestrial Fauna Consolidation Report

Threatened Species Scientific Committee, 2016, EPBC Act Approved Conservation Advice, Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community.

Threatened Species Scientific Committee, 2019, EPBC Act Approved Conservation Advice, Approved Conservation Advice (incorporating listing advice) for the Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain ecological community,

APPENDIX A:

COMMONWEALTH OFFSET ASSESSMENT CALCULATIONS

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Key to Cell Colours
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Drop-down list
Calculated output
Not applicable to attribute

Matter of National Environmental Significance	
Name	Banksia Woodland
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	**1.2%**

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	Yes	Clearing of up to 2.32 ha of Bansia woodland TEC/PEC	**Area**	2.32	Hectares	predominantly very good quality.
			Quality	**10**	Scale 0-10	
			Total quantum of impact	2.32	Adjusted hectares	
Threatened species habitat						
Area of habitat	Yes	Also component of Black Cockatoo foraging habitat	**Area**	43.3	Hectares	predominantly very good quality.
			Quality	**10**	Scale 0-10	
			Total quantum of impact	43.30	Adjusted hectares	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source
Number of features e.g. Nest hollows, habitat trees	No				
Condition of habitat Change in habitat condition, but no change in extent	No				
Threatened species					
Birth rate e.g. Change in nest success	No				
Mortality rate e.g Change in number of road kills per year	No				
Number of individuals e.g. Individual plants/animals	No				

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	Yes	2.32	Adjusted hectares	Eglinton site	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	5.98	**Risk of loss (%) without offset**	50%	**Risk of loss (%) with offset**	1%	2.93	90%	2.64	2.08	2.34	101.01%	Yes		
									Future area without offset (adjusted hectares)	3.0	**Future area with offset (adjusted hectares)**	5.9									
					Time until ecological benefit	1	**Start quality (scale of 0-10)**	**9**	**Future quality without offset (scale of 0-10)**	**9**	**Future quality with offset (scale of 0-10)**	**10**	1.00	90%	0.90	0.89					
Threatened species habitat																					
Area of habitat	Yes	43.30	Adjusted hectares	Eglington site	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	5.98	**Risk of loss (%) without offset**	50%	**Risk of loss (%) with offset**	1%	2.93	90%	2.64	2.08	2.08	4.80%	No		
									Future area without offset (adjusted hectares)	3.0	**Future area with offset (adjusted hectares)**	5.9									
					Time until ecological benefit	1	**Start quality (scale of 0-10)**	**10**	**Future quality without offset (scale of 0-10)**	**10**	**Future quality with offset (scale of 0-10)**	**10**	0.00	90%	0.00	0.00					

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start value	Future value without offset	Future value with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Number of features e.g. Nest hollows, habitat trees	No															
Condition of habitat Change in habitat condition, but no change in extent	No															
Threatened species																
Birth rate e.g. Change in nest success	No															
Mortality rate e.g Change in number of road kills per year	No															
Number of individuals e.g. Individual plants/animals	No															

Appendix A

Eglinton site offset calculations (Primary use - Banksia Woodland TEC)

Criteria	Rating (Banksia Woodland TEC)	Explanation
Start area	**5.98 ha**	Area within the 7-ha site containing Banksia Woodland TEC.
Start quality	9	Flora and Vegetation Consolidation Report (Stantec 2021, confirmed that the Eglinton site is in excellent condition.
Future quality without offset	9	The land is owned by Water Corporation and no improvement would occur without offset.
Future quality with offset	10	Elevation of quality by providing long term security of the site (fencing, protection).
Risk of loss (%) without offset	50%	As the land is freehold land, Water Corporation could use the site for future water infrastructure.
Risk of loss (%) with offset	1%	Protection of the offset site will remove the risk of future loss.
Confidence in result (averted loss) (%)	90%	The protection mechanisms and proposed management provide a high level of certainty that the offset will be conserved, averting the level of loss that would likely occur should no formal protection measures be implemented.
Confidence in result (habitat quality) (%)	90%	There is a high degree of confidence in this prediction based on protection mechanisms proposed.
Time over which loss is averted (years)	20	(Maximum used) offset would provide for long-term protection.
Time until ecological benefit (years)	1	Ecological benefit would occur once the habitat is protected.
Total offset %	**101%**	101% of the offset requirement will be achieved from the Eglinton site

Eglinton site offset calculations (Secondary use – Black Cockatoo foraging habitat)

Criteria	Rating	Explanation
Start area	**7.00 ha**	Area of Black Cockatoo foraging habitat within the site.
Start quality	9	Terrestrial Fauna Consolidation Report (Stantec 2021, confirmed that the Eglinton site is 'heath and shrubland' and 'woodland' habitat which is in excellent condition.
Future quality without offset	9	The land is owned by Water Corporation and no improvement would occur without offset.
Future quality with offset	10	Elevation of quality by providing long term security of the site (fencing, protection).
Risk of loss (%) without offset	50%	As the land is freehold land, Water Corporation could use the site for future water infrastructure.
Risk of loss (%) with offset	1%	Protection of the offset site will remove the risk of future loss.
Confidence in result (averted loss) (%)	90%	The protection mechanisms and proposed management provide a high level of certainty that the offset will be conserved, averting the level of loss that would likely occur should no formal protection measures be implemented.
Confidence in result (habitat quality) (%)	90%	There is a high degree of confidence in this prediction based on protection mechanisms proposed.
Time over which loss is averted (years)	20	(Maximum used) offset would provide for long-term protection.
Time until ecological benefit (years)	1	Ecological benefit would occur once the habitat is protected.
Total offset %	**5.6%**	5.6% of the offset requirement will be achieved from the Eglinton site. The remaining offset will be made up from other sources (on-ground management, etc).

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Matter of National Environmental Significance	
Name	Black Cockatoo (Carnaby's and
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	**1.2%**

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	43.3 ha of Black Cocaktoo habitat	**Area**	43.3	Hectares	predominantly very good quality.
			Quality	**10**	Scale 0-10	
			Total quantum of impact	43.30	Adjusted hectares	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source
Number of features e.g. Nest hollows, habitat trees	No				
Condition of habitat Change in habitat condition, but no change in extent	No				
Threatened species					
Birth rate e.g. Change in nest success	No				
Mortality rate e.g Change in number of road kills per year	No				
Number of individuals e.g. Individual plants/animals	No				

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	43.30	Adjusted hectares	On ground management	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	65	**Risk of loss (%) without offset**	5%	**Risk of loss (%) with offset**	5%	0.00	90%	0.00	0.00	26.18	60.46%	No		
									Future area without offset (adjusted hectares)	61.8	**Future area with offset (adjusted hectares)**	61.8								
					Time until ecological benefit	5	**Start quality (scale of 0-10)**	**1**	**Future quality without offset (scale of 0-10)**	**1**	**Future quality with offset (scale of 0-10)**	**6**	5.00	90%	4.50	4.24				

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start value	Future value without offset	Future value with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Number of features e.g. Nest hollows, habitat trees	No															
Condition of habitat Change in habitat condition, but no change in extent	No															
Threatened species																
Birth rate e.g. Change in nest success	No															
Mortality rate e.g Change in number of road kills per year	No															
Number of individuals e.g. Individual plants/animals	No															

On-ground management offset calculations (Primary use – Black Cockatoo foraging habitat)

Criteria	Rating	Explanation
Start area	**65 ha**	Area of Black Cockatoo Habitat required calculated to meet 60% of the offset requirement
Start quality	1	Area assumed to have little to no vegetation. (eg. Ex pine plantation etc)
Future quality without offset	1	Without Water Corporation involvement, no action would occur.
Future quality with offset	6	- Security of the offset (fencing, protection), - rehabilitation (weed management, seeding, planting) - provision of annual budget to account for activities scheduled in plan - between 5 and 10 years of on-ground management of the site to achieve and maintain the quality (6) of the offset.
Risk of loss (%) without offset	5%	The risk of additional impact to the site is minimal as the land is already under control of the state and would remain as is without intervention.
Risk of loss (%) with offset	5%	Protection of the offset site will substantially reduce the risk of future loss.
Confidence in result (averted loss) (%)	90%	The protection mechanisms and proposed management provide a high level of certainty that the offset will be conserved, averting the level of loss that would likely occur should no formal protection measures be implemented.
Confidence in result (habitat quality) (%)	90%	There is a high degree of confidence in this prediction based on the previous WC projects involveing on-ground management.
Time over which loss is averted (years)	20	(Maximum used) offset would provide for long-term protection.
Time until ecological benefit (years)	1	Ecological benefit is expected to take 1 years before Black Cockatoo habitat will be available.
Total offset %	**60%**	60% of the offset requirement will be achieved from state land The remaining offset will be made up from other sources (Land acquisitions).

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Matter of National Environmental Significance	
Name	Forest Red Tailed Black Cockatoo
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

Impact calculator

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	Yes		**Area**		Hectares	
			Quality		Scale 0-10	
			Total quantum of impact	0.00	Adjusted hectares	
Threatened species habitat						
Area of habitat	Yes	43.3 ha habitat	**Area**	43.3	Hectares	
			Quality	**10**	Scale 0-10	
			Total quantum of impact	43.30	Adjusted hectares	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source
Number of features e.g. Nest hollows, habitat trees	Yes	otential breeding tre	129	Count	
Condition of habitat Change in habitat condition, but no change in extent	No				
Threatened species					
Birth rate e.g. Change in nest success	No				
Mortality rate e.g Change in number of road kills per year	No				
Number of individuals e.g. Individual plants/animals	No				

Offset calculator

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	Yes		Adjusted hectares		**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**		0.00		0.00	0.00		#DIV/0!	#DIV/0!		
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0									
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**		0.00		0.00	0.00	0.00				
Threatened species habitat																					
Area of habitat	Yes	43.30	Adjusted hectares	Gobby Road, Keysbrook	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	36.47	**Risk of loss (%) without offset**	50%	**Risk of loss (%) with offset**	1%	17.87	90%	16.08	15.45	17.09	39.47%	No		
									Future area without offset (adjusted hectares)	18.2	**Future area with offset (adjusted hectares)**	36.1									
					Time until ecological benefit	1	**Start quality (scale of 0-10)**	**9**	**Future quality without offset (scale of 0-10)**	**9**	**Future quality with offset (scale of 0-10)**	**10**	1.00	90%	0.90	0.90					

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start value	Future value without offset	Future value with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Number of features e.g. Nest hollows, habitat trees	Yes	129	Count	Gobby Road, Keysbrook	1	611	0	611	611	90%	549.90	548.80	425.43%	Yes		
Condition of habitat Change in habitat condition, but no change in extent	No															
Threatened species																
Birth rate e.g. Change in nest success	No															
Mortality rate e.g Change in number of road kills per year	No															
Number of individuals e.g. Individual plants/animals	No															

Gobby Road offset calculations – (Primary use – Black Cockatoo foraging habitat)

Criteria	Rating	Explanation
Start area	**36.47 ha**	Area of Black Cockatoo foraging habitat within the site.
Start quality	9	Black Cockatoo Habitat Assessment and Hollow Inspection Report (360 Environmental 2021) Appendix C) confirmed that the Gobby Road site is very high-quality foraging habitat.
Future quality without offset	9	Without Water Corporation involvement, no change would occur.
Future quality with offset	10	Elevation of quality by providing long term security of the site (fencing, protection).
Risk of loss (%) without offset	50%	As the land is freehold land, Water Corporation could use the site for future water infrastructure.
Risk of loss (%) with offset	1%	Protection of the offset site will substantially reduce the risk of future loss.
Confidence in result (averted loss) (%)	90%	The protection mechanisms and proposed management provide a high level of certainty that the offset will be conserved, averting the level of loss that would likely occur should no formal protection measures be implemented.
Confidence in result (habitat quality) (%)	90%	There is a high degree of confidence in this prediction based on protection mechanisms proposed.
Time over which loss is averted (years)	20	(Maximum used) offset would provide for long-term protection.
Time until ecological benefit (years)	1	Ecological benefit would occur once the habitat is protected.
Total offset %	**39.47%**	39.47% of the offset requirement will be achieved from the Gobby Road site The remaining offset will be made up from other sources (On-ground management and Land acquisitions).

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Tuart Woodland
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	**6.8%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	Yes	Clearing of up to 0.89 ha of Tuart Woodland TEC/PEC	**Area**	0.89	Hectares	The TEC condition: Very Good - Good
			Quality	**10**	Scale 0-10	
			Total quantum of impact	0.89	Adjusted hectares	
Threatened species habitat						
Area of habitat	Yes	43.3 ha of Black Cocaktoo habitat	**Area**	43.3	Hectares	predominantly very good quality.
			Quality	**10**	Scale 0-10	
			Total quantum of impact	43.30	Adjusted hectares	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source
Number of features e.g. Nest hollows, habitat trees	No				
Condition of habitat Change in habitat condition, but no change in extent	No				
Threatened species					
Birth rate e.g. Change in nest success	No				
Mortality rate e.g Change in number of road kills per year	No				
Number of individuals e.g. Individual plants/animals	No				

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	Yes	0.89	Adjusted hectares	Land Acquisition - Alkimos buffer	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	4.8	**Risk of loss (%) without offset**	80%	**Risk of loss (%) with offset**	1%	3.79	90%	3.41	0.92	0.90	101.67%	Yes		
									Future area without offset (adjusted hectares)	1.0	**Future area with offset (adjusted hectares)**	4.8									
					Time until ecological benefit	1	**Start quality (scale of 0-10)**	**8**	**Future quality without offset (scale of 0-10)**	**8**	**Future quality with offset (scale of 0-10)**	**9**	1.00	90%	0.90	0.84					
Threatened species habitat																					
Area of habitat	Yes	43.30	Adjusted hectares	Land Acquisition - Alkimos buffer	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	3.63	**Risk of loss (%) without offset**	80%	**Risk of loss (%) with offset**	1%	2.87	90%	2.58	0.69	0.69	1.60%	No		
									Future area without offset (adjusted hectares)	0.7	**Future area with offset (adjusted hectares)**	3.6									
					Time until ecological benefit	1	**Start quality (scale of 0-10)**	**10**	**Future quality without offset (scale of 0-10)**	**10**	**Future quality with offset (scale of 0-10)**	**10**	0.00	90%	0.00	0.00					

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start value	Future value without offset	Future value with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Number of features e.g. Nest hollows, habitat trees	No															
Condition of habitat Change in habitat condition, but no change in extent	No															
Threatened species																
Birth rate e.g. Change in nest success	No															
Mortality rate e.g Change in number of road kills per year	No															
Number of individuals e.g. Individual plants/animals	No															

Alkimos Site offset calculations (Primary use – Tuart TEC offset)

Criteria	Rating	Explanation
Start area	**4.8 ha**	Area of Tuart TEC within the Alkimos Site.
Start quality	8	Flora and Vegetation Consolidation Report (Stantec 2021, confirmed that the Alkimos site is in good to very good condition
Future quality without offset	8	Without Water Corporation involvement, no change would occur.
Future quality with offset	9	Quality will improve slightly with provision of long term security of the site (fencing, protection) and rehabilitation.
Risk of loss (%) without offset	80%	As the land is freehold land, zoned urban deferred Water Corporation could use the site for future water infrastructure or residential land.
Risk of loss (%) with offset	1%	Protection of the offset site will substantially reduce the risk of future loss.
Confidence in result (averted loss) (%)	90%	The protection mechanisms and proposed management provide a high level of certainty that the offset will be conserved, averting the level of loss that would likely occur should no formal protection measures be implemented.
Confidence in result (habitat quality) (%)	90%	There is a high degree of confidence in this prediction based on protection mechanisms proposed.
Time over which loss is averted (years)	20	(Maximum used) offset would provide for long-term protection.
Time until ecological benefit (years)	1	Ecological benefit would occur once the habitat is protected.
Total offset %	**101%**	101% of the offset requirement for Tuart TEC will be achieved from the Alkimos site.

Alkimos Site offset calculations (Secondary use – Black Cockatoo foraging habitat)

Criteria	Rating	Explanation
Start area	**3.63 ha**	Area of high-quality Black Cockatoo foraging habitat within the Alkimos Site. Noting that it does not include the entire offset site.
Start quality	10	Terrestrial Fauna Consolidation Report (Stantec 2021, confirmed that the Alkimos site is 'heath and shrubland' and 'Scattered trees' habitat which is in good to very good condition.
Future quality without offset	10	Without Water Corporation involvement, no change would occur.
Future quality with offset	10	quality will remain relatively unchanged by providing long term security of the site (fencing, protection).
Risk of loss (%) without offset	80%	As the land is freehold land, zoned urban deferred Water Corporation could use the site for future water infrastructure or residential land.
Risk of loss (%) with offset	1%	Protection of the offset site will substantially reduce the risk of future loss.
Confidence in result (averted loss) (%)	90%	The protection mechanisms and proposed management provide a high level of certainty that the offset will be conserved, averting the level of loss that would likely occur should no formal protection measures be implemented.
Confidence in result (habitat quality) (%)	90%	There is a high degree of confidence in this prediction based on protection mechanisms proposed.
Time over which loss is averted (years)	20	(Maximum used) offset would provide for long-term protection.
Time until ecological benefit (years)	1	Ecological benefit would occur once the habitat is protected.
Total offset %	**1.6%**	1.6% of the offset requirement for Black Cockatoos will be achieved from the Alkimos site. The remaining offset will be made up from other sources (On-ground management and Land acquisitions).

WA Environmental Offsets Calculator

Step 3: Calculating offsets

Key:

	Data to be entered
	Drop-down selection
	Automatically-generated scores

Environmental value (step 1)	Melaleuca huegelii-Melaleuca systena shrublands on limestone ridges	Significant impact (step 2, part A)	0.73
		Rehabilitation credit (step 2, part B)	0.00
		Significant residual impact (step 2, part C)	0.73

Area **(offset site)**

Offset calculation *Area*							
Offsets calculation	**Description**	**Proposed offset (area in hectares)**	2.20	**Duration of offset implementation (maximum 20 years)**	20.00	**Offset value**	**1.07**
	land acquisition - Carabooda Tank Site	**Current quality of offset site (scale)**	10.00	**Time until offset site secured (years)**	1.00		**145.9%**
		Future quality WITHOUT offset (scale)	10.00	**Risk of future loss WITHOUT offset (%)**	50.0%		
		Future quality WITH offset (scale)	10.00	**Risk of future loss WITH offset (%)**	1.0%		
		Time until ecological benefit (years)	1.00				
		Confidence in offset result (%)	90.0%			**OFFSET ADEQUATE?**	**YES**

WA Environmental Offsets Calculator

Rationale for scores used in the offsets calculator

Environmental value to be offset			
Calculation	***Score (Area)***		***Rationale***
Conservation significance			
Description	Melaleuca huegelii-Melaleuca systena shrublands on limestone ridges		As defined by Flora and Vegetation Consolidation Report (Stantec, 2020a)
Type of environmental value	Ecological community		As detailed in guidance. https://www.dpaw.wa.gov.au/images/documents/plants-animals/tecs/SCP26a-Melaleuca-shrublands-on-limestone-ridges.pdf
Conservation significance of environmental value	Threatened ecological community - endangered		Endangered - as per guidance. https://www.dpaw.wa.gov.au/images/documents/plants-animals/tecs/SCP26a-Melaleuca-shrublands-on-limestone-ridges.pdf
Landscape-level value impacted	yes/no		
Significant impact			
Description	clearing for ASDP to Wanerroo pipeline		
Significant impact (hectares) / Type of feature	0.73		
Quality (scale) / Number	10.00		predominantly very good quality vegetation
Rehabilitation credit			
Description	not applicable at this stage		n/a
Proposed rehabilitation (area in hectares)	0.00		n/a
Current quality of rehabilitation site / Start number (of type of feature)	0.00		n/a
Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation	0.00		n/a
Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation	0.00		n/a
Time until ecological benefit (years)	0.00		n/a
Confidence in rehabilitation result (%)	0		n/a
Offset			
Description	land acquisition - Carabooda Tank Site		
Proposed offset (area in hectares)	2.20		
Current quality of offset site / Start number (of type of feature)	10.00		Stantec report identifies the condition of the Carabooda Tank Site to be excellent.
Future quality WITHOUT offset (scale) / Future number WITHOUT offset	10.00		unlikely to change if not used as offset, although could be cleared if required for future water assets.
Future quality WITH offset (scale) / Future number WITH offset	10.00		quality of vegetation will be protected through transfer to the conservation estate, or secured with conservation covenant.
Time until ecological benefit (years)	1.00		immediate benefit, as land is already vegetated
Confidence in offset result (%)	0.9		high confidence in the result as land is already owned by Water Corporation.
Duration of offset implementation (maximum 20 years)	20.00		in perpetuity
Time until offset site secured (years)	1.00		allowance of 1 year for land transfer or covenant
Risk of future loss WITHOUT offset (%)	50.0%		Site is used to house the Carabooda Water Tank and could be cleared if required for future water assets.
Risk of future loss WITH offset (%)	1.0%		protected in perpetuity
Offset ratio (Conservation area only)	N/A		

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Matter of National Environmental Significance	
Name	SCP26a
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	**1.2%**

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	Yes	********** Used state calculator ********** 0.73 ha of SCP26a	**Area**	0.73	Hectares	The TEC condition: Very Good - Good
			Quality	**10**	Scale 0-10	
			Total quantum of impact	0.73	Adjusted hectares	
Threatened species habitat						
Area of habitat	Yes	Also component of Carnaby's Black Cockatoo foraging habitat	**Area**	43.3	Hectares	predominantly very good quality.
			Quality	**10**	Scale 0-10	
			Total quantum of impact	43.30	Adjusted hectares	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source
Number of features e.g. Nest hollows, habitat trees	No				
Condition of habitat Change in habitat condition, but no change in extent	No				
Threatened species					
Birth rate e.g. Change in nest success	No				
Mortality rate e.g Change in number of road kills per year	No				
Number of individuals e.g. Individual plants/animals	No				

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	Yes	0.73	Adjusted hectares	land acquisition - Carabooda Tank Site	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	2.2	**Risk of loss (%) without offset**	50%	**Risk of loss (%) with offset**	1%	1.08	90%	0.97	0.76	0.86	117.35%	Yes		
									Future area without offset (adjusted hectares)	1.1	**Future area with offset (adjusted hectares)**	2.2									
					Time until ecological benefit	1	**Start quality (scale of 0-10)**	**9**	**Future quality without offset (scale of 0-10)**	**9**	**Future quality with offset (scale of 0-10)**	**10**	1.00	85%	0.85	0.84					
Threatened species habitat																					
Area of habitat	Yes	43.30	Adjusted hectares	land acquisition - Carabooda Tank Site	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	2.2	**Risk of loss (%) without offset**	50%	**Risk of loss (%) with offset**	1%	1.08	90%	0.97	0.76	0.76	1.77%	No		
									Future area without offset (adjusted hectares)	1.1	**Future area with offset (adjusted hectares)**	2.2									
					Time until ecological benefit	1	**Start quality (scale of 0-10)**	**10**	**Future quality without offset (scale of 0-10)**	**10**	**Future quality with offset (scale of 0-10)**	**10**	0.00	90%	0.00	0.00					

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start value	Future value without offset	Future value with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Number of features e.g. Nest hollows, habitat trees	No															
Condition of habitat Change in habitat condition, but no change in extent	No															
Threatened species																
Birth rate e.g. Change in nest success	No															
Mortality rate e.g Change in number of road kills per year	No															
Number of individuals e.g. Individual plants/animals	No															

Carabooda Tank offset calculations (Secondary use – Black Cockatoo foraging habitat)

Criteria	Rating	Explanation
Start area	**2.2 ha**	Area of Black Cockatoo foraging habitat within the site.
Start quality	10	Terrestrial Fauna Consolidation Report (Stantec 2021, confirmed that the Carabooda Tank site is 'heath and shrubland' and 'woodland' habitat which is in excellent condition.
Future quality without offset	10	Without Water Corporation involvement, no change would occur.
Future quality with offset	10	quality will remain relatively unchanged by providing long term security of the site (fencing, protection).
Risk of loss (%) without offset	50%	As the land is freehold land, Water Corporation could use the site for future water infrastructure.
Risk of loss (%) with offset	1%	Protection of the offset site will substantially reduce the risk of future loss.
Confidence in result (averted loss) (%)	90%	The protection mechanisms and proposed management provide a high level of certainty that the offset will be conserved, averting the level of loss that would likely occur should no formal protection measures be implemented.
Confidence in result (habitat quality) (%)	90%	There is a high degree of confidence in this prediction based on protection mechanisms proposed.
Time over which loss is averted (years)	20	(Maximum used) offset would provide for long-term protection.
Time until ecological benefit (years)	1	Ecological benefit would occur once the habitat is protected.
Total offset %	**1.7%**	1.7% of the offset requirement for Black Cockatoos will be achieved from the Carabooda Tank site The remaining offset will be made up from other sources (On-ground management and Land acquisitions).

APPENDIX B:

BLACK COCKATOO HABITAT IMPACTS

LEGEND

Fauna Habitat

- Cleared
- Heath and Shrubland
- Parkland, Planted Vegetation and Gardens
- Pine Plantation
- Pine Plantation Regrowth
- Scattered Trees
- Wetlands and Riparian Vegetation
- Woodland
- Potential Breeding Trees
- ASDP Disturbance Footprint

1:12,000 at A4

0 110 220 330

Metres

Coordinate System:
GCS GDA 1994
Vertical Datum: AHD

DATE: 9/08/2022
AUTHOR: ZAHRAP0

Perth

N

WATER CORPORATION

Black Cockatoo Habitat

Data Source: Water Corporation - DevelopmentAreaFootprint, [DATE], INSERT ANY OTHER DATASETS HERE WITH THE NAME OF THE FILE AND DATE OF LAST EDIT

Appendix B - Figure 1

File: S:\AA_EIA_GIS\1_Projects\Capital\CW03474 - Alkimos Desalination Plant\ArcMap\Offset strategy\BC habitat_Landscape.mxd

LEGEND

Fauna Habitat

- Cleared
- Heath and Shrubland
- Parkland, Planted Vegetation and Gardens
- Pine Plantation
- Pine Plantation Regrowth
- Scattered Trees
- Wetlands and Riparian Vegetation
- Woodland
- Potential Breeding Trees
- ASDP Disturbance Footprint

1:12,000 at A4

0 110 220 330

Metres

Coordinate System:
GCS GDA 1994
Vertical Datum: AHD

DATE: 9/08/2022
AUTHOR: ZAHRAP0

Perth

N

WATER CORPORATION

Black Cockatoo Habitat

Appendix B - Figure 2

File: S:\AA_EIA_GIS\1_Projects\Capital\CW03474 - Alkimos Desalination Plant\ArcMap\Offset strategy\BC habitat_Landscape.mxd

LEGEND

Fauna Habitat

- Cleared
- Heath and Shrubland
- Parkland, Planted Vegetation and Gardens
- Pine Plantation
- Pine Plantation Regrowth
- Scattered Trees
- Wetlands and Riparian Vegetation
- Woodland
- Potential Breeding Trees
- ASDP Disturbance Footprint

1:12,000 at A4

0 110 220 330

Metres

Coordinate System:
GCS GDA 1994
Vertical Datum: AHD

DATE: 9/08/2022
AUTHOR: ZAHRAP0

Perth

N

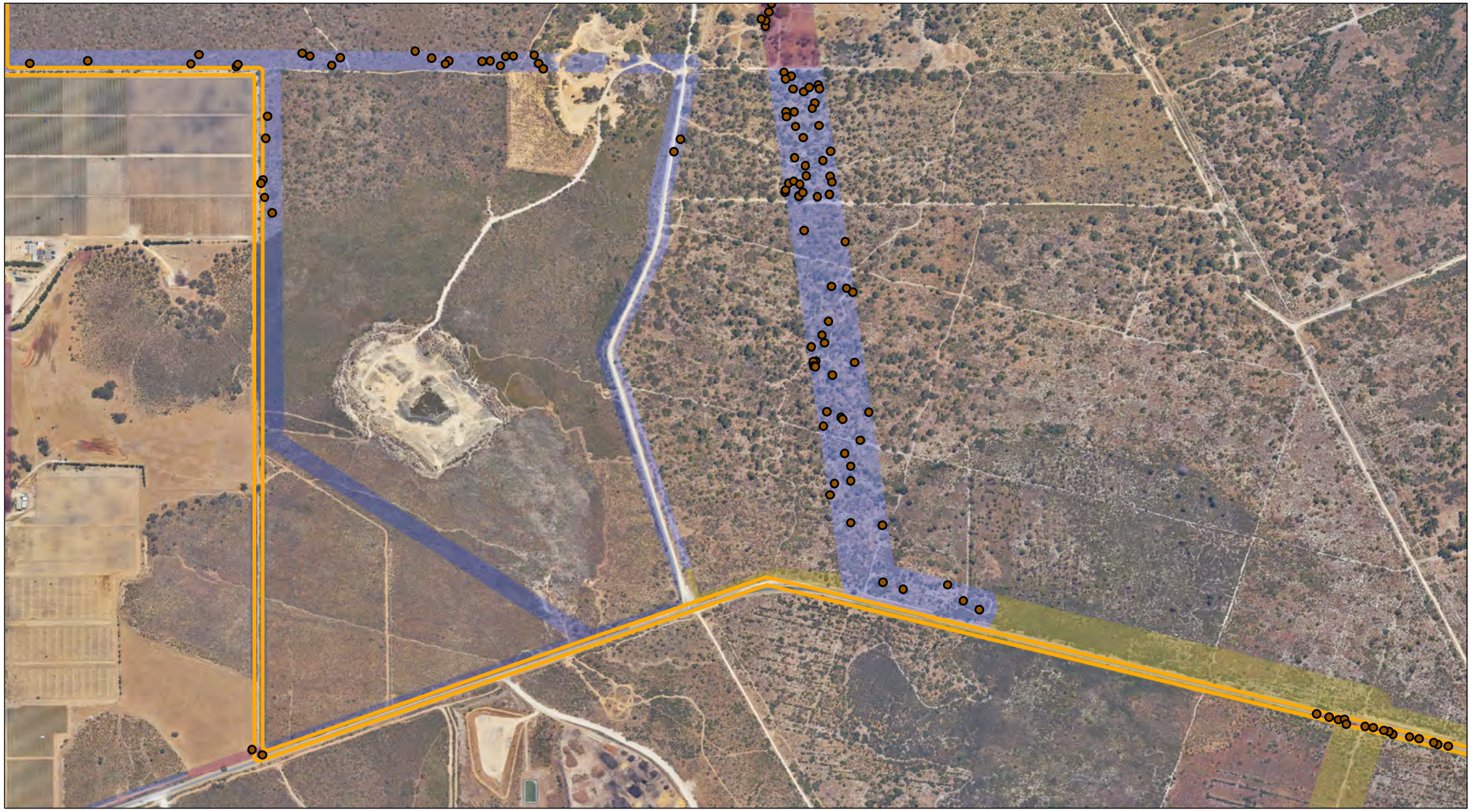
WATER CORPORATION

Black Cockatoo Habitat

Data Source: Water Corporation - DevelopmentAreaFootprint, [DATE], INSERT ANY OTHER DATASETS HERE WITH THE NAME OF THE FILE AND DATE OF LAST EDIT

Appendix B - Figure 3

File: S:\AA_EIA_GIS\1_Projects\Capital\CW03474 - Alkimos Desalination Plant\ArcMap\Offset strategy\BC habitat_Landscape.mxd



LEGEND

Fauna Habitat

- Cleared
- Heath and Shrubland
- Parkland, Planted Vegetation and Gardens
- Pine Plantation
- Pine Plantation Regrowth
- Scattered Trees
- Wetlands and Riparian Vegetation
- Woodland
- Potential Breeding Trees
- ASDP Disturbance Footprint

1:12,000 at A4

0 110 220 330

Metres

Coordinate System:
GCS GDA 1994
Vertical Datum: AHD

DATE: 9/08/2022
AUTHOR: ZAHRAP0

Perth

N

WATER CORPORATION

Black Cockatoo Habitat

Data Source: Water Corporation - DevelopmentAreaFootprint, [DATE], INSERT ANY OTHER DATASETS HERE WITH THE NAME OF THE FILE AND DATE OF LAST EDIT

Appendix B - Figure 4

File: S:\AA_EIA_GIS\1_Projects\Capital\CW03474 - Alkimos Desalination Plant\ArcMap\Offset strategy\BC habitat_Landscape.mxd

LEGEND

Fauna Habitat

- Cleared
- Heath and Shrubland
- Parkland, Planted Vegetation and Gardens
- Pine Plantation
- Pine Plantation Regrowth
- Scattered Trees
- Wetlands and Riparian Vegetation
- Woodland
- Potential Breeding Trees
- ASDP Disturbance Footprint

1:12,000 at A4

0 110 220 330

Metres

Coordinate System:
GCS GDA 1994
Vertical Datum: AHD

DATE: 9/08/2022
AUTHOR: ZAHRAP0

Perth

N

WATER CORPORATION

Black Cockatoo Habitat

Data Source: Water Corporation - DevelopmentAreaFootprint, [DATE], INSERT ANY OTHER DATASETS HERE WITH THE NAME OF THE FILE AND DATE OF LAST EDIT

Appendix B - Figure 5

File: S:\AA_EIA_GIS\1_Projects\Capital\CW03474 - Alkimos Desalination Plant\ArcMap\Offset strategy\BC habitat_Landscape.mxd

LEGEND

Fauna Habitat

- Cleared
- Scattered Trees
- Woodland

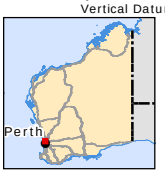
- Potential Breeding Trees
- ASDP Disturbance Footprint

1:12,000 at A4

0 120 240 360

Metres

Coordinate System: GDA 1994 MGA Zone 50
Vertical Datum: AHD



DATE: 9/08/2022
AUTHOR: ZAHRAP0

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WATER CORPORATION

Black Cockatoo Habitat

Appendix B - Figure 6

Data Source: Water Corporation - DevelopmentAreaFootprint, [DATE], INSERT ANY OTHER DATASETS HERE WITH THE NAME OF THE FILE AND DATE OF LAST EDIT

File: S:\AA_EIA_GIS\1_Projects\Capital\CW03474 - Alkimos Desalination Plant\ArcMap\Offset strategy\BC habitat_Portrait.mxd

LEGEND

Fauna Habitat

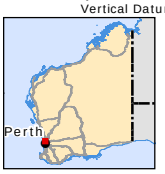
- Cleared
- Parkland, Planted Vegetation and Gardens
- Woodland
- Potential Breeding Trees
- ASDP Disturbance Footprint

1:12,000 at A4

0 120 240 360

Metres

Coordinate System: GDA 1994 MGA Zone 50
Vertical Datum: AHD



DATE: 9/08/2022
AUTHOR: ZAHRAP0

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Black Cockatoo Habitat

Appendix B - Figure 7

Data Source: Water Corporation - DevelopmentAreaFootprint, [DATE], INSERT ANY OTHER DATASETS HERE WITH THE NAME OF THE FILE AND DATE OF LAST EDIT

File: S:\AA_EIA_GIS\1_Projects\Capital\CW03474 - Alkimos Desalination Plant\ArcMap\Offset strategy\BC habitat_Portrait.mxd

LEGEND

Fauna Habitat

- Cleared
- Heath and Shrubland
- Parkland, Planted Vegetation and Gardens
- Pine Plantation
- Pine Plantation Regrowth
- Scattered Trees
- Wetlands and Riparian Vegetation
- Woodland
- Potential Breeding trees
- ASDP Disturbance Footprint

1:12,000 at A4

0 110 220 330

Metres

Coordinate System:
GCS GDA 1994
Vertical Datum: AHD

DATE: 9/08/2022
AUTHOR: ZAHRAP0

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WATER CORPORATION

Black Cockatoo Habitat

Data Source: Water Corporation - DevelopmentAreaFootprint, [DATE], INSERT ANY OTHER DATASETS HERE WITH THE NAME OF THE FILE AND DATE OF LAST EDIT

Appendix B - Figure 8

File: S:\AA_EIA_GIS\1_Projects\Capital\CW03474 - Alkimos Desalination Plant\ArcMap\Offset strategy\BC habitat_Landscape.mxd

LEGEND

Fauna Habitat

- Cleared
- Parkland, Planted Vegetation and Gardens
- Scattered Trees
- Wetlands and Riparian Vegetation
- Woodland
- Potential Breeding Trees
- ASDP Disturbance Footprint

1:12,000 at A4

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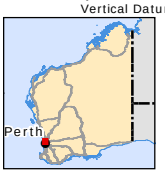
Metres

Coordinate System: GDA 1994 MGA Zone 50
Vertical Datum: AHD



DATE: 9/08/2022
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Black Cockatoo Habitat

Appendix B - Figure 9

Data Source: Water Corporation - DevelopmentAreaFootprint, [DATE], INSERT ANY OTHER DATASETS HERE WITH THE NAME OF THE FILE AND DATE OF LAST EDIT

File: S:\AA_EIA_GIS\1_Projects\Capital\CW03474 - Alkimos Desalination Plant\ArcMap\Offset strategy\BC habitat_Portrait.mxd

LEGEND

Fauna Habitat

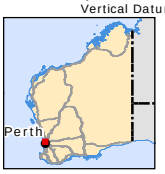
- Cleared
- Parkland, Planted Vegetation and Gardens
- Scattered Trees
- Woodland
- Potential Breeding Trees
- ASDP Disturbance Footprint

1:12,000 at A4

0 120 240 360

Metres

Coordinate System: GDA 1994 MGA Zone 50
Vertical Datum: AHD



DATE: 9/08/2022
AUTHOR: ZAHRAP0

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Black Cockatoo Habitat

Appendix B - Figure 10

Data Source: Water Corporation - DevelopmentAreaFootprint, [DATE], INSERT ANY OTHER DATASETS HERE WITH THE NAME OF THE FILE AND DATE OF LAST EDIT

File: S:\AA_EIA_GIS\1_Projects\Capital\CW03474 - Alkimos Desalination Plant\ArcMap\Offset strategy\BC habitat_Portrait.mxd

APPENDIX C:

SURVEY OF GOBBY ROAD - 360 ENVIRONMENTAL (2021)

360 environmental

Alkimos Desalination Plant Offset Site, Lot 1375 Gobby Road, Keysbrook

Black Cockatoo Habitat Assessment and Hollow Inspection

Prepared for

Water Corporation

April 2021

people planet professional

Document Reference	Revision	Prepared by	Reviewed by	Admin Review	Submitted to Client	
					Copies	Date
4323AA_Rev0	Internal Draft	L. Geidans	E. Webb S. Walker	-	-	08/04/2021
4323AA_Rev1	Client Draft	360 Environmental	Water Corporation	S. Hick	x1 electronic copy	28/04/2021
4323AA_Rev2	Client Final					

Disclaimer

Executive Summary

Water Corporation commissioned 360 Environmental Pty Ltd (360 Environmental) to undertake a black cockatoo habitat assessment of Lot 1375 Gobby Road, Keysbrook, in February 2021.The Survey Area covers 37 ha and is approximately 56 km south south-east of Perth, in the Jarrah Forest bioregion.

This biological assessment aims to provide information to assist in determining whether the Survey Area is an appropriate environmental offset for the proposed Alkimos Desalination Plant.

The Survey Area occurs within the modelled breeding distribution of the Carnaby's Black Cockatoo, Forest Red-tailed Black Cockatoo and Baudin's Black Cockatoo.

The black cockatoo habitat assessment identified 611 potential breeding trees with a DBH of greater than 500 mm, and three trees with a DBH of less than 500 mm but with a potentially suitable breeding hollow, comprising:

- 215 Jarrah (*Eucalyptus marginata*)
- 158 Marri (*Corymbia calophylla*)
- 38 Powderbark Wandoo (*Eucalyptus accedens*)
- 115 Wandoo (*Eucalyptus wandoo*)
- One Tuart (*Eucalyptus gomphocephala*)
- 84 stags.

157 trees contain hollows that were of suitable size (>12 cm) for black cockatoo breeding and were further investigated. A total of 55 trees were identified to contain potentially suitable hollows for use by black cockatoo breeding. Twelve hollows exhibited evidence of black cockatoo breeding such as chew marks around the hollow entrance.

A total of 36.47 ha of very high-quality black cockatoo foraging habitat, comprising predominantly Jarrah and Marri, was recorded within the Survey Area. Direct sightings of Forest Red-tailed Black Cockatoos and Baudin's Black Cockatoos were recorded within the Survey Area.

Table of Abbreviations

Abbreviation	Description
BC Act	WA Biodiversity Conservation Act 2016
EP Act	WA Environmental Protection Act 1986
EPA	Environmental Protection Authority
360 Environmental	360 Environmental Pty Ltd
DBCA	Department of Biodiversity, Conservation and Attractions
GIS	Geographic Information System
IBRA	Interim Biogeographic Regionalisation for Australia
IBSA	Index of Biodiversity Surveys for Assessments
EPBC Act	Environment Protection Biodiversity and Conservation Act 1999
PMST	Protected Matters Search Tool
WA	Western Australia
km	Kilometres
mm	millimetres

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1 Introduction

1.1 The Project

Water Corporation commissioned 360 Environmental Pty Ltd (360 Environmental) to undertake a black cockatoo habitat assessment of Lot 1375 Gobby Road, Keysbrook, in February 2021.The Survey Area covers 37 ha and is approximately 56 km south south-east of Perth, in the Jarrah Forest bioregion (Figure 1).

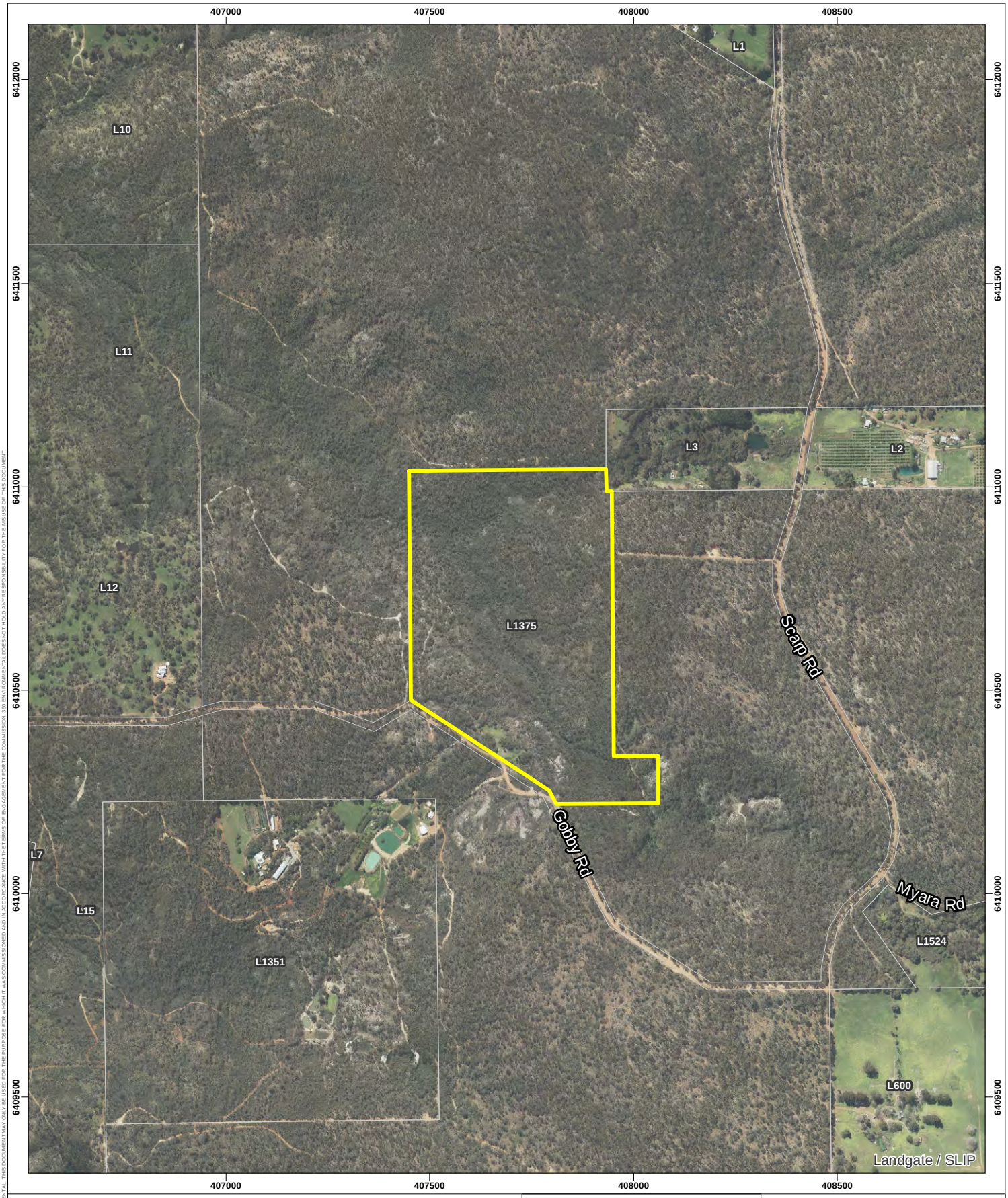
This biological assessment aims to provide information to assist in determining whether the Survey Area is an appropriate environmental offset for the proposed Alkimos Seawater Desalination Plant.

1.2 Objectives and Scope

The purpose of the survey is to delineate key black cockatoo values within the Survey Area.

The scope of works includes:

- Completing a desktop assessment using DBCA database searches for the proposed Offset Site to determine environmental values and conservation significant habitat
- Undertaking a field survey to assess the quality of black cockatoo habitat within the Survey Area
- Identifying evidence (if any) of black cockatoo foraging and assess the quality of foraging habitat within the Survey Area
- Conducting a visual inspection on any trees with hollows to identify evidence of use by black cockatoos and provide an indication on the size of the hollow.



Legend

- Cadastral Lines
- Survey Area

0 130 260 390 Meters
1:12,500 @ A4

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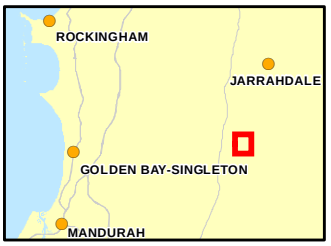
- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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- OTHER DATA SOURCED LANDGATE 2019
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2020
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PROJECT ID	DATE
4323	30/03/2021

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GDA 1994 MGA Zone 50

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LF	LG	SW	0

Water Corporation
Gobby Road Offset Site, Keysbrook

Alkimos Seawater Desalination Plant
Offset Black Cockatoo Assessment

Figure 1
Survey Area

K:\Projects\1.0 EBS\4323 Alkimos Seawater Desalination Plant Offset Black Cockatoo Assessment\4323 F01 Survey Area.mxd

2 Methods

2.1 Desktop Assessment

2.1.1 Database Searches

Database searches were undertaken to identify known black cockatoo breeding areas within or surrounding the Survey Area (Table 1). The search area for each parameter was varied to reflect distances recommended by DBCA.

Table 1: Database Searches of the Survey Area

Database Name	Date Received	Search Target	Search Area
DBCA Threatened and Priority Fauna List and black cockatoo custom search (Department of Biodiversity Conservation and Attractions, 2021b)	26 February 2021	Threatened Priority Fauna and Black Cockatoo	20 km search buffer of the Survey Area
NatureMap area search (Department of Biodiversity Conservation and Attractions, 2021a)	17 February 2021	Threatened Priority Fauna and Black Cockatoo	20 km search buffer of the Survey Area
Protected Matters Search Tool area search (Department of Agriculture Water and the Environment, 2021)	17 February 2021	Commonwealth listed threatened flora and fauna, and TECs	20 km search buffer of the Survey Area

2.2 Black Cockatoo Habitat Assessment

2.2.1 Field Survey

The black cockatoo habitat assessment was undertaken by 360 Environmental ecologists Lukas Geidans, Louis Masarei and Poppy Walker over six non-consecutive days in February 2021. The Survey Area was traversed on foot to determine the presence of breeding, foraging and roosting habitat. The survey was conducted in accordance with the EPBC Act Referral Guidelines for three threatened Black Cockatoo Species (Department of Sustainability Environment Water Population and Communities, 2012) and with due regard for the revised draft referral guideline for three threatened black cockatoo species (Department of the Environment and Energy, 2017).

2.2.2 Breeding Habitat

Any trees meeting the following criteria for potential breeding or future breeding, based on the criteria described in the referral and revised draft referral guidelines (Department of Sustainability Environment Water Population and Communities, 2012; Department of the Environment and Energy, 2017), were recorded using the Fulcrum mobile data-collection application. The following information was collected:

- Tree species with the potential to form suitable hollows, particularly endemic eucalypt species (e.g. Wandoo, York Gum and Salmon Gum)

- Diameter at breast height (DBH) of greater than 500 mm (greater than 300 mm for Wandoo and Salmon Gum) regardless of the presence or absence of hollows (DBH was measured approximately 1.3 m from the ground)
- Any trees containing hollows (observed from the ground) were then categorised as:
    - Hollows that are obviously unsuitable for black cockatoo breeding (e.g. hollows with an estimated opening diameter of obviously less than 100 mm, downwards-facing hollows)
    - Hollows that are potentially suitable for black cockatoo breeding (e.g. upwards or sideways-facing hollows with an estimated opening diameter of possibly greater than 100 mm) (Saunders, Mawson and Dawson, 2014).

Trees with swellings or forking/branching at breast height were measured just above or below breast height to gain a more accurate measurement of diameter. In instances where trees had multiple stems, only the largest stem was measured.

2.2.2.1 Hollow Inspection

Hollows that were recorded as potentially suitable during the initial assessment from the ground were reinspected using a DJI Mini 2 drone. Each hollow was photographed and reassessed for its suitability for use by black cockatoos.

2.2.3 Foraging Habitat

Foraging habitat was assessed based on the presence of tree and shrub species known to be important dietary items for black cockatoos, such as Marri and *Banksia* species, as outlined in the referral and revised draft referral guidelines. It also included looking for:

- Evidence of feeding (chewed cones, seed and nut material)
- Opportunistic observations of black cockatoos foraging or using the Survey Area.

Foraging habitat was mapped and classified as low, medium, high, or very high quality using criteria based on the Foraging Habitat Scoring Tool in the Draft Revised EPBC Referral Guidelines (Department of the Environment and Energy, 2017).

2.2.4 Roosting Habitat

Areas suitable for black cockatoo roosting were identified and recorded. If observed, evidence of roosting such as scat at the base of trees was recorded. Note, absence of roosting evidence did not rule out the possibility of black cockatoo roosting, as dusk/dawn surveys were not undertaken.

2.3 Limitations

Limitations and constraints of the black cockatoo survey are detailed below in Table 2.

Table 2: Limitations and Constraints Associated with the Survey

Variable	Degree of Limitation	Potential Constraints on Survey Outcomes
Availability of Data	Not a limitation	All data required to complete the scope of works including regional and local contextual information was available

Variable	Degree of Limitation	Potential Constraints on Survey Outcomes
Access and Survey Intensity	Minor limitation	The site contained adequate tracks to allow for vehicle access. The remainder of the site was accessed on foot. Hollows were inspected using a DJI Mini 2 drone. Potential hollows occurring below the canopy or in amongst other foliage and strong and gusty winds experienced during the survey inhibited flying close to some hollows during the inspections. These weather conditions meant that photographs of hollows were taken from further away and finer details such as chew marks were difficult to observe.
Experience	Not a limitation	The black cockatoo habitat assessment was undertaken by suitably qualified ecologists Lukas Geidans, Poppy Walker and Louis Masarei with a combined total of eight years' experience conducting black cockatoo surveys. The team was supported by senior zoologist Evan Webb who has over 5 years' experience conducting black cockatoo surveys.
Timing, weather, season	Not a limitation	The field survey was undertaken during the recommended timing for black cockatoo surveys as outlined the Revised Draft Referral Guideline for Three Threatened Black Cockatoo Species (Department of the Environment and Energy, 2017). Timing was not a limitation for the black cockatoo survey.
Life forms sampled	Not a limitation	There were no constraints relating to black cockatoo sampling during the field survey.
Completeness	Not a limitation	The survey was considered complete for a black cockatoo assessment.

3 Results

3.1 Desktop Assessment

The Survey Area occurs within the modelled breeding distribution of the Carnaby's Black Cockatoo, Forest Red-tailed Black Cockatoo and Baudin's Black Cockatoo (Department of Sustainability Environment Water Population and Communities, 2012; Department of the Environment and Energy, 2017).

The DBCA black cockatoo database search identified three potential Forest Red-tailed breeding sites within 20 km of the Survey Area. The closest potential Forest Red-tailed breeding site was 5.25 km north east of the Survey Area. An additional eight potential White-tailed Black Cockatoo (where a positive species identification to Carnaby's Black Cockatoo or Baudin's Black Cockatoo was not made) breeding sites were recorded within 20 km of the Survey Area. One confirmed White-tailed Black Cockatoo breeding site was identified 10.7 km east north-east of the Survey Area. The three closest potential White-tailed Black Cockatoo breeding sites were within 1.3 km and 1.5 km west of the Survey Area. Figure 2 outlines the location of these sites.

The database search also identified 32 black cockatoo roosting sites within 20 km of the Survey Area, of which five roost sites were located within 5 km of the Survey Area (Figure 2). The nearest roost sites to the Survey Area are located approximately 18 m south and 380 m west. In 2019, both Forest Red-tailed and White-tailed Black Cockatoos were recorded at these two roost sites (Department of Biodiversity Conservation and Attractions, 2021c).

3.2 Breeding Habitat

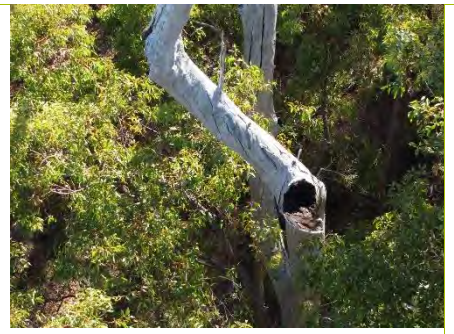
A total of 611 potential breeding trees with a DBH of greater than 500 mm, and three trees with a DBH of less than 500 mm but with a potentially suitable breeding hollow, were recorded within the Survey Area (Figure 3; Appendix A), comprising:

- 215 Jarrah (*Eucalyptus marginata*)
- 158 Marri (*Corymbia calophylla*)
- 38 Powderbark Wandoo (*Eucalyptus accedens*)
- 115 Wandoo (*Eucalyptus wandoo*)
- One Tuart (*Eucalyptus gomphocephala*)
- 84 stags (dead trees).

200 trees were observed to contain hollows from the ground, of which 157 were considered potentially suitable for black cockatoo breeding and inspected by drone. Drone inspections found that:

- A total of 55 trees contain hollows are suitable for black cockatoo breeding, of which 12 show potential signs of previous use such as evidence of chewing around the entrance (Table 3).
- One tree contains hollows that may potentially be suitable for black cockatoo breeding in the future but are currently occupied by bees.

Table 3: Hollows Exhibiting Breeding Evidence

 Tree ID: 5	 Tree ID: 106	 Tree ID: 48	 Tree ID: 82
 Tree ID: 116	 Tree ID: 117	 Tree ID: 124	 Tree ID: 40
 Tree ID: 58	 Tree ID: 98	 Tree ID: 224	 Tree ID: 223

3.3 Black Cockatoo Observations

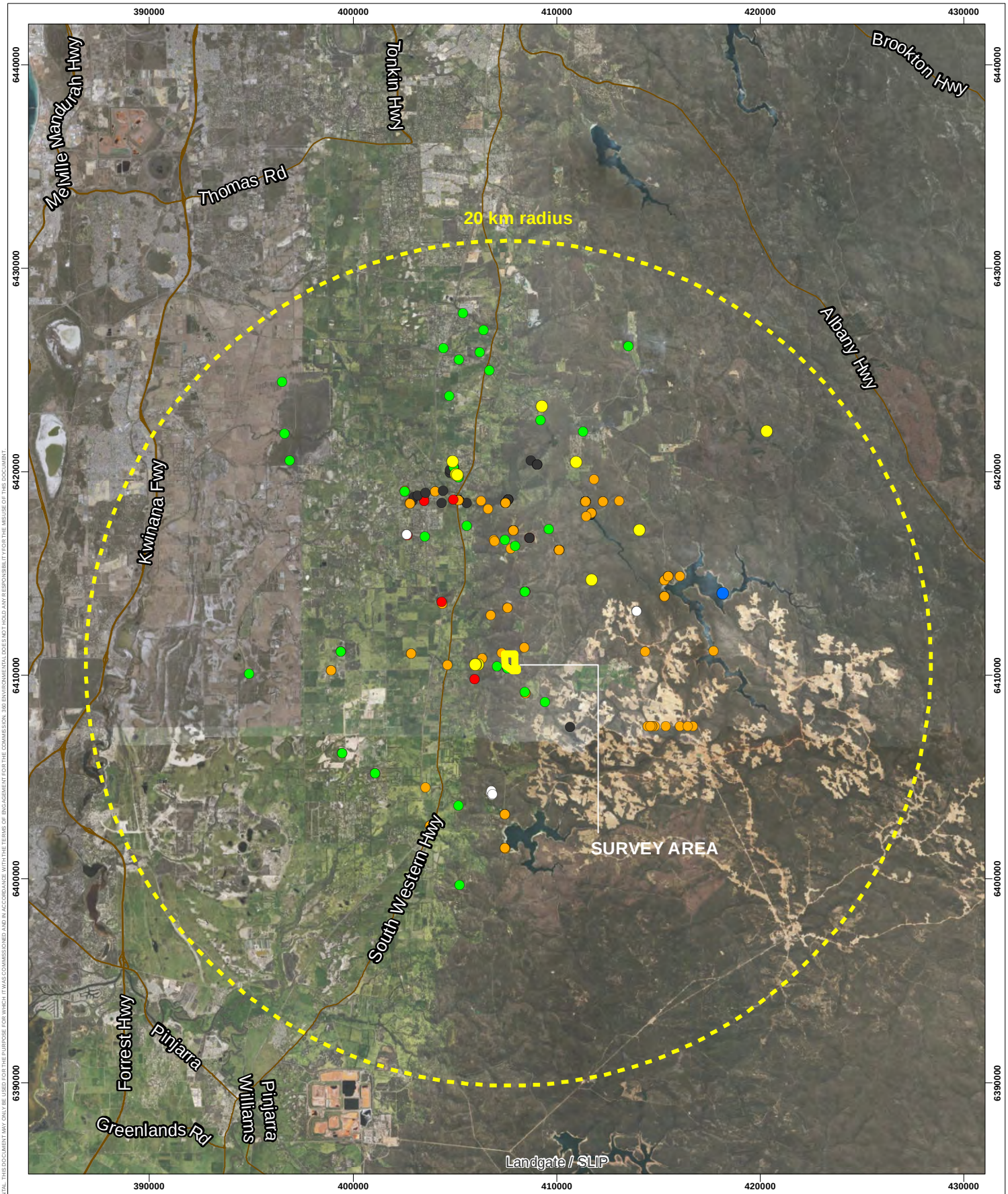
Black cockatoos were heard calling during the six day survey. Direct sightings of approximately ten Forest Red-tailed Black Cockatoos was made within the Survey Area. A sighting of a flock of approximately 15 Baudin's Black Cockatoos was roughly approximately 25 outside the Survey Area. These locations are shown in Figure 4 and Appendix B.

3.4 Foraging Habitat

A total of 36.47 ha of very high quality black cockatoo foraging habitat was recorded within the Survey Area, consisting of vegetation dominated by Jarrah and Marri. Foraging habitat is mapped in Figure 4 and the results of the Foraging Habitat Scoring Tool are displayed in full in Appendix C.

3.5 Roosting Habitat

No direct sightings of roosting black cockatoos were made during the survey. The Survey Area contains approximately 36.47 ha of potential roosting habitat and all trees recorded as potential breeding trees may also be used for roosting.



Legend

- Survey Area
- Baudin's cockatoo
- Carnaby's cockatoo
- Forest red-tailed black cockatoo
- White-tailed black cockatoo

Black Cockatoo Breeding Area

- Confirmed
- Potential

Black Cockatoo Roosting Area

- Confirmed

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- OTHER DATA SOURCED LANDGATE 2019
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2020
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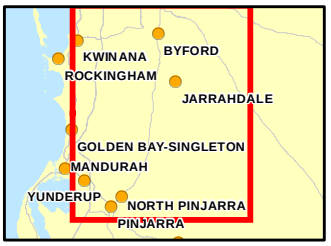
- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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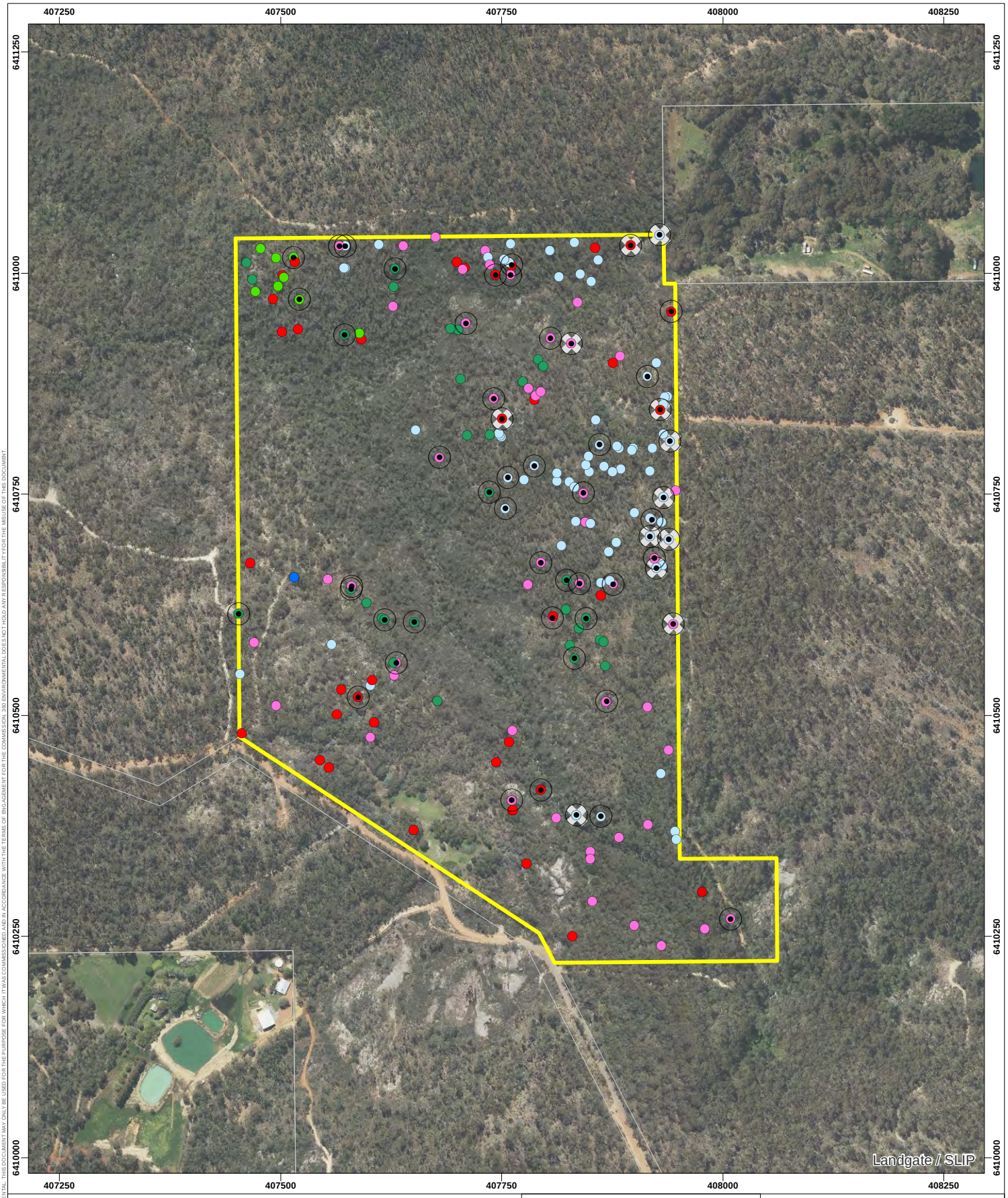
Water Corporation
Gobby Road Offset Site, Keysbrook
Alkimos Seawater Desalination Plant
Offset Black Cockatoo Assessment

Figure 2
DBCA Black Cockatoo Database Search

K:\Projects\1.0 EBS\4323 Alkimos Seawater Desalination Plant Offset Black Cockatoo Assessment\4323 F02 DBCA Black Cockatoo Database Search.mxd



Legend

- Survey Area
- Cadastral Lines
- Trees with Hollows Suitable for Breeding
- Trees with Breeding Evidence

Potential Black Cockatoo Breeding Trees (with hollows)

- Jarrah (*Eucalyptus marginata*)
- Marri (*Corymbia calophylla*)
- Powderbark Wandoo (*Eucalyptus accedens*)
- Stag
- Tuart (*Eucalyptus gomphocephala*)
- Wandoo (*Eucalyptus wandoo*)

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- LOCALITY MAP SOURCED FROM LANDGATE 2020
- OTHER DATA SOURCED LANDGATE 2020
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2020
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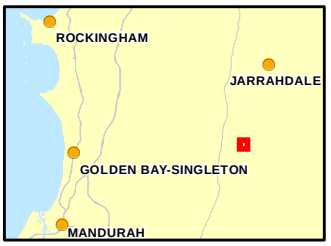
- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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LF	LG	SW	0

Water Corporation
Gobby Road Offset Site, Keysbrook
Alkimos Seawater Desalination Plant Offset Black Cockatoo Assessment

Figure 3
Potential Black Cockatoo Breeding Trees

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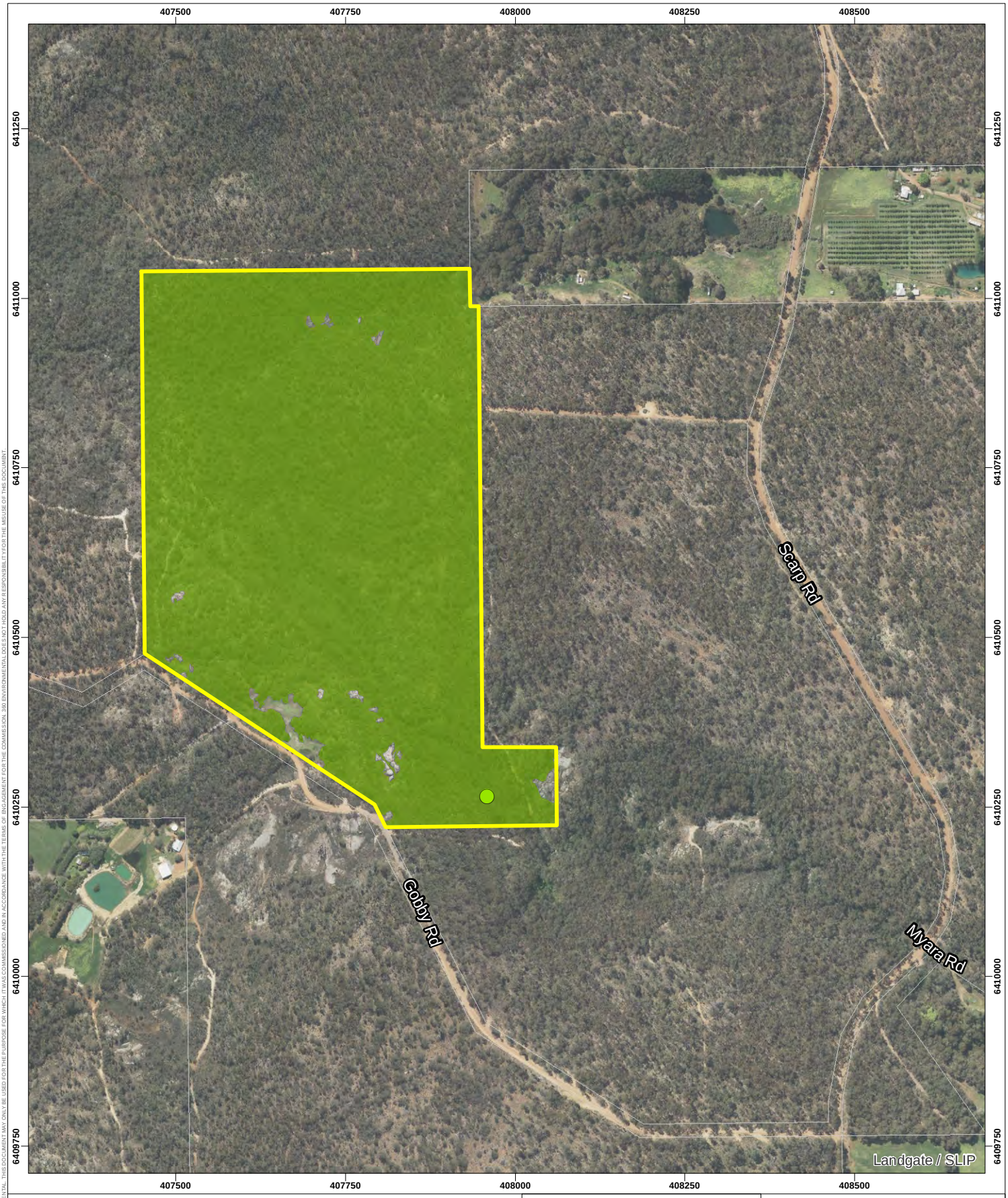

Legend

- Survey Area
- Cadastral Lines
- Very High Quality Foraging Habitat

Black Cockatoo Evidence

- Forest Red-tailed Black Cockatoo, Sighting

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- LOCALITY MAP SOURCED FROM LANDGATE 2020
- OTHER DATA SOURCED LANDGATE 2020
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2020
(© Western Australian Land Information Authority 2020)

0 75 150 225
Meters
1:7,500 @ A4

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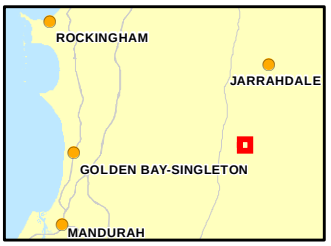
- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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Water Corporation
Gobby Road Offset Site, Keysbrook

Alkimos Seawater Desalination Plant
Offset Black Cockatoo Assessment

Figure 4
Black Cockatoo Foraging Habitat

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4 Discussion and Conclusion

The Survey Area occurs within the known breeding range of the Carnaby's Black Cockatoo, Forest Red-tailed Black Cockatoo and Baudin's Black Cockatoo and the survey was undertaken within the peak breeding season for black cockatoos (Department of Sustainability Environment Water Population and Communities, 2012; Department of the Environment and Energy, 2017). The results of the DBCA database search results identified nearby potential breeding sites for both Forest Red-tailed and White-tailed Black Cockatoos located within 20 km of the Survey Area and suitable breeding hollows were identified within the Survey Area. A number of these identified hollows showed evidence of previous use (such as chew marks at the entrance).

While foraging evidence was not found, the Survey Area contains very high quality foraging habitat for all three black cockatoo species consisting primarily of Jarrah, Marri and Wandoo (Groom, 2011; Department of the Environment and Energy, 2017). The presence of a small creekline dissecting the Survey Area increases the value of foraging habitat within the Survey Area as it provides a water source for black cockatoos.

The DBCA database search results indicate that a known black cockatoo roosting site occurs 18 m to the south of the Survey Area. Given that this roosting site occurs in a patch of vegetation that continues into the Survey Area, it is likely that the Survey Area constitutes part of this known roosting site. Both Forest Red-tailed and White-tailed Black Cockatoos were recorded at this roosting site in 2019.

The Survey Area is a proposed offset for the site of the Alkimos Seawater Desalination Plant, which falls within the Guilderton and Cottesloe (Central and South) Pre-European Vegetation Complexes as described by Beard (2013). The Guilderton Complex is described as Thickets of *Acacia rostellifera (*summer-scented acacia) and *Melaleuca cardiophylla* (tangling melaleuca), interspersed with *A. lasiocarpa* (panjang), and *Melaleuca systena* (coastal melaleuca heath) (Beard *et al.*, 2013). The Cottesloe Complex is described as a Low Woodland or Open Low Woodland, characterized by *Acacia* and *Banksia* species (Beard *et al.*, 2013). The Survey Area therefore comprises very different habitat and vegetation to the Alkimos Seawater Desalination Plant Survey Area, however both sites provide high quality foraging habitat for black cockatoos.

The key findings of the 2021 Black Cockatoo Habitat Assessment are summarised below:

- A total of 611 trees with a DBH of greater than 500 mm and three trees with a DBH of less than 500 mm but with a potentially suitable breeding hollow were recorded
- A total of 55 trees were found to contain potentially suitable hollows for use by black cockatoos, of which 12 hollows showed potential evidence of previous use, such as chew marks around the hollow entrance
- A total of 36.47 ha of very high quality foraging habitat was recorded, which also constitutes roosting habitat
- A known black cockatoo roosting site occurs 18 m to the south of the Survey Area in a patch of vegetation that continues into the Survey Area, therefore it is likely that the Survey Area constitutes part of this roosting site

- Baudin's Black Cockatoos and Forest Red-Tailed Black Cockatoos were seen and heard calling within the Survey Area.

5 References

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6 Limitations of this Report

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Appendices

Appendix A
Raw Tree Data

Latitude	Longitude	Taxa	DBH (mm)	Approx height (m)	# of hollows	# of hollows > 120 mm	# of hollows with bees	Comments	Suitable for Black Cockatoo	Tree Photo Reference	Hollow Photo Reference
-32.44107640	116.01949350	Marri (Corymbia calophylla)	520	6	1					178578fb-a47b-4598-b238-ace6ccfdb310	
-32.44109570	116.02013630	Marri (Corymbia calophylla)	520	12						03116813-9799-407a-a36c-119ed8922a69	
-32.44096960	116.02024010	Stag	980	10	3	3			No	74a964f5-16aa-4b28-8a5c-e676ead1da7	52, 53, 54
-32.44119040	116.02032350	Marri (Corymbia calophylla)	640	10						5295e7b0-f791-403b-8e1e-be3d2d0cf8e0	
-32.44135400	116.02027210	Marri (Corymbia calophylla)	580	8						7d657593-2bb3-4111-a78d-0d47666fb0be	
-32.44117420	116.02056090	Stag	1020	8	1	1			No	f2d30e03-48dd-453c-ab04-22fa86ce3ae3	55, 56
-32.44116030	116.02062630	Marri (Corymbia calophylla)	510	14						fc512237-beac-43fc-8f3e-d81de606f26f	
-32.44109260	116.02078440	Marri (Corymbia calophylla)	500	16						43bfa53f-c2c5-4593-a868-700d46f4df72	
-32.44102690	116.02050870	Marri (Corymbia calophylla)	500	10						d96b1d0e-0135-48cb-82e1-3c5982466f4b	
-32.44052740	116.02048860	Jarrah (Eucalyptus marginata)	760	14						e0798939-0d3f-4f7d-8c77-3039804904ae	
-32.44051070	116.02021800	Marri (Corymbia calophylla)	500	12						27d4d428-d148-4955-93e4-97375cd7ce4f	
-32.44048510	116.01993760	Marri (Corymbia calophylla)	500	12						d8bb4d6c-e6cb-41d1-8d1d-a21418c2e2bf	
-32.44020668	116.01971670	Stag	800	7	1	1			No		57, 58, 59
-32.43985730	116.01931360	Stag	1010	3	1	1				3a134093-aec7-4295-bbbc-91d4ca208af2	
-32.43977160	116.01947970	Marri (Corymbia calophylla)	1160	17						1fc5b2ea-2737-4486-abae-b87f5df3dc97	
-32.43983459	116.01955280	Jarrah (Eucalyptus marginata)	990	18	3				Yes	513a63c0-4ff9-40cb-934f-8574ce80868f	60, 61, 62, 63
-32.43896440	116.01879620	Stag	940	7	1	1			No	a326cb31-8a03-4a77-b234-703a52a1010e	65, 66
-32.43885240	116.01818990	Wandoo (Eucalyptus wandoo)	500	10						1f0cf2af-7b81-442d-86e9-5affd0286440	
-32.43875090	116.01786900	Wandoo (Eucalyptus wandoo)	510	8						6726d38e-7093-4a07-a47e-aa5d9e5636d9	
-32.43865590	116.01789640	Wandoo (Eucalyptus wandoo)	700	14	2	2			No	3636321c-6d00-41fe-a3ff-bca9bf03e3a0,e33f09f4-e008-4250-9547-54b24526b343	87, 88, 89, 90
-32.43874480	116.01750930	Jarrah (Eucalyptus marginata)	670	8						df1912ac-1f6f-41fc-b925-0b195868dc2f	
-32.43874450	116.01745300	Marri (Corymbia calophylla)	780	6						9a451670-4167-4e56-9a7d-903335c15e56	
-32.43899710	116.01738800	Stag	870	17						c2fe50f1-3f12-4fa3-ad73-bf7036ed972d	
-32.43908960	116.01725710	Marri (Corymbia calophylla)	650	11						e47e9577-bd23-4e36-bc19-04d5864da3a2	
-32.43898590	116.01711880	Marri (Corymbia calophylla)	940	14						332d88b0-7980-4801-bb13-7643dadb4946	
-32.43901790	116.01708700	Stag	500	16	1					f32913e2-6f39-413c-abcf-565988319c68	
-32.43899250	116.01699240	Marri (Corymbia calophylla)	720	12						ed6c428a-b2d0-4bc5-a9bb-e3b49b0a9ea8	
-32.43891220	116.01695270	Marri (Corymbia calophylla)	740	12						d7cc6826-d2a3-47b3-ac92-4f78409c19d8	
-32.43887020	116.01713510	Marri (Corymbia calophylla)	690	12	1					54253f7b-90f4-4265-b1bc-a4ac1afc6f45	
-32.43877100	116.01714030	Marri (Corymbia calophylla)	710	17						b758b505-7388-4360-b33a-6a3e794d741c	
-32.43873190	116.01731760	Jarrah (Eucalyptus marginata)	580	14						d152bee2-3f43-443e-8b36-e52a903c4a06	
-32.43868410	116.01725780	Marri (Corymbia calophylla)	610	12						5a7fb8ca-0347-41d6-b053-4405136639ee	
-32.43861010	116.01720250	Jarrah (Eucalyptus marginata)	540	10						e52263c9-bf00-4edf-a5d7-82d2a2ca006a	
-32.43865880	116.01707290	Jarrah (Eucalyptus marginata)	620	10						764a3aec-eba0-4fa2-bb97-642ec14bf8c6	
-32.43860630	116.01693770	Marri (Corymbia calophylla)	510	8	1	1			Yes	0c6017ff-bddd-46c6-93dc-4512a88b0392	75, 76
-32.43849790	116.01703650	Marri (Corymbia calophylla)	840	8						65845a87-198d-4feb-88fd-f1d0eba50d81	
-32.43849400	116.01709360	Jarrah (Eucalyptus marginata)	700	12	1	1			No	254c6757-cf87-4fa9-8cad-033ecca24345	73, 74
-32.43843720	116.01711640	Marri (Corymbia calophylla)	820	8	1	1				5e16daf4-9d35-4f83-aec9-0b8d460c99f5	
-32.43839630	116.01737950	Stag	760	16	2	2				602aa5c7-0545-4cf9-8c83-366bca8562ea	
-32.43852770	116.01673600	Marri (Corymbia calophylla)	1060	7	1					8986bc70-2634-44c1-9237-1db576e23ab4	
-32.43878540	116.01667930	Marri (Corymbia calophylla)	510	6	1	1			No	754a9098-90ff-4a50-8f8f-0a57983ad7b4	81, 82
-32.43901940	116.01650600	Marri (Corymbia calophylla)	530	13						8e6cd522-1566-45bf-aca3-7b1d747f01ff	
-32.43925060	116.01647280	Marri (Corymbia calophylla)	1240	18	1					0aee307f-34ee-4221-9b8c-c71f01fe196d	
-32.44021510	116.01852400	Marri (Corymbia calophylla)	510	12						750cbf9a-d670-4428-b4b9-2ad19e1e8fbb	
-32.44023100	116.01852520	Marri (Corymbia calophylla)	550	14						dfea8f07-671d-41e3-b92d-4beba8eb5ea4	
-32.44074300	116.01886260	Marri (Corymbia calophylla)	500	8						2190e76b-b041-4952-a47a-0d944f976197	
-32.44077990	116.01884790	Jarrah (Eucalyptus marginata)	160	12						dec91d2b-a3c1-4b15-a785-50370bfc2150	
-32.44078700	116.01884600	Jarrah (Eucalyptus marginata)	550	12						699fa901-88c6-4e16-bcea-9af4df9e0a74	
-32.44084160	116.01899440	Marri (Corymbia calophylla)	500	10						67c7a236-f8de-4d70-a4f8-67bfa2c0b4f6	
-32.44082080	116.01975890	Marri (Corymbia calophylla)	520	8						6c8df97a-aa7c-4c03-b75f-6b1045c6bd92	
-32.44071070	116.01974030	Stag	600	10	3	1				6588ef8a-a761-4335-813b-72e74686dc7f	
-32.44065440	116.01985090	Marri (Corymbia calophylla)	920	14						a9da0e8b-520b-4a79-bb43-236ae9710700	
-32.44065960	116.02057230	Jarrah (Eucalyptus marginata)	850	14						3c4f666e-3abb-4fb1-b6f1-bbfb12c05186	
-32.44028950	116.02012660	Jarrah (Eucalyptus marginata)	490	12						1ab9f1d7-58ac-433b-b5a8-3f99c74f9c68	
-32.44037108	116.01987630	Jarrah (Eucalyptus marginata)	510	12						779ca1cf-bd91-4238-8142-f7b2f8ecf96c	
-32.44028750	116.01972300	Stag	760	10	3	2				170b1e6d-c1fe-4a11-b5d1-8153a0a13498	
-32.43957200	116.01912960	Marri (Corymbia calophylla)	540	10	1	1			Yes	4df0b1ba-59e3-467d-86c0-0fe601de1164	64
-32.43908160	116.01875650	Marri (Corymbia calophylla)	530	10	1					aef643e8-f8b9-4726-ad6a-d901f7466cd5,37958150-7499-47bc-94a6-1397d3df2185	
-32.43928650	116.01859940	Marri (Corymbia calophylla)	810	10	2	1				bcdd9a13-d276-4ec3-abef-2685f8e9f65c	
-32.43929150	116.01849830	Stag	490	10						69b7eced-69dc-4beb-8f38-ca9e470a2ecc	
-32.43929018	116.01817610	Marri (Corymbia calophylla)	590	10						60d4bd49-1e65-45cf-89b4-f9a0bd5be449,48b4103c-ece3-408f-8c1f-4eff86b96f76	
-32.43930574	116.01794040	Marri (Corymbia calophylla)	480	10						b6c06a8b-84a8-4957-b7d4-0ad185187efc	
-32.43951120	116.01769200	Marri (Corymbia calophylla)	560	10						9effefce-8fd9-42b0-b30f-019c2621487c	
-32.43946180	116.01741250	Wandoo (Eucalyptus wandoo)	590	12						a48a2b40-3acd-4af5-a3f6-54c89ff196ee,7a6a8610-ef1c-4cc9-92d5-6eee6816a8d1	
-32.43953352	116.01701200	Marri (Corymbia calophylla)	800	12						2f3e34cd-64f2-4ef1-9e2e-01d4ecbf0132	
-32.43996900	116.01759530	Marri (Corymbia calophylla)	1020	12	1	1				c36b8420-a3cb-4b07-a619-3f8ba2edf04e,f944fb3a-e915-4473-b3b1-fb26cbf88605	
-32.43997120	116.01791550	Marri (Corymbia calophylla)	720	10						34572d8a-7596-4638-afb1-bed1f0a2410e	
-32.44001144	116.01808760	Marri (Corymbia calophylla)	890	14						0d528926-e362-499f-bf5b-f4e980443237	
-32.43999503	116.01827370	Marri (Corymbia calophylla)	840	12						c4929b2a-e5e7-470f-8884-75fccf48fc22	
-32.44015179	116.01827400	Cape Lilac (Melia azedarach)	760	10						6a50a7fd-9a35-4b34-8f9d-b0af2b83b77f,e242e633-5a2b-4227-94b6-278947a14d54	
-32.43959889	116.01838430	Marri (Corymbia calophylla)	640	8						db8177ec-f7e8-48f0-9124-8677e542a687	
-32.43978390	116.01878640	Marri (Corymbia calophylla)	530	8	2					23d7be38-b205-43aa-939a-2ea058fd7607,f8f518e4-a935-4a34-a929-4e5ee777e2ab	
-32.43960992	116.01875550	Marri (Corymbia calophylla)	600	10						57fbf8d1-6ae7-4029-975c-095b0e78000d	
-32.43967890	116.01877920	Stag	0	8	3	2			Yes	045968db-9bc4-45c0-b05f-75f70288d6e1	67, 68, 69
-32.43977870	116.01879350	Marri (Corymbia calophylla)	510	10	1					68dcf962-d1e6-4a45-92c4-d027343e3d9d	
-32.44006605	116.01926840	Marri (Corymbia calophylla)	890	13						9fa02157-02f3-4526-b633-ab6fbade39de	
-32.44032213	116.01895360	Marri (Corymbia calophylla)	600	14	2	1				29fdbecd-e44c-442f-ac10-6e4db34b3857	
-32.44055472	116.01912600	Stag	540	8						3d5d46ec-ed55-42ec-9460-395562cec8b2	
-32.43932413	116.01658250	Marri (Corymbia calophylla)	1240	18	1					0aee307f-34ee-4221-9b8c-c71f01fe196d	
-32.43911400	116.01573240	Marri (Corymbia calophylla)	550	12						bfaf8211-147e-4559-a6d4-9c518a23feb0	
-32.43912400	116.01568800	Jarrah (Eucalyptus marginata)	820	12						b2e5f60d-a56a-4ec5-a26f-dcb756876270	
-32.43868770	116.01595450	Stag	670	12	1	1				b035866f-f7bb-466d-9d43-bf588d0925bf	
-32.43824890	116.01583360	Marri (Corymbia calophylla)	630	14						1b59139c-48f6-47df-8cb1-2f94d316fcad	
-32.43804730	116.01569780	Stag	500	6	1	1			No	ac65c6d0-5dc6-4581-903b-4e3312e557c7	70, 71

Latitude	Longitude	Taxa	DBH (mm)	Approx height (m)	# of hollows	# of hollows > 120 mm	# of hollows with bees	Comments	Suitable for Black Cockatoo	Tree Photo Reference	Hollow Photo Reference
-32.43736570	116.01619740	Marri (Corymbia calophylla)	550	12						3cbd7384-ae3b-4f5d-9ad7-253a32f432c4	
-32.43723756	116.01565790	Marri (Corymbia calophylla)	780	12	1	1			No	985af68d-544a-4b9f-8b87-bece6b4ea523	72
-32.43723830	116.01565880	Marri (Corymbia calophylla)	550	8						e715c9f9-9f1c-417e-b0af-f9198b867a2b	
-32.43658460	116.01616630	Marri (Corymbia calophylla)	500	7						efde04ff-0c55-49b1-a8d2-854b33139204	
-32.43628080	116.01565460	Wandoo (Eucalyptus wandoo)	560	5						f427c250-5a90-4544-a946-4586c7a8efd7	
-32.43609980	116.01561330	Wandoo (Eucalyptus wandoo)	650	10						1a2ec1b8-1dfe-408f-b4b7-67ceec0250bf	
-32.43780576	116.01723800	Wandoo (Eucalyptus wandoo)	640	7	1	1				a3847d5d-dfe0-41da-83e1-110c9160869b	
-32.43824750	116.01652070	Marri (Corymbia calophylla)	550	12						b7cda83b-abc3-440f-9c9d-18395c689110	
-32.43948150	116.01634080	Marri (Corymbia calophylla)	1090	14	1	1			No	f85c42f2-ed49-4add-86bb-16f5b734e3af	85, 86
-32.43868060	116.01619910	Marri (Corymbia calophylla)	800	12						710cad8e-18df-4e03-9a94-352461066533	
-32.43822992	116.01650310	Marri (Corymbia calophylla)	640	12						29e9df1a-79d0-404e-8133-4bb5c5d70fce	
-32.43807146	116.01662680	Jarrah (Eucalyptus marginata)	510	8	2	1				8acad7d2-bc4e-4a9b-86dc-b7010a1d41cd	
-32.43809353	116.01665630	Marri (Corymbia calophylla)	510	10						6bdcf16b-d41e-47ae-bf10-7d715dad2be4	
-32.43738188	116.01618760	Tuart (Eucalyptus gomphocephala)	680	14	1	1		No access to hollow		0cabdccc-3d17-4f27-8dec-fe0056e0e2cd	
-32.43694979	116.01637700	Wandoo (Eucalyptus wandoo)	950	12						b45d57a3-2ffe-490e-9415-568fadbf7d9b	
-32.43693762	116.01658250	Marri (Corymbia calophylla)	510	10						1cb1d163-96e2-46c9-8990-b10b41dff01f	
-32.43692234	116.01624560	Marri (Corymbia calophylla)	540	10						7900c992-ea16-441c-baaf-f47320dde16d	
-32.43655350	116.01626200	Marri (Corymbia calophylla)	540	12						ac1c904a-7dc4-4e76-84f5-01226362f4e7	
-32.43626331	116.01614270	Marri (Corymbia calophylla)	560	12						aa010524-53db-4f49-82d6-5ebdd08a9134	
-32.43652130	116.01643020	Marri (Corymbia calophylla)	460	12						d424cb03-2417-45e3-a22e-1bd34dbb362e	
-32.43729953	116.01710990	Wandoo (Eucalyptus wandoo)	320	10						e5f3f20d-b710-4adf-b34a-2321d298686a	
-32.43740565	116.01658590	Stag	510	12	1					3d60ca0b-25c9-475e-b591-acee77e20598	
-32.43740590	116.01677100	Wandoo (Eucalyptus wandoo)	410	10						bee733be-d78d-48dd-b353-e8a9e42a3776	
-32.43751006	116.01686920	Wandoo (Eucalyptus wandoo)	480	10	3	2			Yes	508fc141-c531-4537-ada3-87bdea3d3fdd	102, 103
-32.43747497	116.01687320	Stag	0	11	1	1			Yes	44dc4c7b-85fc-4918-960f-bf8b57a18659	99, 100, 101
-32.43759790	116.01662030	Wandoo (Eucalyptus wandoo)	480	10						d336f822-563a-46c4-82e6-07acaac1cad4	
-32.43760316	116.01656950	Wandoo (Eucalyptus wandoo)	490	13						19e83379-68fd-4ddc-9e67-3c6399e4be68	
-32.43759260	116.01654640	Wandoo (Eucalyptus wandoo)	510	12						90184d78-f3b9-4cc4-81a3-9f4c48504e3c	
-32.43752817	116.01654940	Wandoo (Eucalyptus wandoo)	540	12						01c58377-c794-4857-b172-4b7fc597a7bb	
-32.43777463	116.01679240	Wandoo (Eucalyptus wandoo)	480	10						53def982-8021-485a-84e3-b8db88f9e172	
-32.43776954	116.01677130	Wandoo (Eucalyptus wandoo)	490	15						0b2e980c-d148-406c-a18f-061174b387a6	
-32.43776630	116.01680640	Wandoo (Eucalyptus wandoo)	310	16						a82db726-f5e9-40be-be53-1edb484191f7	
-32.43768120	116.01668520	Wandoo (Eucalyptus wandoo)	480	12						be9f8bd2-9045-46c4-973a-7d31da0fe142	
-32.43784368	116.01688160	Wandoo (Eucalyptus wandoo)	300	12						97ca2ecc-ca0f-4573-bf24-ee000b6d6242	
-32.43784962	116.01705060	Wandoo (Eucalyptus wandoo)	540	12						4f699c84-53fa-4793-ad9c-da253298f9e5	
-32.43781906	116.01726520	Wandoo (Eucalyptus wandoo)	540	12	5	2			Yes	accdfd99-e273-43c3-9040-515048e3faef	95-98
-32.43776840	116.01715380	Wandoo (Eucalyptus wandoo)	510	14						f125713a-91e3-4d36-9a3b-23c6a8ecd721	
-32.43772059	116.01709220	Wandoo (Eucalyptus wandoo)	380	16						d6d698ca-fa2d-4a0e-b16e-d0f62eef03c9	
-32.43764702	116.01704860	Wandoo (Eucalyptus wandoo)	510	16	1	1			No	5a9909c7-bc52-49a7-ac32-3a9a57480a8b	108
-32.43785330	116.01762420	Wandoo (Eucalyptus wandoo)	640	14	1	1			Yes	3d2f38bd-4bd0-4453-b1b9-38ed8ee0f019	94
-32.43792240	116.01737680	Wandoo (Eucalyptus wandoo)	300	13						df8a8dc7-03a9-4de0-b64d-dba16a231fb1	
-32.43826390	116.01740360	Stag	890	12	3	2			Yes	b9106ef8-b6a8-4835-9b1e-b7d0d0365b5b,1a47cc5c-66e4-4337-afa8-7ad9d668d9c7	91, 92, 93
-32.43826530	116.01737380	Wandoo (Eucalyptus wandoo)	540	18	2	1				879a1f41-2c5d-4258-ad69-b55aad03a7d1	
-32.43477657	116.02071680	Jarrah (Eucalyptus marginata)	720	16						69b76dba-90da-4f1d-847a-4b3ecb181dbb	
-32.43475875	116.02067490	Stag	600	18						9e2cb0df-f0b7-40e4-b6fb-ed73712fc9d9	
-32.43492429	116.02056730	Jarrah (Eucalyptus marginata)	540	17						a065d185-b2f2-4f02-8b5d-ccc9ec38ea89	
-32.43484477	116.02032260	Stag	700	10						fe299c19-373e-4fb0-96e1-4112f6fae8c5	
-32.43484392	116.02033430	Marri (Corymbia calophylla)	640	18						7998f994-100f-499b-9754-fc84c13d8b5b	
-32.43475535	116.02028370	Jarrah (Eucalyptus marginata)	570	19						f0fec55d-4e84-422d-a740-53f9f780a258	
-32.43471830	116.02032790	Marri (Corymbia calophylla)	510	16						1ff4ab86-2fb6-4456-80bb-c818dc13d197	
-32.43460226	116.02025850	Jarrah (Eucalyptus marginata)	730	22						8f77b29b-bdd6-4527-a2a8-911343078c51	
-32.43497240	116.02030020	Stag	540	16						eb8973a2-d000-4173-a261-5279c1ad2e39	
-32.43492683	116.02016560	Stag	600	12						98009d2d-1ed6-449e-8fd4-4aa1815374f6	
-32.43515220	116.02013010	Stag	670	15	2	2			No	7da8580a-6158-4bd2-81e4-fd9ff1f7b5d1	334, 335, 336
-32.43500833	116.01981430	Wandoo (Eucalyptus wandoo)	670	15						8bfb1dbc-4030-4cd7-b2f5-c2d1085862a3	
-32.43501908	116.01954340	Stag	890	15	3	3			Yes	37525bea-e3a8-4e1e-8d87-f26e319d04b3	337-343
-32.43496730	116.01929760	Stag	510	15	1	1			Yes	15f842e8-b3ee-4f04-b456-482b5aecb3b4	350, 351
-32.43518220	116.01914430	Wandoo (Eucalyptus wandoo)	570	16	2					3221501b-34bc-43f0-a0f0-eb5486eef90b	
-32.43517359	116.01885810	Stag	510	17						f3a1bd59-c289-498f-8d8a-dd9938692b5a	
-32.43506606	116.01879970	Wandoo (Eucalyptus wandoo)	410	16						078020b9-fda0-4b3e-aef9-6bd06c7c6f3d	
-32.43523895	116.01864990	Wandoo (Eucalyptus wandoo)	410	22						c5295967-39aa-4efc-a6b7-fbfb1ab97c6f	
-32.43513930	116.01854290	Wandoo (Eucalyptus wandoo)	320	10						a76a2b6e-16cc-49b1-b78b-9e8ee3d27bcc	
-32.43503578	116.01848620	Wandoo (Eucalyptus wandoo)	380	10						12692c21-d915-416d-8d3e-db9c626b5561	
-32.43519226	116.01847220	Wandoo (Eucalyptus wandoo)	380	10						d3b388de-e18a-43bb-bbb7-1ecca9ca85d5	
-32.43500861	116.01836150	Wandoo (Eucalyptus wandoo)	320	10						7165b5f6-23b5-40af-b81e-0dd438793d85	
-32.43536770	116.01863750	Stag	950	8						5365dbab-54bf-4a9a-b944-90a802c9d587	
-32.43540610	116.01896030	Wandoo (Eucalyptus wandoo)	510	20	2	1	1			a793724f-1b6e-4295-afd2-8c4556d4bb70	
-32.43524590	116.01907260	Wandoo (Eucalyptus wandoo)	320	18						43dd21e7-4f51-482f-9375-3a64afd18b34	
-32.43525678	116.01920780	Wandoo (Eucalyptus wandoo)	890	18	4	2			No	6af3aa44-d8c9-4dd2-a551-d03c808f0585	348, 349
-32.43522282	116.02004290	Marri (Corymbia calophylla)	860	12	3	1				21eb8d07-313a-4a19-a2a9-6d16f92e046a	
-32.43535497	116.02010960	Jarrah (Eucalyptus marginata)	570	14						dc3ff303-47ab-48bf-8245-80e4412c98fa	
-32.43547382	116.02016330	Jarrah (Eucalyptus marginata)	560	13						e2d1e0c3-a003-466d-9184-071f0889f98c	
-32.43552023	116.02040370	Jarrah (Eucalyptus marginata)	570	20						302fe441-4ef2-47f0-bf32-c9fe640a1d7a	
-32.43560059	116.02044430	Jarrah (Eucalyptus marginata)	670	13						bdc5193a-d8de-4171-9497-b56992ba9177	
-32.43536035	116.02045770	Jarrah (Eucalyptus marginata)	860	7	3	2			Yes	c2d9af17-14b4-44f1-82c4-7cc027e30545	120, 121
-32.43533035	116.02056760	Jarrah (Eucalyptus marginata)	640	18						5bce88b8-f9eb-4f66-8e21-3ad6b63eb386	
-32.43522707	116.02057000	Jarrah (Eucalyptus marginata)	510	26	1	1			No	a37ba3be-b9c4-45ae-917a-3f2d4a5a7954	122
-32.43515604	116.02039870	Jarrah (Eucalyptus marginata)	510	27						bcb668e8-c6ea-42f1-aba2-de639eec6321	
-32.43543732	116.02073860	Jarrah (Eucalyptus marginata)	890	28						dc0233f7-509d-4897-b5f8-63f043e81f52	
-32.43545670	116.02068820	Jarrah (Eucalyptus marginata)	560	14						0cd65744-aac1-460e-8d1a-60bc9f6906b3	
-32.43546618	116.02068300	Jarrah (Eucalyptus marginata)	570	18						fd057920-17ec-4916-a161-7d833940fd92	
-32.43556975	116.02069300	Jarrah (Eucalyptus marginata)	670	22	2					502ed128-755a-449b-a5c7-559e26cab68d	
-32.43557480	116.02066410	Jarrah (Eucalyptus marginata)	730	18	2					3c21ede8-6ea1-4a58-bff5-d99fb3001026	
-32.43565605	116.02064740	Jarrah (Eucalyptus marginata)	730	17	4	2			No	cfe6ca1f-85ec-4948-9c55-c0921ab3367b	118, 119

Latitude	Longitude	Taxa	DBH (mm)	Approx height (m)	# of hollows	# of hollows > 120 mm	# of hollows with bees	Comments	Suitable for Black Cockatoo	Tree Photo Reference	Hollow Photo Reference
-32.43570699	116.02060920	Marri (Corymbia calophylla)	760	15	3	3			No	ab135fc7-b800-4c66-b0a6-b3dae8c33b8d	116
-32.43573698	116.02043620	Jarrah (Eucalyptus marginata)	600	22						80c37bfb-aec4-400a-af28-2ab18cb18959	
-32.43575311	116.02040470	Jarrah (Eucalyptus marginata)	670	11						bfd8cdab-ebd8-4309-addd-267fc21d28d7	
-32.43470870	116.02075300	Marri (Corymbia calophylla)	780	26	2				Yes	a224f2e6-111a-4bb3-98da-0f0e7f9d28bf	124, 125
-32.43446790	116.02036070	Jarrah (Eucalyptus marginata)	580	17						ee1b873c-5ffc-4854-b0b1-be2dd59716d1	
-32.43459230	116.02011220	Jarrah (Eucalyptus marginata)	550	17						12f88fe8-cf12-4472-9d22-d19ee46287f4	
-32.43438550	116.01978850	Jarrah (Eucalyptus marginata)	540	16	1	1			No	000f06ad-d987-4a77-91c9-7f87e4117d0b	431
-32.43446610	116.01959050	Jarrah (Eucalyptus marginata)	590	15						5333f572-5bc9-46ad-934e-2514db3c81ff	
-32.43450630	116.01954650	Jarrah (Eucalyptus marginata)	880	16						f4810be9-fba5-4533-8536-541abc457991	
-32.43460690	116.01962210	Stag	620	18	1	1			No	a8b1e204-6f89-45bc-beb4-8c7cb5cbbe68	432
-32.43455750	116.01894920	Marri (Corymbia calophylla)	750	24						83d7a218-0e42-407d-a69f-c20e17f87097	
-32.43480190	116.01828050	Stag	400	25	1	1			Yes	298969ee-b75a-408c-8857-64c067f15976	480, 481
-32.43486850	116.01818210	Wandoo (Eucalyptus wandoo)	600	28	1	1			No	8995c444-b600-44d8-8225-6dfe93fd96c7,59bd92e6-54d4-42f9-b3f8-d6f9d1d6539d	482-484
-32.43485780	116.01809450	Wandoo (Eucalyptus wandoo)	580	12	1	1			No	542c0cd4-d965-4fe0-9e30-53dcf727bd30	485-488
-32.43510930	116.01792410	Powderbark Wandoo (Eucalyptus accedens)	450	24						5bc0c99d-9f94-4e4e-8fd0-e38b181ffcf5	
-32.43547640	116.01797810	Stag	550	22						92cae67e-d6d5-428b-9d3f-a79d7f654610	
-32.43536850	116.01820930	Wandoo (Eucalyptus wandoo)	830	25	2	2				8d5966ab-1429-47e6-91ea-c91ac9e51371	
-32.43539080	116.01822030	Marri (Corymbia calophylla)	500	22						24a1758f-2b61-4688-879c-627458d6c33f	
-32.43542790	116.01833760	Powderbark Wandoo (Eucalyptus accedens)	690	20						66dda8cd-f74e-4fe5-9b2a-10de0be90dab	
-32.43569700	116.01828260	Marri (Corymbia calophylla)	760	8						6a1d985c-483c-4818-a77f-da5f9f26df9e	
-32.43564250	116.01839840	Marri (Corymbia calophylla)	500	12						518816e4-2b1d-45c0-b568-7f20f0e4c363	
-32.43557850	116.01860530	Stag	970	28	1	1			Yes	4e8dafba-6d31-4694-84d2-3b390c1e1ca2	352, 353, 354, 355, 356, 357, 358
-32.43566652	116.01871090	Jarrah (Eucalyptus marginata)	500	22						5e540f53-32cf-4ed7-9cd2-4df19edbc3d5	
-32.43563440	116.01878570	Marri (Corymbia calophylla)	680	20						272cb7fa-f3c5-4166-8b42-d60627f7ba2e	
-32.43569300	116.01873420	Wandoo (Eucalyptus wandoo)	500	20						d47764a4-cdec-466b-88a5-197df98c6c5c	
-32.43578590	116.01870100	Marri (Corymbia calophylla)	750		1	1			Yes	4b24c99d-0e8c-4f59-b7be-dee18c05699e	359, 360, 361, 362
-32.43575340	116.01882440	Jarrah (Eucalyptus marginata)	520							58f75179-ee62-44a9-bf88-c515761696d6	
-32.43569500	116.01902340	Jarrah (Eucalyptus marginata)	640							07a98d6f-4ac9-4d70-b8e5-b15852098d3f	
-32.43559640	116.01909800	Marri (Corymbia calophylla)	740		1	1			No		150
-32.43554830	116.01910670	Stag	750		1				No		151, 152, 153
-32.43551202	116.01917660	Stag	600		1				no	39bd044f-c321-404a-bc22-3f9d257ad240	154, 155
-32.43547948	116.01902270	Stag	950		1				Yes	596b15ae-a7a5-4ea1-b92e-36bbf8e04da3	156, 157, 158, 159
-32.43588060	116.01972150	Jarrah (Eucalyptus marginata)	740							61a6b92f-fbd4-4064-bfe0-49c5a029b7a3	
-32.43580750	116.01983020	Jarrah (Eucalyptus marginata)	1280		3	3			No	e1841c8a-b7cf-4e9d-a49e-67e50164f121	186, 187, 188, 189, 190
-32.43587960	116.02006100	Jarrah (Eucalyptus marginata)	700							389da181-aa7f-4bb8-b750-2b5fca461a15	
-32.43591770	116.02008730	Jarrah (Eucalyptus marginata)	500							96815120-b7eb-45cb-a1ad-f16d5030d785	
-32.43589900	116.02014670	Jarrah (Eucalyptus marginata)	500							7825cda1-d4af-4e2e-be61-251ad367dc6c	
-32.43590270	116.02032490	Jarrah (Eucalyptus marginata)	500							4aeb07c0-4a1c-4f48-b753-939042f5f101	
-32.43587430	116.02033730	Jarrah (Eucalyptus marginata)	500							d58b2599-f7f5-443c-9250-0a404ee77034	
-32.43588280	116.02034860	Jarrah (Eucalyptus marginata)	500							1bf7e047-8f2a-439b-a585-56b7ddfa1a91	
-32.43583310	116.02059770	Jarrah (Eucalyptus marginata)	680							49c27534-0d14-4f18-a66a-4217f60aac55	
-32.43586310	116.02072300	Jarrah (Eucalyptus marginata)	650							0e489696-06a0-4496-a0c4-86a2cf4d2bf6	
-32.43583310	116.02074010	Jarrah (Eucalyptus marginata)	680							88f447f3-1f72-4ce8-b384-1cba6579528b	
-32.43580490	116.02078050	Jarrah (Eucalyptus marginata)	620							03a852b3-d4c5-4103-91ff-6d725c1825de	
-32.43590000	116.02070450	Jarrah (Eucalyptus marginata)	670							00f0dab2-f58b-4956-afd9-034f351ed038	
-32.43595330	116.02064070	Jarrah (Eucalyptus marginata)	1280		2	2				ef011c38-af21-460e-ac25-4a5e02e9d1fc	
-32.43618610	116.02075270	Jarrah (Eucalyptus marginata)	510							9dcb3544-40cb-45fc-9a75-90d101a5e4d1	
-32.43632811	116.02048080	Jarrah (Eucalyptus marginata)	570		1	1			No	6315d9cc-5d67-48b4-b0cf-c36c8720c9cb	242
-32.43640980	116.02062170	Jarrah (Eucalyptus marginata)	700							fac331dc-b902-4a6e-93de-f1e0f18e6eae	
-32.43630890	116.02013120	Jarrah (Eucalyptus marginata)	570		1	1				e1391e7b-8f1b-454a-b0cb-c5265158e5a7	
-32.43633310	116.02002670	Jarrah (Eucalyptus marginata)	600		1	1				f55bbce8-9699-4e59-8cda-9d2a64625bf1	
-32.43641780	116.01999570	Jarrah (Eucalyptus marginata)	490							161e421d-4921-437b-861f-f84f87a364d0	
-32.43628290	116.01992760	Jarrah (Eucalyptus marginata)	890		1	1				7a32252b-ac9a-4324-b0f7-58020485c872	
-32.43635300	116.01992810	Stag	600							7cf7efcb-2346-4ef8-a87c-66416591c4a5	
-32.43631650	116.01984730	Jarrah (Eucalyptus marginata)	730							829c3e3b-d416-4713-b13f-ea8cdeb18f6e	
-32.43640870	116.01984360	Jarrah (Eucalyptus marginata)	510							72658104-8786-4cba-9d96-92de8ace2876	
-32.43632930	116.01974700	Jarrah (Eucalyptus marginata)	760		1	1				650d8b4b-5a53-41c4-bc7b-95679529161c	
-32.43626850	116.01970720	Jarrah (Eucalyptus marginata)	540		2	2				1ad77bba-9dc8-4d45-b133-7844cd4cca56	
-32.43628440	116.01961990	Jarrah (Eucalyptus marginata)	730							7ae54eb1-1a46-4496-a1cd-fd9b4e539653	
-32.43643730	116.01950840	Jarrah (Eucalyptus marginata)	950		5	4			No	dfd61cd8-d4f1-4ee7-99f4-15c28f4c4d61	200, 201, 202
-32.43648740	116.01956660	Jarrah (Eucalyptus marginata)	1020		3	3			No	cf9a1800-e357-4426-bc5c-3d117c235406	203, 204, 205
-32.43642950	116.01936040	Jarrah (Eucalyptus marginata)	570		2	2				79d14825-6c09-4806-ad25-91e8f585e708	
-32.43633930	116.01935990	Jarrah (Eucalyptus marginata)	540		1	1				5cbeeb48-abd5-495a-bc90-64962c3834e3	
-32.43637310	116.01926730	Jarrah (Eucalyptus marginata)	510							7fabd1eb-c68b-49a1-84df-dc1e58d81868	
-32.43639950	116.01926980	Jarrah (Eucalyptus marginata)	760							a47cc41e-7af4-4d4d-a788-3631f394d750	
-32.43642640	116.01925470	Jarrah (Eucalyptus marginata)	540							ebbfd2cd-a409-437c-9a88-19c12293eea4	
-32.43642580	116.01924210	Jarrah (Eucalyptus marginata)	640							3cb0e2ed-9451-47d1-8f04-3e82e1a8dd63	
-32.43636930	116.01912640	Jarrah (Eucalyptus marginata)	640							87b5059c-c3dc-4238-80e4-d7103e20ecd2	
-32.43626960	116.01908730	Jarrah (Eucalyptus marginata)	700		3	3			Yes	82d2932b-0b53-4b38-a8a9-773d54de7a66	209, 210, 211, 212, 213, 214, 215, 216
-32.43629060	116.01894510	Jarrah (Eucalyptus marginata)	510							269706cb-b07f-439d-b43c-9e159052da2b	
-32.43640650	116.01896480	Jarrah (Eucalyptus marginata)	700		1	1				7a719b13-a6b5-48ac-9bc2-7836a5451f30	
-32.43638150	116.01877040	Jarrah (Eucalyptus marginata)	730		2	2			Yes	bb0918d7-6309-4b45-9c9b-bcd6e4fa2984	217, 218, 219
-32.43635510	116.01865680	Jarrah (Eucalyptus marginata)	540							f2e8ef17-5480-47a0-a110-6b183c023c2f	
-32.43621300	116.01834750	Wandoo (Eucalyptus wandoo)	600							f50c801e-90bd-4f06-89ef-8d739b5b4468	
-32.43628679	116.01838830	Wandoo (Eucalyptus wandoo)	640							349fb111-d295-424b-a282-5e330b579d8f	
-32.43632390	116.01838720	Wandoo (Eucalyptus wandoo)	450							a44e5414-9795-43f1-9a74-0f6b9ec22400	
-32.43631690	116.01820970	Wandoo (Eucalyptus wandoo)	380							8a592c0a-bd8f-418e-92af-271ab7dc5e64	
-32.43617049	116.01794280	Stag	1020		2	2			Yes	2c5999aa-525c-422b-b49e-25de4fca50a8	364, 365, 366
-32.43629415	116.01776170	Marri (Corymbia calophylla)	570							8f67593b-fb29-4dda-bed9-bc287f16dbbf	
-32.43645063	116.01747470	Stag	540								
-32.43645657	116.01791730	Wandoo (Eucalyptus wandoo)	380							eef5607c-0662-4024-b3dd-2ebbd0185a06	
-32.43653320	116.01854370	Wandoo (Eucalyptus wandoo)	600		1	1			Yes	3da8543a-c00b-4cf3-8c5c-c20ce75541f3	220, 221
-32.43657650	116.01862790	Stag	800							b62dafe5-74d8-4455-a485-63c915d2f263	
-32.43655160	116.01867450	Stag	700							69a69d31-86de-41ab-b3ef-7586234e2087	

Latitude	Longitude	Taxa	DBH (mm)	Approx height (m)	# of hollows	# of hollows > 120 mm	# of hollows with bees	Comments	Suitable for Black Cockatoo	Tree Photo Reference	Hollow Photo Reference
-32.43649050	116.01923040	Jarrah (Eucalyptus marginata)	540							49aa0e27-0fd2-4f0f-a900-f7e794a7c8f0	
-32.43654911	116.01967310	Stag	950		5	4			Yes	710b7450-5fe0-4b1d-aec4-dc084bf3ccac	206, 207, 208
-32.43661840	116.01974820	Marri (Corymbia calophylla)	890							2cb7668e-4c92-45fe-b37e-e1ea2c4018fa	
-32.43648261	116.01995810	Jarrah (Eucalyptus marginata)	760							69fcb794-9c7d-4d4c-8ace-615ee0c89da5	
-32.43644540	116.01997850	Jarrah (Eucalyptus marginata)	700							2deeebb1-1cb9-4fe1-b960-bd47ed7289ec	
-32.43663660	116.02049540	Marri (Corymbia calophylla)	510							8341c8d8-0178-444d-a50d-969bbd465ff8	
-32.43660004	116.02063670	Jarrah (Eucalyptus marginata)	1110		6	4	1		Yes	c5564921-3ed2-43c9-ba3a-759ffcb18505	128, 129, 130, 131, 132, 133, 134, 135
-32.43653156	116.02078260	Stag	1020		2	2			No	fbb55c08-47fa-401c-bec5-0f38a74fc31a	127
-32.43685020	116.02060910	Jarrah (Eucalyptus marginata)	570		2	2			No	d040b521-1835-49cc-99a2-0f7c94d3b2d3	142, 143, 144
-32.43682755	116.02049690	Jarrah (Eucalyptus marginata)	890		6	4			Yes	1a300a5e-fba4-42b7-b9a2-2981f55f665c	139, 140, 141
-32.44091322	116.02139480	Stag	950		4	3			Yes	a51d8b3e-1f55-4270-9f83-df98ee5f7cce	243, 244, 245, 246, 247
-32.44109530	116.02126240	Marri (Corymbia calophylla)	570							f614e008-519d-450b-ba31-4a412fdfe259	
-32.44110520	116.02120120	Stag	640							23e28262-2f8f-4be2-8392-e857eba2bc78	
-32.44111497	116.02112760	Marri (Corymbia calophylla)	510							1e837281-8b09-4c24-873f-82ed44264aa8	
-32.44100920	116.02120220	Marri (Corymbia calophylla)	600							f2850180-03cf-4590-82af-5a61787012df	
-32.44096896	116.02124960	Marri (Corymbia calophylla)	570							62b2be64-5e91-4491-bd98-317f0b418c36	
-32.44097420	116.02114720	Marri (Corymbia calophylla)	670							efe1b81f-1da5-4e8c-be42-af957e56ecdd	
-32.44102290	116.02111960	Marri (Corymbia calophylla)	540							ffb2a9e4-1969-43c0-ad5c-88b29e3811df	
-32.44100971	116.02108500	Stag	700		2	2			No	5da2eba9-52de-4fbe-ad43-8ecea1ac1573	248
-32.44093970	116.02093150	Jarrah (Eucalyptus marginata)	1150							8fa2f4b3-101d-4732-9f7a-299084977001	
-32.44098620	116.02094260	Marri (Corymbia calophylla)	700							1ed0f998-7aa2-4047-bba3-1422cb839779	
-32.44092260	116.02085300	Marri (Corymbia calophylla)	600							a5a861db-91fd-439f-83bc-b588aa4c28ad	
-32.44089650	116.02094900	Marri (Corymbia calophylla)	700							f47fbf3c-8df4-4c20-8068-9d068ae643b3	
-32.44083994	116.02098880	Marri (Corymbia calophylla)	700							4b97cbaf-55da-40d4-8970-2d5ce215f942	
-32.44078700	116.02094370	Marri (Corymbia calophylla)	540							fdc0c468-5f6e-4b62-88dd-b152e1a98a88	
-32.44074571	116.02079030	Marri (Corymbia calophylla)	570							5af34a3a-9d8e-4e2a-bc41-3c3a37580a06	
-32.44065262	116.02071150	Jarrah (Eucalyptus marginata)	640							e8b604b3-d36b-49ea-b2c4-da682b9d55c6	
-32.44063910	116.02075010	Marri (Corymbia calophylla)	530							14b6b948-6dc2-4f3a-b5c0-4ca78e575c5e	
-32.44062347	116.02067960	Marri (Corymbia calophylla)	570							c4bd3b6b-3369-496c-b196-45629c6b3d32	
-32.44054764	116.02064480	Marri (Corymbia calophylla)	600							71ed4b9d-0706-48fc-bf94-927b60fd8740	
-32.44054350	116.02080710	Marri (Corymbia calophylla)	730							68e85f95-283e-47a6-bbba-51bfed08603d	
-32.44060150	116.02085170	Marri (Corymbia calophylla)	540							33245e0a-a1db-4bd4-b037-00e8039daba8	
-32.44059550	116.02100690	Marri (Corymbia calophylla)	600							a525e3c6-f8c0-41b8-85af-f41109f5915f	
-32.44063320	116.02106180	Marri (Corymbia calophylla)	490								
-32.44079381	116.02123920	Marri (Corymbia calophylla)	510							b90a9ed8-260d-40c6-ade7-9a4b6d3663e3	
-32.44000776	116.02073860	Jarrah (Eucalyptus marginata)	920		1	1				b5b4ed7c-7c63-4099-a831-be151537ed23	
-32.44009490	116.02075520	Jarrah (Eucalyptus marginata)	890		1	1			No	0d5f7176-87a9-40fb-9684-9c9188fc979f	161
-32.43993800	116.02041570	Stag	890		3	3			No	328abc9c-3b7d-4312-9d19-bd7b81c708e6	249, 250, 251, 252
-32.43984490	116.02049940	Marri (Corymbia calophylla)	540							76206559-44c2-4e93-abcf-867b5c72f3ef	
-32.43976753	116.02066550	Marri (Corymbia calophylla)	540							eacefbf2-e176-4f51-871b-6d0af1d2e7c9	
-32.43953130	116.02075580	Jarrah (Eucalyptus marginata)	800							96a5b557-9158-4bcf-bad6-6305a4b99ab8	
-32.43922360	116.02077240	Jarrah (Eucalyptus marginata)	890							900907be-8f53-49d6-aa08-5297cafe6296	
-32.43917671	116.02067490	Stag	640		2	2			No	f7816ba8-b15a-4271-a3a8-02bc7e2195d3	163, 164, 165
-32.43922130	116.02060420	Stag	1110							6417eec3-f3dc-48f2-9716-a82fa59f6a54	
-32.43933350	116.02058950	Jarrah (Eucalyptus marginata)	640							9586f422-ab77-46b6-834e-0aa0f3b2c33e	
-32.43942100	116.02057950	Jarrah (Eucalyptus marginata)	700		1	1			No	2369f5d4-b0f2-49a5-99d3-92c54f107c9a	162
-32.43943520	116.02050490	Jarrah (Eucalyptus marginata)	730							b2d24222-e41d-4205-b85a-20ebf6eb991c	
-32.43868011	116.01993060	Stag	570		2	2			Yes	01c5d343-d127-4329-b39a-8cbedd369353	267, 268
-32.43899222	116.02046600	Stag	570							1f2d490e-5913-4964-9f09-ea11754f85d9	
-32.43900524	116.02055460	Stag	600							1fba6b49-21f7-480a-ac49-6e6a61fc8b8b	
-32.43901599	116.02082850	Marri (Corymbia calophylla)	570							b480e421-9ef2-478f-9d1b-5ac36606a958	
-32.43885612	116.02082850	Stag	950		5	5			Yes	19ddc1c6-e0a6-4f51-8c83-4b47f559c656	166, 167
-32.43789178	116.02073660	Stag	600		1	1			Yes	e31d986b-4a62-4d1c-b99a-e965bb6c7f5d	386
-32.43771663	116.02075300	Jarrah (Eucalyptus marginata)	540							030f5cbb-50d7-4181-96a1-78fc4af850b9	
-32.43770219	116.02040810	Marri (Corymbia calophylla)	570							706e0f85-5772-48cf-b8b5-761cee766034	
-32.43785217	116.02046600	Marri (Corymbia calophylla)	540							4ccc4f92-f3e5-4ada-8db6-64f16ce46683	
-32.43776480	116.02031100	Stag	700							faf642f7-2b09-44d3-ac04-b18da141308f	
-32.43760490	116.02007710	Marri (Corymbia calophylla)	540							92b060c5-aead-49d8-9ac0-2f916648733e	
-32.43748205	116.02002180	Stag	640		2	2			Yes	259b6bc5-099d-47e9-a8ca-9e9a5df188d7	280, 281
-32.43773550	116.01997120	Wandoo (Eucalyptus wandoo)	320							5fdd095b-c11b-47f0-aab0-088acb2a09ad	
-32.43773077	116.01987300	Wandoo (Eucalyptus wandoo)	320							a0f3f5b7-d3c8-40aa-a8a1-f9c974625c49	
-32.43759890	116.01987460	Marri (Corymbia calophylla)	540		1	1	1		No	d42363cc-92cc-4fd3-94fc-284317187fe7	287
-32.43746507	116.01987130	Jarrah (Eucalyptus marginata)	730		3	3				680673cf-96a7-4499-a3a3-a8084a2f1d95	
-32.43746790	116.01961580	Stag	730		2	2			Yes	01244222-396f-4268-a895-cff3e984c4e6	377, 378, 379
-32.43743220	116.01958160	Wandoo (Eucalyptus wandoo)	450							e49f2db7-cb8b-40bc-a8cd-97e2908984d2	
-32.43743860	116.01946340	Wandoo (Eucalyptus wandoo)	890		2	2			Yes	d8851cf4-0831-43ab-8d12-852bb17ab118	376
-32.43774153	116.01952160	Wandoo (Eucalyptus wandoo)	570							2376af96-a8a5-49fa-952f-749d282a3851	
-32.43781538	116.01929160	Stag	1110		9	8			Yes	8976f7f6-8c77-4ca2-be85-c7c05613a022	273, 274, 275, 276, 277, 278
-32.43751210	116.01910400	Wandoo (Eucalyptus wandoo)	350							003c00b2-8db5-4048-9c7a-fcac6892341c	
-32.43747752	116.01899550	Stag	600		2					433792cd-9f57-4cda-803a-f0ac979c484d	
-32.43725709	116.01915580	Stag	540		4	4			Yes	f81a2f90-8ea2-4a35-9eaa-71a657f78e87	226, 227, 228, 229, 230, 231, 232, 233
-32.43712630	116.01905810	Jarrah (Eucalyptus marginata)	600							e879d6aa-f617-432f-9fc8-c9a75cd9f14c	
-32.43717305	116.01890270	Stag	540							a7b9898a-c076-40e5-ac8a-051a02213493	
-32.43722596	116.01905450	Stag	570							c8b3f8f9-0f35-4c30-bd8e-568e261254e4	
-32.43712891	116.01928860	Jarrah (Eucalyptus marginata)	700							62786c12-e467-4e11-9d62-88d4fced2948	
-32.43712080	116.01928580	Marri (Corymbia calophylla)	540							a6088015-f6ba-47cd-bf7c-75aed0da0f93	
-32.43716230	116.01938700	Jarrah (Eucalyptus marginata)	570							665d5efb-53eb-4432-9913-6edc7c21688a	
-32.43602920	116.02072280	Jarrah (Eucalyptus marginata)	1250		4	2			Yes	0d6d1d90-fc29-4839-9492-c41753afb116	109, 110, 111, 112, 113, 114
-32.43609870	116.02050890	Jarrah (Eucalyptus marginata)	810		1	1			No	68f0f2ed-d32a-4091-9138-6fb59bf21f20	242
-32.43614530	116.02050070	Jarrah (Eucalyptus marginata)	640							6252660d-db0a-44d4-803d-81177727f124	
-32.43613910	116.02029280	Jarrah (Eucalyptus marginata)	1710								
-32.43609690	116.02028120	Jarrah (Eucalyptus marginata)	670		1						
-32.43609510	116.02026920	Jarrah (Eucalyptus marginata)	680								
-32.43611900	116.02026160	Jarrah (Eucalyptus marginata)	1130		2	1			No	486a1e92-c08f-455d-ade3-4f773122d663	367, 368

Latitude	Longitude	Taxa	DBH (mm)	Approx height (m)	# of hollows	# of hollows > 120 mm	# of hollows with bees	Comments	Suitable for Black Cockatoo	Tree Photo Reference	Hollow Photo Reference
-32.43609990	116.02010550	Jarrah (Eucalyptus marginata)	540		2						
-32.43607150	116.02008090	Jarrah (Eucalyptus marginata)	670		2						
-32.43605646	116.01987130	Jarrah (Eucalyptus marginata)	850		2	2			Yes	e592d803-5043-4268-b4d6-7ff4378ed4eb	178, 179, 180, 181, 182, 183, 184, 185
-32.43617672	116.01973750	Jarrah (Eucalyptus marginata)	1090		5	2			No	dbde61e9-68fb-4b37-82fd-4f0cf2f96e9b	194, 195, 196, 197
-32.43604690	116.01948790	Jarrah (Eucalyptus marginata)	520								
-32.43596420	116.01916660	Jarrah (Eucalyptus marginata)	620								
-32.43597770	116.01912500	Jarrah (Eucalyptus marginata)	600								
-32.43594480	116.01898980	Jarrah (Eucalyptus marginata)	510								
-32.43604660	116.01890070	Wandoo (Eucalyptus wandoo)	450							4c5d42b0-5de6-4fd9-b2a1-c0f811e444f9	
-32.43604627	116.01874240	Powderbark Wandoo (Eucalyptus accedens)	820								
-32.43596480	116.01869670	Jarrah (Eucalyptus marginata)	680		1						
-32.43595450	116.01867620	Jarrah (Eucalyptus marginata)	690		2						
-32.43593240	116.01866030	Jarrah (Eucalyptus marginata)	760		3						
-32.43594420	116.01855830	Wandoo (Eucalyptus wandoo)	470		1	1				f4e2df29-167b-4381-89d7-111cc2f9312b	
-32.43598900	116.01844320	Wandoo (Eucalyptus wandoo)	430								
-32.43603700	116.01835860	Wandoo (Eucalyptus wandoo)	410								
-32.43595020	116.01828430	Wandoo (Eucalyptus wandoo)	650		1						
-32.43576080	116.01806860	Wandoo (Eucalyptus wandoo)	470								
-32.43581904	116.01791960	Wandoo (Eucalyptus wandoo)	450								
-32.43588724	116.01765810	Jarrah (Eucalyptus marginata)	790		1					11e1daef-0442-4e04-a74f-fdd5288260d8	
-32.43669690	116.01873380	Jarrah (Eucalyptus marginata)	820		3	2			Yes	c2f3e7f4-80b2-455b-9c22-77da89bd5c66	370, 371, 372, 373, 374, 375
-32.43667010	116.01886930	Jarrah (Eucalyptus marginata)	550								
-32.43667650	116.01943510	Jarrah (Eucalyptus marginata)	500								
-32.43684770	116.01945500	Jarrah (Eucalyptus marginata)	650								
-32.43685970	116.01944810	Jarrah (Eucalyptus marginata)	510								
-32.43687660	116.01953850	Jarrah (Eucalyptus marginata)	580								
-32.43683680	116.01957620	Jarrah (Eucalyptus marginata)	800		1	1			No		237, 238
-32.43678800	116.01956940	Jarrah (Eucalyptus marginata)	910								
-32.43684670	116.01969630	Stag	600		1	1			No		239, 240, 241
-32.43685620	116.01975960	Jarrah (Eucalyptus marginata)	620		2						
-32.43704980	116.02006350	Jarrah (Eucalyptus marginata)	760		4						
-32.43715010	116.01996760	Jarrah (Eucalyptus marginata)	740		2						
-32.43675980	116.02028470	Jarrah (Eucalyptus marginata)	810		1	1			No		139
-32.43681480	116.02046820	Jarrah (Eucalyptus marginata)	910		2						
-32.43699490	116.02046640	Jarrah (Eucalyptus marginata)	930		3	1			Yes		145, 146, 147
-32.43685613	116.02061220	Jarrah (Eucalyptus marginata)	840								
-32.43701240	116.02068090	Jarrah (Eucalyptus marginata)	870								
-32.43703270	116.02069500	Jarrah (Eucalyptus marginata)	1000		4	1			Yes		148, 149
-32.44100220	116.02179660	Jarrah (Eucalyptus marginata)	810								
-32.44042180	116.02179430	Marri (Corymbia calophylla)	710								
-32.44043520	116.02178320	Marri (Corymbia calophylla)	650								
-32.44033140	116.02177890	Jarrah (Eucalyptus marginata)	1010								
-32.44032470	116.02164820	Stag	520								
-32.44034090	116.02084550	Jarrah (Eucalyptus marginata)	860								
-32.44036660	116.02087050	Jarrah (Eucalyptus marginata)	680								
-32.44037400	116.02071270	Jarrah (Eucalyptus marginata)	500								
-32.44041510	116.02069710	Jarrah (Eucalyptus marginata)	550								
-32.44048171	116.02065680	Jarrah (Eucalyptus marginata)	650								
-32.44052416	116.02066150	Jarrah (Eucalyptus marginata)	520								
-32.44050011	116.02069940	Jarrah (Eucalyptus marginata)	510								
-32.44043250	116.02076810	Jarrah (Eucalyptus marginata)	510								
-32.44053460	116.02083130	Jarrah (Eucalyptus marginata)	850								
-32.44046170	116.02083590	Jarrah (Eucalyptus marginata)	720								
-32.44039310	116.02085680	Jarrah (Eucalyptus marginata)	810								
-32.44045520	116.02093650	Jarrah (Eucalyptus marginata)	500								
-32.44038640	116.02114070	Marri (Corymbia calophylla)	550								
-32.44026960	116.02076420	Jarrah (Eucalyptus marginata)	550								
-32.44023230	116.02072700	Jarrah (Eucalyptus marginata)	560								
-32.44027060	116.02069630	Stag	650								
-32.44033630	116.02063740	Jarrah (Eucalyptus marginata)	670								
-32.44019590	116.02050410	Stag	720								
-32.44021970	116.02034920	Stag	650								
-32.44024035	116.02031080	Stag	610								
-32.44019410	116.02035030	Jarrah (Eucalyptus marginata)	560								
-32.44014350	116.02030120	Jarrah (Eucalyptus marginata)	660								
-32.44014230	116.02031140	Jarrah (Eucalyptus marginata)	650								
-32.44014560	116.02030470	Jarrah (Eucalyptus marginata)	550								
-32.44021772	116.02013380	Stag	650								
-32.44006690	116.02006020	Stag	850		4	2			No		253, 254, 255
-32.43998654	116.01986890	Jarrah (Eucalyptus marginata)	600								
-32.43984053	116.01980520	Jarrah (Eucalyptus marginata)	580								
-32.43985220	116.01985050	Jarrah (Eucalyptus marginata)	1250		4	2			Yes		258, 259, 260
-32.43969198	116.01987930	Jarrah (Eucalyptus marginata)	1060								
-32.43870020	116.02045260	Stag	800								
-32.43873680	116.02041860	Stag	990		2						
-32.43873940	116.02035830	Jarrah (Eucalyptus marginata)	860								
-32.43851050	116.02021010	Wandoo (Eucalyptus wandoo)	780								
-32.43867960	116.01992270	Stag	580		4						
-32.43864790	116.01971210	Stag	660								
-32.43734170	116.01797290	Jarrah (Eucalyptus marginata)	880								
-32.43823450	116.01955020	Wandoo (Eucalyptus wandoo)	540		5	2			Yes		269, 270, 271
-32.43812830	116.01913480	Wandoo (Eucalyptus wandoo)	490								
-32.43759325	116.01867400	Wandoo (Eucalyptus wandoo)	320								
-32.43808060	116.01918100	Wandoo (Eucalyptus wandoo)	310								

Latitude	Longitude	Taxa	DBH (mm)	Approx height (m)	# of hollows	# of hollows > 120 mm	# of hollows with bees	Comments	Suitable for Black Cockatoo	Tree Photo Reference	Hollow Photo Reference
-32.43804060	116.01928860	Wandoo (Eucalyptus wandoo)	560								
-32.43802530	116.01933580	Wandoo (Eucalyptus wandoo)	550								
-32.43794380	116.01929190	Wandoo (Eucalyptus wandoo)	460								
-32.43795320	116.01930380	Wandoo (Eucalyptus wandoo)	740								
-32.43791070	116.01935380	Wandoo (Eucalyptus wandoo)	600								
-32.43780240	116.01929750	Marri (Corymbia calophylla)	1550		10	4			No		273, 274, 275, 276, 277, 278
-32.43773730	116.01945550	Wandoo (Eucalyptus wandoo)	590								
-32.43789010	116.01949700	Marri (Corymbia calophylla)	540								
-32.43792340	116.01954460	Wandoo (Eucalyptus wandoo)	360								
-32.43793360	116.01960410	Wandoo (Eucalyptus wandoo)	600		1	1			No		272
-32.43782530	116.01969170	Wandoo (Eucalyptus wandoo)	790		3	1			Yes		279, 280, 281
-32.43803870	116.01974860	Wandoo (Eucalyptus wandoo)	490								
-32.43803340	116.01981810	Wandoo (Eucalyptus wandoo)	380								
-32.43804830	116.01985720	Wandoo (Eucalyptus wandoo)	310		1						
-32.43806580	116.01990250	Wandoo (Eucalyptus wandoo)	800		1						
-32.43813640	116.01988260	Wandoo (Eucalyptus wandoo)	480								
-32.43807760	116.02000500	Wandoo (Eucalyptus wandoo)	730								
-32.43805090	116.02004690	Wandoo (Eucalyptus wandoo)	630								
-32.43789857	116.02001140	Wandoo (Eucalyptus wandoo)	630								
-32.43799880	116.02014270	Wandoo (Eucalyptus wandoo)	460								
-32.43799820	116.02038570	Marri (Corymbia calophylla)	650								
-32.43806070	116.02054020	Marri (Corymbia calophylla)	510								
-32.43803390	116.02061560	Jarrah (Eucalyptus marginata)	720								
-32.43804600	116.02073550	Stag	980								
-32.43800070	116.02070200	Marri (Corymbia calophylla)	560								
-32.43727420	116.02079380	Jarrah (Eucalyptus marginata)	970								
-32.43724280	116.02074480	Jarrah (Eucalyptus marginata)	680								
-32.43724830	116.02069230	Jarrah (Eucalyptus marginata)	630								
-32.43730980	116.02064740	Jarrah (Eucalyptus marginata)	630								
-32.43729290	116.02062360	Jarrah (Eucalyptus marginata)	660		1						
-32.43732230	116.02054180	Jarrah (Eucalyptus marginata)	980		3	3			Yes		171, 172, 173
-32.43722340	116.02052420	Stag	1080		4	4			Yes		168, 169, 170
-32.43731770	116.02008820	Marri (Corymbia calophylla)	980								
-32.43725880	116.02002150	Marri (Corymbia calophylla)	780								
-32.43720590	116.02004570	Marri (Corymbia calophylla)	670								
-32.43744770	116.01997970	Jarrah (Eucalyptus marginata)	950		2						
-32.43708370	116.01940330	Jarrah (Eucalyptus marginata)	800		1	1			No		234, 235, 236
-32.43712270	116.01940280	Jarrah (Eucalyptus marginata)	610								
-32.43716610	116.01968790	Jarrah (Eucalyptus marginata)	880								
-32.43500833	116.01981430	Wandoo (Eucalyptus wandoo)	670							8bfb1dbc-4030-4cd7-b2f5-c2d1085862a3	
-32.43416280	116.01564380	Wandoo (Eucalyptus wandoo)	590		2						
-32.43439040	116.01562750	Wandoo (Eucalyptus wandoo)	410								
-32.43433990	116.01571350	Wandoo (Eucalyptus wandoo)	620		1						
-32.43447220	116.01575750	Wandoo (Eucalyptus wandoo)	900								
-32.43441520	116.01583080	Marri (Corymbia calophylla)	630								
-32.43454990	116.01576360	Marri (Corymbia calophylla)	610								
-32.43462550	116.01569360	Wandoo (Eucalyptus wandoo)	830								
-32.43466920	116.01562150	Wandoo (Eucalyptus wandoo)	830								
-32.43482760	116.01567530	Wandoo (Eucalyptus wandoo)	710								
-32.43514218	116.01559180	Wandoo (Eucalyptus wandoo)	500								
-32.43553353	116.01657450	Marri (Corymbia calophylla)	790								
-32.43555135	116.01642670	Marri (Corymbia calophylla)	700								
-32.43495370	116.01669190	Wandoo (Eucalyptus wandoo)	480								
-32.43494220	116.01675790	Jarrah (Eucalyptus marginata)	630								
-32.43491300	116.01681510	Jarrah (Eucalyptus marginata)	530								
-32.43492490	116.01683040	Wandoo (Eucalyptus wandoo)	480								
-32.43490950	116.01681750	Wandoo (Eucalyptus wandoo)	540		1	1			Yes		519, 520, 521
-32.43473260	116.01680380	Marri (Corymbia calophylla)	560								
-32.43465530	116.01675630	Marri (Corymbia calophylla)	500								
-32.43446450	116.01660950	Wandoo (Eucalyptus wandoo)	450								
-32.43443080	116.01655560	Marri (Corymbia calophylla)	620								
-32.43440720	116.01657860	Wandoo (Eucalyptus wandoo)	610								
-32.43421450	116.01673630	Wandoo (Eucalyptus wandoo)	490								
-32.43423120	116.01683050	Jarrah (Eucalyptus marginata)	750		1	1					
-32.43400130	116.01683540	Jarrah (Eucalyptus marginata)	690		2	1			Yes		514, 515, 516
-32.43400520	116.01676940	Stag	700		1	1			Yes		512, 513
-32.43397310	116.01673870	Wandoo (Eucalyptus wandoo)	400								
-32.43392950	116.01663220	Wandoo (Eucalyptus wandoo)	470								
-32.43393860	116.01659610	Wandoo (Eucalyptus wandoo)	730								
-32.43411696	116.01657620	Marri (Corymbia calophylla)	780								
-32.43409100	116.01752760	Wandoo (Eucalyptus wandoo)	470								
-32.43401028	116.01753240	Stag	800		1	1			No		489, 490
-32.43415660	116.01755800	Wandoo (Eucalyptus wandoo)	440								
-32.43424310	116.01743070	Wandoo (Eucalyptus wandoo)	730		1	1			Yes		494, 495
-32.43436590	116.01734030	Marri (Corymbia calophylla)	660								
-32.43442730	116.01741350	Wandoo (Eucalyptus wandoo)	580		1	1			No		496, 497, 498, 499
-32.43458755	116.01747270	Marri (Corymbia calophylla)	600								
-32.43462943	116.01740630	Stag	900		1	1			No		500, 501
-32.43392878	116.01792600	Stag	1000		3	1			No		433, 434, 435, 436, 437, 438
-32.43393501	116.01798770	Wandoo (Eucalyptus wandoo)	680								
-32.43405950	116.01852230	Stag	1000		2	1			No		443, 444, 445, 446
-32.43413500	116.01855190	Jarrah (Eucalyptus marginata)	850		3	1			No		447, 448, 449, 450
-32.43420460	116.01857340	Stag	800		2	1					
-32.43431190	116.01863960	Marri (Corymbia calophylla)	780		1	1			Yes		451, 452, 453

Latitude	Longitude	Taxa	DBH (mm)	Approx height (m)	# of hollows	# of hollows > 120 mm	# of hollows with bees	Comments	Suitable for Black Cockatoo	Tree Photo Reference	Hollow Photo Reference
-32.43431530	116.01882460	Stag	780		1	1			Yes		454, 455
-32.43421380	116.01883570	Marri (Corymbia calophylla)	920		3	1			Yes		456, 457, 458, 459, 460
-32.43420949	116.01891940	Marri (Corymbia calophylla)	690								
-32.43418850	116.01880840	Jarrah (Eucalyptus marginata)	850		4	2			No		461, 462, 463, 464, 465, 466
-32.43415820	116.01874520	Jarrah (Eucalyptus marginata)	990		4	2			No		467, 468, 469, 470, 471, 472
-32.43399880	116.01882740	Jarrah (Eucalyptus marginata)	920		3	1			No		402, 403, 404, 405, 406, 407, 408, 409, 410
-32.43399440	116.01959240	Jarrah (Eucalyptus marginata)	1350		4	2			No		413, 414, 415, 416, 417, 418, 419, 420
-32.43415150	116.01950290	Jarrah (Eucalyptus marginata)	900								
-32.43417460	116.01950280	Jarrah (Eucalyptus marginata)	800								
-32.43423220	116.01958100	Jarrah (Eucalyptus marginata)	510								
-32.43431690	116.01952760	Jarrah (Eucalyptus marginata)	590								
-32.43431690	116.01965750	Jarrah (Eucalyptus marginata)	900		4	1			No		425, 426, 427, 428, 429, 430
-32.43417110	116.01968100	Jarrah (Eucalyptus marginata)	750								
-32.43408390	116.01972600	Jarrah (Eucalyptus marginata)	700								
-32.43404740	116.01984270	Marri (Corymbia calophylla)	890		2	1			No		411, 412
-32.43416931	116.01987830	Jarrah (Eucalyptus marginata)	780		1	1			No		396, 397, 398, 399, 400, 401
-32.43397070	116.01989740	Marri (Corymbia calophylla)	860								
-32.43403600	116.02013510	Marri (Corymbia calophylla)	890								
-32.43403990	116.02016300	Marri (Corymbia calophylla)	830								
-32.43402120	116.02026920	Marri (Corymbia calophylla)	900		1	1			Yes		391, 392, 393, 394, 395
-32.43412319	116.02058470	Jarrah (Eucalyptus marginata)	760								
-32.43412658	116.02054080	Jarrah (Eucalyptus marginata)	800								
-32.43395906	116.02058940	Jarrah (Eucalyptus marginata)	690								
-32.43392171	116.02061860	Jarrah (Eucalyptus marginata)	700		1	1			Yes		387, 388, 389, 390
-32.43392454	116.02062160	Jarrah (Eucalyptus marginata)	510								
-32.43406800	116.01930020	Jarrah (Eucalyptus marginata)	670		2	1			No		421, 422
-32.43410440	116.01932040	Marri (Corymbia calophylla)	670								
-32.43422160	116.01939210	Jarrah (Eucalyptus marginata)	580								
-32.43433940	116.01940530	Jarrah (Eucalyptus marginata)	1200		3	1			No		423, 424
-32.43439994	116.01937410	Jarrah (Eucalyptus marginata)	670								
-32.43425280	116.01919380	Jarrah (Eucalyptus marginata)	540								
-32.43429439	116.01909510	Marri (Corymbia calophylla)	530								
-32.43421100	116.01914660	Jarrah (Eucalyptus marginata)	550								
-32.43410890	116.01915060	Jarrah (Eucalyptus marginata)	680								
-32.43408430	116.01914620	Jarrah (Eucalyptus marginata)	600								
-32.43399410	116.01903760	Marri (Corymbia calophylla)	530								
-32.43409290	116.01900500	Marri (Corymbia calophylla)	510								
-32.43422421	116.01900060	Jarrah (Eucalyptus marginata)	680								
-32.43397140	116.01839050	Stag	600								
-32.43424034	116.01826760	Marri (Corymbia calophylla)	800		1	1			No		474
-32.43413600	116.01828160	Marri (Corymbia calophylla)	500								
-32.43833066	116.02037850	Jarrah (Eucalyptus marginata)	560								
-32.43822420	116.02033250	Marri (Corymbia calophylla)	520								
-32.43831700	116.01991960	Wandoo (Eucalyptus wandoo)	430		1	1					
-32.43812190	116.01954450	Wandoo (Eucalyptus wandoo)	310								
-32.43810420	116.01949830	Wandoo (Eucalyptus wandoo)	660		1						
-32.43836740	116.01552010	Jarrah (Eucalyptus marginata)	1120		1	1			No		545, 546, 547, 548
-32.43818280	116.01553150	Jarrah (Eucalyptus marginata)	800								
-32.43774490	116.01551380	Wandoo (Eucalyptus wandoo)	490		2	2	2		Yes		549, 550, 551
-32.43688640	116.01571980	Wandoo (Eucalyptus wandoo)	540								
-32.43668760	116.01560290	Wandoo (Eucalyptus wandoo)	390								
-32.43773730	116.01945550	Wandoo (Eucalyptus wandoo)	590		1	1				e776b2af-cdb6-4d82-a967-7fe26f494fa1	
-32.43402290	116.01581940	Powderbark Wandoo (Eucalyptus accedens)	450		1		1			1efdaec0-2419-4492-abd4-45d6cc2a5080	
-32.43412290	116.01584730	Powderbark Wandoo (Eucalyptus accedens)	570							a25eb9c2-bf87-47cb-92ed-f3f19d32fbd1	
-32.43414611	116.01588450	Powderbark Wandoo (Eucalyptus accedens)	330							4f26963a-b16f-4703-943c-c6a8a00dba7f	
-32.43412150	116.01600370	Powderbark Wandoo (Eucalyptus accedens)	1220		2	1			No	ddb05ce0-c5ee-4f95-976c-9838e20c15a4	527, 528, 529
-32.43415020	116.01608620	Powderbark Wandoo (Eucalyptus accedens)	540							0fa06cba-4a50-45e9-acd1-c78222a76639	
-32.43411540	116.01620960	Powderbark Wandoo (Eucalyptus accedens)	480		1	1			Yes	866b936b-672b-463d-94ed-2a94c474d4eb	522, 523, 524, 525, 526
-32.43407530	116.01620940	Marri (Corymbia calophylla)	510							220d5948-2873-4c83-b258-51b4b6ce336f	
-32.43400730	116.01599390	Powderbark Wandoo (Eucalyptus accedens)	320							f947d761-3370-4373-90be-cdc59b35ee22	
-32.43436739	116.01575580	Powderbark Wandoo (Eucalyptus accedens)	320							1826d92a-f927-4d33-8c50-58003fcf7aa1	
-32.43433315	116.01594050	Powderbark Wandoo (Eucalyptus accedens)	410							6855a06b-0d54-4c28-9cc3-2e3322f539fe	
-32.43432806	116.01594180	Powderbark Wandoo (Eucalyptus accedens)	450							99d40fbb-f9f6-4c21-9d00-5941245d5f73	
-32.43430344	116.01607930	Marri (Corymbia calophylla)	490		1	1				ad2e229c-0d14-41e0-a5a5-71dafdb52609	
-32.43431730	116.01609590	Powderbark Wandoo (Eucalyptus accedens)	540		1					8636e1f3-9abf-4681-9f57-2316ea081380	
-32.43416350	116.01622680	Marri (Corymbia calophylla)	510		1					c2ed130d-acfe-4944-9ca4-9a4ac4af8226	
-32.43423990	116.01628910	Marri (Corymbia calophylla)	510							17711646-fcd7-46b3-a15c-787b7bba6827	
-32.43423400	116.01632270	Marri (Corymbia calophylla)	730							3585bd12-737c-4fb0-9334-dde8b5c285fe	
-32.43420950	116.01642570	Powderbark Wandoo (Eucalyptus accedens)	450							b4e6b956-74fc-4232-98fd-4b49cfae80af	
-32.43402386	116.01644370	Marri (Corymbia calophylla)	600							5752e5f3-16fa-4532-9963-5f1f786cff9e	
-32.43441300	116.01585730	Marri (Corymbia calophylla)	490							4ebd1337-4cd5-40ef-81ef-d1fc30e81735	
-32.43446060	116.01575360	Powderbark Wandoo (Eucalyptus accedens)	570		1	1			No	a06bc995-a822-4b25-8ace-cfb6a02bd085	533
-32.43458330	116.01577370	Marri (Corymbia calophylla)	540							df92ec13-74b0-44da-88ee-6fd9d3bce5b3	
-32.43471470	116.01585220	Stag	600							a5dc7807-5d9b-4cb4-99eb-20ee1ec5ea90	
-32.43487380	116.01606150	Marri (Corymbia calophylla)	1020		1					56f63b11-b180-489e-99aa-542d155e7c85	
-32.43488950	116.01618950	Marri (Corymbia calophylla)	510							576b0827-f96c-4137-8006-bd93ea2d089b	
-32.43485120	116.01626090	Marri (Corymbia calophylla)	700		1	1			No	95e97e6e-5634-4bd8-a5c3-d8d07555a9c2	536, 537, 538, 539, 540
-32.43454600	116.01627420	Powderbark Wandoo (Eucalyptus accedens)	640		1	1			Yes	167b1702-fe99-451e-841e-92ac0474bccd	541, 542, 543
-32.43453980	116.01638880	Powderbark Wandoo (Eucalyptus accedens)	570							26be3fac-fa67-4596-a034-70892572a7de	
-32.43445900	116.01625150	Powderbark Wandoo (Eucalyptus accedens)	370							9fb62de2-cfae-4f9b-93f7-8eabc2396ab4	
-32.43440440	116.01605310	Stag	600							b46af9f2-0552-41c3-9f28-1494158e9d31	
-32.43441560	116.01602300	Powderbark Wandoo (Eucalyptus accedens)	570		2	1			No	6afb139e-9629-43f2-95f5-ca1cff640458	530
-32.43441230	116.01602240	Powderbark Wandoo (Eucalyptus accedens)	0								
-32.43453670	116.01596130	Marri (Corymbia calophylla)	530		1					f44166bb-4035-4261-8a37-ad8815b240bd	

Latitude	Longitude	Taxa	DBH (mm)	Approx height (m)	# of hollows	# of hollows > 120 mm	# of hollows with bees	Comments	Suitable for Black Cockatoo	Tree Photo Reference	Hollow Photo Reference
-32.43441170	116.01636790	Powderbark Wandoo (Eucalyptus accedens)	350							5377804f-168e-406f-8113-4826e1c5ea22	
-32.43393070	116.01686730	Powderbark Wandoo (Eucalyptus accedens)	320							f3b05856-c69f-4c4b-bbb1-c5d6ab5ea4d0	
-32.43398730	116.01682160	Jarrah (Eucalyptus marginata)	490							fe2a6081-ccf7-4a8a-80dc-d3832e44d58c	
-32.43417170	116.01694930	Jarrah (Eucalyptus marginata)	570							e6d99542-5152-4d95-934c-dc7ee9c390f6	
-32.43420030	116.01694600	Powderbark Wandoo (Eucalyptus accedens)	490							f11863c8-3b74-4282-b02a-e730b7d74a79	
-32.43423100	116.01681460	Jarrah (Eucalyptus marginata)	540		1	1			No	129590a6-d57b-4c6c-8fe6-59c355b025c6	517, 518
-32.43433140	116.01686660	Jarrah (Eucalyptus marginata)	510							4f11808d-fd04-4250-bd9b-3c602d4988d3	
-32.43444730	116.01687210	Marri (Corymbia calophylla)	540							6327a0c4-e3b3-42d9-b515-155305b449e0,f9c9cedb-2952-4a37-941d-0698b6afe560	
-32.43472550	116.01680470	Marri (Corymbia calophylla)	510							89f91491-856d-4bea-998c-b8943c7e75ce	
-32.43489840	116.01681220	Powderbark Wandoo (Eucalyptus accedens)	320							bc602961-adb3-455e-9a8f-2f05bf640cd2	
-32.43533177	116.01664420	Powderbark Wandoo (Eucalyptus accedens)	480							2af04ce6-3770-4b59-92f5-900ab2238c87	
-32.43491693	116.01667980	Powderbark Wandoo (Eucalyptus accedens)	320							842ec712-b8be-4f91-b549-7702c91cb210	
-32.43494947	116.01676860	Stag	640							a809591f-4d61-4460-b605-8b5f234f3158	
-32.43493650	116.01682740	Powderbark Wandoo (Eucalyptus accedens)	320							d465606a-2666-4016-8cd1-d70b2de22e2b	
-32.43516793	116.01674880	Powderbark Wandoo (Eucalyptus accedens)	480							37840474-ee0d-4ef1-b8dd-251c428387b5	
-32.43496060	116.01702090	Marri (Corymbia calophylla)	510		2	1	1		No	72fd2d9c-159b-4776-8b25-4e7d6bba7ee0	502, 503, 504, 505
-32.43490350	116.01699710	Powderbark Wandoo (Eucalyptus accedens)	570		1	1			No	fb5c4865-3ef1-40d7-b711-bac8d91063ba	506, 507, 508
-32.43473780	116.01722620	Powderbark Wandoo (Eucalyptus accedens)	320							071bc457-c1ee-4a2f-91cf-5b24b2f2cf7f	
-32.43444520	116.01723710	Jarrah (Eucalyptus marginata)	600							de40967d-443e-4c49-ac30-65e87c4bde4a,bf3ef2d9-4f31-4ab6-b135-5e402a3a53ab	
-32.43443983	116.01729770	Powderbark Wandoo (Eucalyptus accedens)	350							b25ea042-7d03-4ead-8cb5-45a0d1bc250b	
-32.43442455	116.01741670	Powderbark Wandoo (Eucalyptus accedens)	350							2e588d25-932e-4910-a24e-441d2a2e3991	
-32.43432042	116.01722090	Stag	510							abdab315-decf-4f76-8fdd-5e2e25586a79	
-32.43421720	116.01715980	Powderbark Wandoo (Eucalyptus accedens)	350							2fc7c3e3-c1e2-43d8-af7c-022dc2d56690	
-32.43413480	116.01718830	Powderbark Wandoo (Eucalyptus accedens)	450							ede068d2-1367-4255-949d-e481b47bfc4c	
-32.43406310	116.01721700	Powderbark Wandoo (Eucalyptus accedens)	350							a2432aef-6345-46ee-97d1-e1b0fe03ba49	
-32.43399180	116.01723940	Jarrah (Eucalyptus marginata)	920		1	1			No	cac21eaa-92dc-486f-962b-a93a2f1d89a9	491, 492, 493
-32.43392029	116.01792300	Stag	640							807a7a72-4dec-40b4-ae8a-18262b6c2105	
-32.43417978	116.01817950	Marri (Corymbia calophylla)	510		1	1			No	0df1b0f0-dc62-46ab-9157-945a9889828a	439, 440
-32.43425788	116.01824450	Stag	510		1	1			No	b3fb1208-b009-4039-b0af-227b9943a5f4	441, 442
-32.43393274	116.01817880	Marri (Corymbia calophylla)	510							b5178f09-932d-4bc7-87ca-00f742398601	
-32.43387610	116.01830460	Marri (Corymbia calophylla)	640							c6690581-c009-4ff7-b299-d122f8f35d36	
-32.43470380	116.01992320	Jarrah (Eucalyptus marginata)	510							d9e8a219-0f8b-4958-92e9-c84aa0f1cf82	
-32.43459810	116.01967150	Jarrah (Eucalyptus marginata)	510							7017f537-d6a6-44f0-9ec9-40aae7d1da81	
-32.43454538	116.01931870	Stag	510								
-32.43814830	116.02035880	Stag	480							4ee6cd88-6c8b-4ea2-a586-d69f419df151	
-32.43896845	116.01553680	Marri (Corymbia calophylla)	800		1	1			No	9a69e596-9686-467e-8c09-6a89ab332e9b	544
-32.43806500	116.01552580	Powderbark Wandoo (Eucalyptus accedens)	380							52cedaa3-34bf-4130-8f32-69517cecedb1	
-32.43778920	116.01575380	Powderbark Wandoo (Eucalyptus accedens)	350							158fbc83-db27-4360-ab34-211a65ca3585	
-32.43724650	116.01598350	Powderbark Wandoo (Eucalyptus accedens)	350							b087f88b-ded4-48ef-bf31-af2851276ea9	
-32.43708278	116.01581010	Marri (Corymbia calophylla)	540							cfd2cf42-497b-4bb3-a2d4-0ec705c72793	
-32.43668070	116.01557880	Powderbark Wandoo (Eucalyptus accedens)	330							d8ddb651-fe2b-4465-8102-53713207a9c4	

Appendix B
Sightings and Foraging Evidence

Latitude	Longitude	Species	Evidence type	Foraging material	Comments
-32.4409455	116.0208563	Forest Red-tailed Black Cockatoo	Sighting		Flock of Birds

Appendix C
Foraging Habitat Scoring Tool Results

Habitat	Area (ha)	Starting Score	Within Swan Coastal Plain	Suitable nest hollows	Primarily marri/jarrah	Contains trees DBH >500mm	Known roost	No feeding debris	No foraging habitat within 6km	>12km from known breeding site	>12km from known roosting site	>2km from water	Disease present e.g. dieback	Total	Quality
Predominantly Marri	36.47	7	3	3	2	2	0	0	0	0	0	0	0	17	Very High Quality

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