Jurien Bay Borefield Upgrade

EPBC Act Referral Supporting Document

WATER CORPORATION

Document Control

Document Name	Jurien Bay Borefield Upgrade – EPBC Supporting Document
Nexus Reference	186029330

Version	Date	Prepared By	Reviewed By
V1	22 November 2024	SLR Consulting	C. McLeod
V2	10 December 2024	C. McLeod	L. Wynne; J Leonard

Contents

Tables

1 Background

Water Corporation currently operates the Jurien Bay borefield, located approximately 3.5 km northeast of Jurien Bay town centre in the Shire of Dandaragan, Western Australia.

Due to high salinity from some of the current production bores, Water Corporation propose to equip an existing water production bore to supplement the water supply scheme to the area and to install and commission a water treatment plant (WTP). The proposed action includes the following activities to be undertaken in the 8.82 ha Project Area:

- Clearing of 7.57 ha of native vegetation and earthworks
- Equipping existing groundwater bore 29/01 to supplement the water scheme, including installation of headworks and a variable speed pump;
- Construction of a new access track;
- Connecting bore 29/01 to the existing borefield collector main via a 2.5 km PVC pipeline along the new access track;
- Operation of bore 29/01 and associated infrastructure for abstraction of and transfer of water;
- Installing and operating a temporary filtration WTP for bore 29/01, then installing and operating a new permanent WTP, evaporation ponds and associated infrastructure
- Construction and operation of new above-ground and under-ground powerlines along Jurien Road;
- Road widening along Jurien Road to allow for safe access to and from the new bore site;
- Revegetation of 2.13 ha cleared for construction works (Figure 1 of Attachment 2).

The clearing associated with the Proposal minimises disturbance where possible in an east-west direction, maintaining connectivity between the remaining patch of Banksia Woodlands TEC. Clearing has been limited to 25 m width, of which approximately 8 m of this corridor will be revegetated leaving 17 m remaining for use as an access track and pipeline alignment.

2 Purpose

A search using the Protected Matters Search Tool (PMST) and results of biological surveys showed Matters of National Environmental Significance (MNES) may be present in the Project Area. This document is a supporting document to the online *Environment Protection and Biodiversity Conservation Act 1999 (*EPBC Act) referral form. This document includes an assessment of the likelihood of occurrence of MNES and, for species that have been recorded or are likely to occur in the Project Area an assessment against relevant Significant Impact Criteria and referral guidelines.

This document should be read in conjunction with the information in the EPBC Act online referral form.

3 Matters of National Environmental Significance

3.1 Flora and Vegetation

Threatened Flora that may occur in the Project Area (based on the results from the PMST) and their likelihood of occurrence are shown in Table 1. Descriptions of vegetation types and their mapped extents in the Project Area are presented in Table 2 (GHD, 2020; Eco Logical, 2023; Biota Environmental Sciences, 2024) and Figure 3 of Attachment 2 (Eco Logical, 2023).

Table 1: Threatened Flora potentially occurring in the Project Area from PMST and Likelihood Assessment (GHD, 2020; Eco Logical, 2023)

Scientific Name	Conservation Status (Federal)	Habitat in the Survey Area	Post-survey Likelihood of Occurrence
Andersonia gracilis	Endangered	No	**Unlikely:** No suitable habitat (winter-wet areas) present. Nearest records ~40km from Project Area.
Eucalyptus argutifolia	Vulnerable	Possible	**Unlikely:** Nearest records >100km from the Project Area. This mallee is of a size that it would have been observed if present.
Hemiandra gardneri	Endangered	Possible	**Unlikely:** No recent nearby records (most recent 1978). This shrub is of a size and appearance that is would have been observed if present.
Thelymitra stellata	Endangered	No	**Unlikely:** No suitable habitat (Eucalyptus woodland, lateritic hill tops) present. This orchid is of an appearance that it would have been observed if present. Recent records ~15 km from Project Area.

Table 2: Vegetation Types Mapped in the Project Area

Vegetation Type	Description	Extent in Project Area (ha)
Survey 1 (GHD, 2020)		
VT01 – Melaleuca Mid Shrubland	*Melaleuca cardiophylla, Melaleuca systena* and *Hibbertia hypericoides* subsp. *hypericoides* mid shrubland over *Conostylis candicans* subsp. *calcicola*, *Lomandra maritima* and *Desmocladus asper* herbland and sedgeland.	0.44
VT02 – Banksia Low Open Woodland	*Banksia prionotes* with occasional emergent *Allocasuarina lehmanniana*, *Acacia rostellifera* and *Nuytsia floribunda* over *Banksia leptophylla*, *Melaleuca systena* and *Eremaea pauciflora* var. *pauciflora* open shrubland over *Conostylis candicans* subsp. *calcicola*, *Desmocladus asper* and *Lepidosperma calcicola* open herbland and sedgeland.	1.66

Vegetation Type	Description	Extent in Project Area (ha)
	Some areas of this vegetation type meet the key diagnostic characteristics for the Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (Banksia Woodlands TEC).	
VT03 – Acacia Tall Closed Shrubland	*Acacia rostellifera, Spyridium globulosum* and *Melaleuca cardiophylla* tall closed scrubland over *Acanthocarpus preissii, Rhagodia baccata* subsp. *baccata* and *Acacia lasiocarpa* low open shrubland over *Lomandra maritima, Desmocladus asper* and *Lepidosperma calcicola* open herbland and sedgeland.	0.01
VT04 – Melaleuca Mid-Tall Closed Shrubland	*Melaleuca huegelii, Santalum acuminatum* and *Spyridium globulosum* mid-tall closed shrubland with occasional emergent *Acacia rostellifera* and *Banksia sessilis* over *Acacia lasiocarpa*, *Banksia leptophylla* and *Melaleuca systena* shrubland over *Conostylis candicans* subsp. *calcicola* and *Lomandra maritima* open herbland over *Desmocladus asper* and *Lepidosperma calcicola* sedgeland.	0
VT05 – Melaleuca Low Open Shrubland	*Melaleuca systena*, *Acacia lasiocarpa* and *Acacia spathulifolia* low open shrubland with emergent *Santalum acuminatum* on lower slopes over *Lomandra maritima, Conostylis candicans* subsp. *calcicola* and *Cassytha racemosa* open herbland over *Desmocladus asper, Mesomelaena pseudostygia* and *Lepidosperma calcicola* open sedgeland.	0.06
Survey 2 (Eco Logical, 2023)		
BaBmEp	*Banksia attenuata, Banksia menziesii* low open woodland over *Eremaea pauciflora, Scholtzia involucrata, Melaleuca systena* mid sparse shrubland over *Hibbertia hypericoides, Bossiaea eriocarpa, Petrophila macrostachya* low sparse shrubland over *Mesomelaena pseudostygia* low isolated clumps of sedges and *Desmocladus asper, Johnsonia pubescens* subsp. *pubescens* low isolated clumps of forbs. Some areas of this vegetation type meet the key diagnostic characteristics for the Banksia Woodlands TEC	0.52
BpCqHh	*Banksia prionotes* low open woodland over *Calothamnus quadrifidus* subsp. *quadrifidus*, *Jacksonia calcicola*, *Banksia leptophylla* mid open shrubland to shrubland over *Hibbertia hypericoides, Lechenaultia linarioides* low isolated clumps of shrubs, *Mesomelaena pseudostygia* low isolated clumps of sedges and *Desmocladus asper, Conostylis candicans, Opercularia spermacocea* low isolated clumps of forbs. Some areas of this vegetation type meet the key diagnostic characteristics for the Banksia Woodlands TEC.	1.57

Vegetation Type	Description	Extent in Project Area (ha)
CqHhDa	*Calothamnus quadrifidus* subsp. *quadrifidus, Banksia leptophylla, Hakea trifurcata* mid open shrubland over *Hibbertia hypericoides, Acacia lasiocarpa, Gompholobium tomentosum* low sparse shrubland and *Desmocladus asper, Dampiera carinata, Opercularia vaginata* low isolated clumps of forbs.	1.88
MhMsDa	*Melaleuca huegelii* subsp. *huegelii* mid open shrubland over *Melaleuca systena, Acacia truncata, Melaleuca cardiophylla* low open shrubland and *Austrostipa flavescens* tall isolated grasses *over Desmocladus asper, Conostylis candicans, Opercularia spermacocea* low open forbland.	0.12
MsAIDa	*Melaleuca systena, Acacia lasiocarpa, Beyeria cinerea subsp. cinerea* (P3) low sparse shrubland and *Austrostipa flavescens* tall isolated grasses over *Desmocladus asper, Conostylis candicans, Lomandra maritima* low sparse forbland, *Lepidosperma calcicola* low isolated clumps of sedges and *Cassytha racemosa* isolated clumps of vines.	0.44
Ar	*Acacia rostellifera* tall open shrubland over *Lepidosperma calcicola* low isolated clumps of sedges *Conostylis candicans* low isolated clumps of forbs and *Desmocladus asper* low sparse rushland.	0.76
Survey 3 (Biota Environmental Sciences, 2024)		
Planted	Patches of planted vegetation consisting of non-local native *Eucalyptus utilis* and *Agonis flexuosa* trees on farm properties, that were overhanging or on the edge of cleared firebreaks.	0.05

3.2 Fauna Habitat

Threatened fauna that may occur in the Project Area (based on the results from the PMST) and their likelihood of occurrence are shown in Table 3. Fauna habitat descriptions and their mapped extents in the Project Area are presented in Table 4 (GHD, 2020; Eco Logical 2023; Biota Environmental Sciences, 2024).

Table 3: Threatened Fauna potentially occurring in the Project Area from PMST and Likelihood Assessment (GHD, 2020; Eco Logical, 2023)

Scientific Name	Common Name	Conservation Status (Federal)	Likelihood of Occurrence
Calidris acuminata	Sharp-tailed Sandpiper	Vulnerable, Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area.
Calidris canutus	Red Knot	Vulnerable, Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area and this species is marine, therefore unlikely to occur.

Scientific Name	Common Name	Conservation Status (Federal)	Likelihood of Occurrence
Calidris ferruginea	Curlew Sandpiper	Critically Endangered, Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area.
Charadrius leschenaultii	Greater Sand Plover	Vulnerable, Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area.
Dasyurus geoffroii	Chuditch, Western Quoll	Vulnerable	**Unlikely** – no suitable habitat present in the Survey Area, no records within 30 km.
Egernia stokesii badia	Western Spiny-tailed Skink	Endangered	**Unlikely** – suitable habitat unlikely to be present in the Survey Area, no records within 30 km.
Leipoa ocellata	Malleefowl	Vulnerable	**Unlikely** – no suitable habitat present in the Survey Area. Historical records (1959) are known from >10 km north-east.
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit	Endangered	**Unlikely** – no suitable habitat present in the Survey Area.
Macroderma gigas	Ghost Bat	Vulnerable	**Unlikely** – no suitable habitat present in the Survey Area. One historical record (1990) known from 5 km north-east.
Numenius madagascariensis	Far Eastern Curlew	Critically Endangered, Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area.
Pristis pristis	Freshwater Sawfish	Vulnerable, Migratory	**Unlikely** – no suitable habitat present in the Survey Area.
Rostratula australis	Australian Painted Snipe	Endangered, Marine	**Unlikely** – no suitable habitat present in the Survey Area.
Sternula nereis nereis	Australian Fairy Tern	Vulnerable	**Unlikely** – no suitable habitat present in the Survey Area.
Tringa nebularia	Common Greenshank	Endangered, Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area
Zanda latirostris	Carnaby's Black Cockatoo	Endangered	**Likely** – foraging evidence recorded in the Survey Area.

Table 4: Fauna Habitat Mapped in the Project Area

Fauna Habitat	Habitat Description	Extent in the Project Area (ha)
Banksia Woodland	Survey 1 (GHD, 2020): Low open woodlands of *Banksia prionotes* (with occasional *Allocasuarina lehmanniana* and *Nuytsia floribunda*) over shrubland of *Banksia leptophylla, Melaleuca systena, Eremaea pauciflora* var. *pauciflora* over an understorey of *Conostylis candicans* subsp. *calcicola, Desmocladus asper* and *Lepidosperma calcicola* on grey to brown sand on plains and low undulating slopes. This habitat type contains good structural diversity and a variety of micro-habitat types including patches of thick leaf litter, fallen logs and branches and deep sandy soils. Overall, the vegetation is in excellent condition. This habitat provides suitable foraging for Carnaby's Black Cockatoo. Survey 2 (Eco Logical, 2023): This habitat contains *Banksia attenuata, Banksia leptophylla, Banksia menziesii* and *Banksia prionotes*. Aligned with vegetation community BaBmEp and BpCqHh. This habitat is considered high quality due to its complexity and condition. This habitat provides connected dispersal habitat for Threatened bird and insect species. This habitat provides potential foraging habitat for Carnaby's Cockatoos.	3.84
Low shrublands on sand dunes	Low open mixed shrubland/heathland of *Melaleuca systena, Acacia lasiocarpa* and *Acacia spathulifolia* with emergent *Santalum acuminatum* over low herbland and sedgeland dominated by *Lomandra maritima, Conostylis candicans* subsp. *calcicola Desmocladus asper*, and *Lepidosperma calcicola* on white/grey/yellow sandy dune systems. The shrubland/heathland provides good foraging and breeding opportunities for small native ground mammals, birds and reptiles.	0.06
Acacia shrublands	Closed shrublands of *Acacia rostellifera, Melaleuca cardiophylla* and *Spyridium globulosum* over mixed open shrubland and open herbland/sedgeland on white/grey soils in dunes swales and lower slopes. Traversing this habitat was difficult due to the thickness of some areas. This habitat would be utilised by a number of coastal species such as skinks, burrowing reptiles, small birds, and mammal species.	0.01
Melaleuca shrublands on limestone outcropping	Closed shrublands dominated by *Melaleuca huegelii, Spyridium globulosum, Melaleuca systena*, with occasional *Acacia rostellifera* and *Banksia sessilis* over herbland and sedgeland of *Conostylis candicans* subsp. *calcicola*,	0.16

Fauna Habitat	Habitat Description	Extent in the Project Area (ha)
	Lomandra maritima, Desmocladus asper and *Lepidosperma calcicola* on skeletal grey sand with limestone outcropping. The dense shrubland provides good foraging and breeding opportunities for small native ground mammals, birds and reptiles. Leaf-litter was scattered and densest under shrubs. *Banksia sessilis* provides suitable foraging habitat for Carnaby's Black Cockatoo.	
Melaleuca shrubland on limestone ridges	This habitat contains *Banksia dallanneyi, Banksia sessilis* and *Hakea trifurcata*. This habitat is aligned with vegetation community MhMsDa. This habitat is considered high quality due to its complexity and condition. This habitat provides connected dispersal habitat for Threatened bird species. This habitat provides potential foraging habitat for Carnaby's Cockatoos.	0.40
Melaleuca shrubland on sandy slopes	This habitat contains *Lomandra maritima*. Aligned with vegetation community MsAlDa. This habitat is considered high quality due to its complexity and condition.	0.44
Myrtaceous-Proteaceous heathland	This habitat contains *Banksia leptophylla, Hakea trifurcata, Lomandra maritima* and *Xanthorrhoea preissii*. Aligned with vegetation community CqHhDa. This habitat is considered high quality due to its complexity and condition. This habitat provides connected dispersal habitat for Threatened bird species. This habitat provides potential foraging habitat for Carnaby's Cockatoos.	1.88
Acacia thicket	This habitat contains *Acacia rostellifera*. Aligned with vegetation community Ar. This habitat provides connected dispersal habitat for Threatened bird and mammal species.	0.76
Planted	Patches of planted vegetation consisting of non-local native *Eucalyptus utilis* and *Agonis flexuosa* trees on farm properties, that were overhanging or on the edge of cleared firebreaks.	0.05

3.3 Migratory Species

Threatened Migratory Species that may occur in the Project Area (based on the results from the PMST) and their likelihood of occurrence are shown in Table 5.

Table 5: Migratory Species potentially occurring in the Project Area from PMST and Likelihood Assessment (GHD, 2020; Eco Logical, 2023)

Scientific Name	Common Name	Conservation Status (Federal)	Likelihood of Occurrence
Actitis hypoleucos	Common Sandpiper	Migratory, Marine	**Unlikely** – No suitable habitat present in the Survey Area.
Apus pacificus	Fork-tailed Swift	Migratory, Marine	**Unlikely** – This species can occupy a wide range of habitat types. This species does not breed in Australia and is almost exclusively aerial, including foraging. This species is therefore unlikely to utilise the Survey Area.
Calidris acuminata	Sharp-tailed Sandpiper	Vulnerable, Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area.
Calidris canutus	Red Knot	Vulnerable, Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area and this species is marine, therefore unlikely to occur.
Calidris ferruginea	Curlew Sandpiper	Critically Endangered, Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area.
Calidris melanotos	Pectoral Sandpiper	Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area (i.e. wetland habitat)
Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover	Vulnerable, Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area.
Limosa lapponica	Bar-tailed Godwit	Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area.
Motacilla cinerea	Grey Wagtail	Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area.
Numenius madagascariensis	Far Eastern Curlew	Critically Endangered, Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area.
Pandion haliaetus	Osprey	Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area.
Pristis pristis	Freshwater Sawfish	Vulnerable, Migratory	**Unlikely** – no suitable habitat present in the Survey Area.
Sterna dougallii	Roseate Tern	Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area.
Tringa nebularia	Common Greenshank	Endangered, Migratory, Marine	**Unlikely** – no suitable habitat present in the Survey Area

4 Assessment of Significance

This section provides a significant impact assessment of the Proposal on the Carnaby's Cockatoo and Banksia Woodland of the Swan Coastal Plain ecological community.

4.1 Carnaby's Cockatoo (*Zanda latirostris*) Impact Assessment

The impact assessment in Table 6 below was conducted in accordance with the following:

- Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (DEWHA, 2013).
- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan (DPaW, 2013)
- Referral Guideline for 3 WA Threatened Black Cockatoo Species (DAWE, 2022b)
- Threatened Species Action Plan (DCCEEW, 2022).

Table 6: Significant Impact Assessment – Carnaby's Cockatoo (*Zanda latirostris*) - Endangered

Significant Impact Criteria	Assessment of Significance	Significance Summary
Lead to a long-term decrease in the size of a population	The Proposal does not include the clearing of any potential breeding or roosting habitat. The Significant Impact Guidelines 1.1 (DEWHA, 2013) describes an important population as a population necessary for a species' long-term survival and recovery and may be a key source for populations either for breeding or dispersal, populations that are necessary for maintaining genetic diversity, and/or populations that are near the limit of the species' range (DEWHA, 2013). Of the 123.43 ha of Black Cockatoo foraging habitat recorded during the surveys, 6.23 ha occurs within the Project Area that is proposed to be cleared. The foraging habitat proposed to be cleared consists of (GHD, 2020; Eco Logical, 2023; Biota. 2024): • 1.66 ha of High Quality; • 4.45 ha of Low-Quality; and • 0.12 ha of Low to Negligible habitat.	Not a significant impact

Significant Impact Criteria	Assessment of Significance	Significance Summary
	The *Referral Guidelines for 3 WA Threatened Black Cockatoos* (DAWE, 2022) states Black Cockatoos are not dependent on one particular area of habitat and are considered to forage within 6 to 12 km of their nesting site during the breeding season. The Project Area is within the foraging range and outside of the modelled breeding and roosting distribution for the Carnaby's Cockatoo (DAWE, 2022) The Project Area or wider combined Survey Area does not contain any breeding or roosting habitat (GHD, 2020; Eco Logical, 2023; Biota. 2024). The Proposal does not include the clearing of any potential breeding or roosting habitat. Carnaby's Cockatoo have been recorded roosting approximately 15 km north and 35 km east of the Project Area (DoPW, 2013). Given the lack of suitable roosting habitat, it is unlikely that there would be a permanent or regular population of Black Cockatoos within the Project Area. The Project Area may be suitable for occasional foraging, but the native flora species recorded within the survey area are not primary food sources (Groom, 2011). Extensive foraging habitat is available in areas immediately surrounding the Project Area, within the 6-12 km radius Black Cockatoos are considered to forage in during the breeding season and within the 20 km radius Black Cockatoos are considered to forage in during the non-breeding season. Drovers Cave National Park is located approximately 300 m from the Project Area and contains suitable foraging habitat in conservation tenure, in addition to the vegetation within wider Jurien Water Reserve (Figure 1 of Attachment 2). Given the mobile and widely dispersed nature of Black Cockatoos, the clearing of 6.23 ha of potential foraging habitat is unlikely to lead to a long-term decline in the size of a Black Cockatoo population. This is due to the small area of clearing and the presence of larger remnants within the wider Jurien Water Reserve and the Drovers Cave National Park protected by a conservation covenant in perpetuity. The Proposed Action has been designed to avoid unnecessary clearing of intact native vegetation where possible, whilst also working with the natural dune landscape system for the proposed infrastructure. Bore 29/01 is an existing production bore drilled in 2001 and	

Significant Impact Criteria	Assessment of Significance	Significance Summary
	the infrastructure proposed to be constructed will utilise existing cleared areas as much as possible. The extent of foraging habitat of 6.23 ha proposed to be cleared within 123.43 ha of foraging habitat recorded represents ~5.05% reduction within the surveyed areas. As no potential breeding or roosting habitat has been recorded within or surrounding the Project Area and the area of foraging habitat proposed to be cleared is minor, in addition to the highly mobile nature of the species, it is considered the Proposed Action would not have a significant impact on the Carnaby's Cockatoo. The Proposal includes the revegetation of 2.13 ha of foraging habitat post construction, with the net direct impact to Carnaby's Cockatoo foraging habitat being 4.10 ha. Groundwater abstraction is unlikely to have an indirect impact on the surrounding Carnaby's Cockatoo foraging habitat. The abstraction from the Lesueur Sandstone aquifer will not impact on MNES as the vegetation is not hydraulically linked to this deep aquifer (DoW, 2009; 2017; Rutherford et al. 2005). The depth to groundwater at bore 29/01 is approximately 30-40 mbgl which is greater than the depth the vegetation can access groundwater (Groom, 2004; Groom *et al.,* 2000). In accordance with the Significant Impact Guidelines 1.1 (DEWHA, 2013) the Proposal is unlikely to lead to a long-term decrease in the size of a nearby population of Carnaby's Cockatoo.	
Reduce the area of occupancy of the species	Carnaby's Cockatoo has an estimated area of occupancy between 34,500 km^2 and 86,000 km^2 (DPaW, 2013). The species generally breeds in the WA Wheatbelt from July to January. From February through to June, individuals return to the Swan Coastal Plain for the non-breeding season, with some non-breeding individuals remaining within the Swan Coastal Plain throughout the year to forage. The Project Area contains a small patch (6.23 ha) of suitable foraging habitat for Carnaby's Cockatoo that is located within a wider area of native vegetation providing significant foraging habitat. Jurien Water Reserve and nearby Drovers Cave National Park cover a total estimated area of 3,825 ha that is considered to provide suitable foraging habitat for	Not a significant impact

Significant Impact Criteria	Assessment of Significance	Significance Summary
	the species (Figure 1 of Attachment 2). The Project Area represents a small portion of the foraging habitat to be cleared that was recorded in the survey area: 6.23 ha (5.05%) out of 123.43 ha of the extent of foraging habitat recorded in surveys (GHD, 2020; Eco Logical, 2023; Biota, 2024) 6.23 ha (0.16%) of the extent of remnant native vegetation within the wider Jurien Water Reserve and nearby Drovers Cave National Park (~3,825 ha) that would likely provide suitable foraging habitat (Figure 1 of Attachment 2). The Proposal will not significantly increase the distance between patches of foraging habitat and has been designed to utilise existing cleared and degraded areas near existing infrastructure where possible, whilst maintaining the dune system landscape. The proposed clearing corridor has been restricted to 25 m in width, including temporary and permanent cleared areas, to prevent fragmentation. The Proposal will involve the revegetation of 2.13 ha of foraging habitat post construction, with the net direct impact to Carnaby's Cockatoo foraging habitat being 4.10 ha. The abstraction from the Lesueur Sandstone aquifer will not impact on MNES as the vegetation is not hydraulically linked to this deep aquifer (DoW, 2009; 2017; Rutherford et al. 2005). The depth to groundwater at bore 29/01 is approximately 30-40 mbgl which is greater than the depth the vegetation can access groundwater (Groom, 2004; Groom et al., 2000). Therefore, groundwater abstraction will not indirectly impact on the surrounding foraging habitat. The habitat proposed to be cleared is not considered to be a primary source of critical habitat for the Carnaby's Cockatoo and is therefore unlikely to reduce the area of occupancy of the species.	
Fragment an existing population into two or more populations	The Proposal to clear up to 6.23 ha of Black Cockatoo foraging habitat is not likely to fragment an existing population into two or more populations. The Project Area does not	Not a significant impact

Significant Impact Criteria	Assessment of Significance	Significance Summary
	contain potential breeding or roosting habitat and is located outside of the modelled distribution range for Carnaby's Cockatoo breeding and roosting (DAWE, 2022). In accordance with the Referral Guidelines (DAWE, 2022), the Proposal will not create a gap of more than 4 km between patches of Black Cockatoo. Foraging habitat is present immediately adjacent to the Project Area with surveyed extent of 123.43 ha (GHD, 2020; Eco Logical, 2023; Biota, 2024). The Project Area has been designed to minimise clearing of native vegetation where possible by following existing cleared areas and utilise as much existing water services infrastructure as possible, whilst balancing the constraints of a highly variable topography of the dune system. The vegetation within and surrounding the Project Area is not considered to be dependent upon the groundwater of the Lesueur Sandstone aquifer (DoW, 2009; 2017; Rutherford et al. 2005) and the proposal to abstract groundwater is not likely to have an indirect impact on the Black Cockatoo habitat within the surrounding area. The Proposal is unlikely to impact the general movement patterns of the Carnaby's Cockatoo or the occupancy of the general area that would cause fragmentation of an existing population of the species.	
Adversely affect habitat critical to the survival of a species	The seasonal movements of Black Cockatoos mean they require extensive areas of habitat for breeding, roosting and foraging, as well as connectivity between habitats to assist their movement across the landscape (DSEWPaC, 2012). Habitat critical to the survival of the Carnaby's Black Cockatoo has been defined in the species' Recovery Plan (DPAW, 2013) as: "The eucalypt woodlands that provide nest hollows used for breeding, together with nearby vegetation that provides feeding, roosting, and watering habitat that supports successful breeding."	Not a significant impact.

Significant Impact Criteria	Assessment of Significance	Significance Summary
	Woodland sites are known to have supported breeding in the past and could be used in the future, provided adequate nearby food and/or water resources are available or are re-established. In the non-breeding season, the vegetation that provides food resources as well as the sites for nearby watering and night roosting that enable the cockatoos to effectively utilise the available food resources (DPAW, 2013). The Project Area could be considered to partially meet the definition of critical habitat for Carnaby's Cockatoo as it provides a food resource within the non-breeding season within the foraging range. However, it is not located within the breeding or roosting range and does not contain any breeding or roosting habitat. The nearest known breeding site is located ~30 km to the east of the Project Area (DBCA, 2023). The Project Area and surrounds do not provide a surface water source (DoW, 2012). The nearest surface water feature is a mapped sumpland ~1.5 km from the Project Area that could provide a seasonal water source (DoW, 2012). Whilst the vegetation within the Project Area partially aligns with the definition of critical habitat for the Carnaby's Cockatoo, the Project Area represents only 0.03% of potential foraging habitat within a 12 km radius of the Project Area (~23,719 ha) (DBCA, 2023). The small area of 6.23 ha foraging habitat to be cleared is unlikely to be substantially relied upon by any individuals or breeding pairs within the region. The abstraction from the Lesueur Sandstone aquifer will not impact on MNES as the vegetation is not hydraulically linked to this deep aquifer (DoW, 2009; 2017; Rutherford et al. 2005). The depth to groundwater at bore 29/01 is approximately 30-40 mbgl which is greater than the depth the vegetation can access groundwater (Groom, 2004; Groom et al., 2000). Therefore, groundwater abstraction will not indirectly impact on the surrounding foraging habitat.	

Significant Impact Criteria	Assessment of Significance	Significance Summary
	The proposal to clear up to 6.23 ha of potential foraging habitat is not considered to have an adverse impact on the habitat critical to the survival of Carnaby's Cockatoo. The Proposal includes the revegetation of 2.13 ha of foraging habitat post construction, with the net direct impact to Carnaby's Cockatoo foraging habitat being 4.10 ha.	
Disrupt the breeding cycle of a population	The Project Area and the Jurien area within the Swan Coastal Plain is within the modelled range for foraging but is not within the modelled range for Carnaby's Cockatoo breeding or roosting (DAWE, 2022). The nearest known breeding site is located ~30 km to the east of the Project Area (DBCA, 2023). While breeding pairs have the potential to forage within the Project Area, due its small size of 6.23 ha and the abundance of alternative foraging areas within 12 km of the Project Area (~23,719 ha) means breeding pairs are unlikely to be reliant upon the foraging habitat within the Project Area during the breeding season (DBCA, 2023). The proposal is therefore not likely to be a significant impact as it is not likely to disrupt the breeding cycle of a population.	Not a significant impact.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project Area lacks suitable breeding or roosting habitat (GHD, 2020; Eco Logical, 2023; Biota, 2024) and is located outside of the range for breeding and roosting (DAWE, 2022) for the Carnaby's Cockatoo and as such the Proposed Action will only impact potential foraging habitat. The Proposed Action will result in the clearing of 6.12 ha representing ~0.03% of potential foraging habitat within a 12 km radius of the Project Area (~23,719 ha) (DBCA, 2023). Given the small amount of vegetation that is proposed to be cleared, the presence of alternative foraging vegetation within the immediate vicinity and broader region, the absence of breeding or roosting habitat, the Proposed Action is unlikely to result in the decline of the Carnaby's Cockatoo.	Not a significant impact.

Significant Impact Criteria	Assessment of Significance	Significance Summary
	The Proponent will mitigate any potential impacts to the potential foraging by requiring all contractors to utilise industry best practices to manage access and avoid the introduction or spread of weeds and disease into the retained vegetation. ~2.13 ha of native vegetation will also be revegetated post construction, resulting in a net direct impact of 4.10 ha of Carnaby's Cockatoo foraging habitat. It is therefore considered unlikely that the clearing would cause a significant impact to habitat that would cause the species to decline.	
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Black Cockatoos are adversely impacted by direct predation by feral cats as well as competition with feral European bees, introduced galahs and corellas (Johnstone & Kirkby 2008). None of these invasive species were observed during the surveys (GHD, 2020; Eco Logical, 2023). The quality of native vegetation and habitat can be impacted from weed invasion. The surveys identified weed species that are considered environmental weeds that are common along the Swan Coastal Plain with the exception of one species, Paterson's Curse (**Echium plantagineum*) declared under the *Biosecurity and Agricultural Management Act 2007*. One individual of Paterson's Curse was recorded and was removed by hand during the survey (Eco Logical, 2023) The Proposed Action is unlikely to result in the introduction of harmful species into the area with hygiene management measures to be implemented, including but not limited to the following: • Clean on entry and exit procedures and strict weed control measures. • Weed control during and post construction. • Revegetation of 2.13 ha of native vegetation including weed control within the entire Project Area for a period of 3 years post construction.	Not a significant impact.

Significant Impact Criteria	Assessment of Significance	Significance Summary
	• All waste is to be removed off site and in enclosed bins to prevent attraction of feral fauna • No feeding of fauna is permitted. • Feral fauna control to be implemented if required (Attachment 9). A Weed and Dieback Hygiene Management Plan will be prepared and implemented during the Construction phase of the project.	
Introduce disease that may cause the species to decline	While several diseases have been identified as affecting Black Cockatoos, such as Psittacine Beak and Feather Disease (DPaW 2013), these have not been identified as key threats to either species in the relevant Conservation Advice or Listing Advice. Given no direct interaction with individuals is anticipated, the Proposed Action poses a very low risk of introducing these diseases to local populations (DAWE 2022). The introduction of dieback (*Phytophthora cinnamomi*) has the potential to impact on vegetation that can affect key species used by Black Cockatoos (DEC, 2008). A Weed and Dieback Hygiene Management Plan will be prepared and implemented during the Construction phase of the project. To mitigate any potential impacts on adjacent retained habitat, the Proponent will require all contractors to utilise industry best practices to manage access and avoid the introduction or spread of Phytophthora Dieback into patches of remnant vegetation. This will include, but is not limited to, strict clean on entry and exit procedures and avoiding works during wet periods where possible (NRM WA, 2023).	
Interfere with the recovery of the species.	The performance criteria for the successful recovery of the Carnaby's Black Cockatoo are outlined within the species' Recovery Plan (DPAW 2013) and have been summarised below: The species' area of occupancy does not decline The number of breeding pairs of Carnaby's cockatoos at pre-determined breeding sites across the breeding range remains stable or increases, averaged over three consecutive years	Not a significant impact.

Significant Impact Criteria	Assessment of Significance	Significance Summary
	Estimates of the number of birds and proportion of juveniles across the entirety of known night roost sites across the range of the species remain stable or increase, averaged over three consecutive years The extent of nesting, feeding habitat, and night roosting habitat are maintained throughout the species range (DPAW, 2013). The small size of 6.23 ha of Black Cockatoo foraging habitat proposed to be cleared in the context of the available potential foraging habitat within 12 km (~23,719 ha) indicates that the Proposed Action is unlikely to cause the species' area of occupancy to decline. Additionally, the Project Area does not contain any breeding or night roost sites (GHD, 2020; Eco Logical, 2023) nor is it within the range for breeding or roosting (DAWE, 2022). The foraging habitat within the Project Area is not considered to be critical to the continual viability of any known breeding or roosting sites, with the nearest roost site located ~30 km to the east of the Project Area. As such, it is unlikely that the Proposed Action will impact the current extent, utilisation, or existence of any known Carnaby's breeding or roosting sites. It is noted that the Proposed Action will cause a reduction to the overall extent of Carnaby's foraging habitat, however, the small nature of the clearing associated with the Proposed Action is not considered to be a significant impact and that it will not trigger any of the Recovery Plan's failure performance criteria (DPAW 2013).	

4.2 Banksia Woodlands of the Swan Coastal Plain TEC Impact Assessment

The impact assessment in Table 7 below was conducted in accordance with the following:

- Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (DEWHA, 2013).
- Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community (DEE, 2016)
- Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi* (DEE, 2018)

- Banksia Woodlands of the Swan Coastal Plain: a nationally protected ecological community (DEE, 2016)
- EPBC Referral Guidance – Banksia Woodlands of the Swan Coastal Plain Ecological Community (DEE, n.d.)

Table 7: Assessment of Significance – Banksia Woodlands of the Swan Coastal Plain Ecological Community (Endangered)

Significant Impact Criteria	Assessment of Significance	Significance Summary
Reduce the extent of an ecological community	The Banksia Woodlands of the SCP TEC had an extent of approximately 336,490 ha at the time of listing under the EPBC Act. The TEC is restricted to the south-west of Western Australia between Jurien Bay, Dunsborough, and the Darling Escarpment (TSSC 2016). Within this extent, approximately 24.3% (81,832 ha) is located within reserves (TSSC 2016). A total combined extent of 40.16 ha of the TEC was surveyed (Figure 5 of Attachment 2) (GHD, 2020; Eco Logical, 2023; Biota 2024). The proposed clearing of the Banksia Woodlands TEC is 3.84 ha which represents 9.56% of the surveyed areas of the TEC (Figure 5 of Attachment 2). The Project Area is located approximately 300 m from the Drovers Cave National Park (Figure 1 of Attachment 2), which covers an area of 2,573 ha managed by the Department of Biodiversity, Conservation and Attractions (DBCA) (DOPA Explorer, 2021), where Banksia Woodland is likely to be present. Of the 3.84 ha of Banksia Woodlands TEC proposed to be cleared, 2.13 ha will be revegetated post-construction with the overall net direct impact to the TEC being 1.71 ha. The Project is located in the Shire of Dandaragan local government area and within the Swan Coastal Plain IBRA region. The Approved Conservation Advice (DEE, 2016a) estimates the following approximate extents of Banksia Woodlands TEC in 2015: • 99,624.5 ha in the Shire of Dandaragan • 253,540.6 ha in the Perth IBRA subregion, of which approximately 57,054.9 ha (22.5%) is protected in reserves (DEE, 2016a) The proposed clearing equates to approximately:	Not a significant impact.

Significant Impact Criteria	Assessment of Significance	Significance Summary
	• 0.004% of the estimated extent of Banksia Woodlands TEC in the Shire of Dandaragan • 0.002% of the estimate extent of Banksia Woodlands TEC in the Perth IBRA subregion The proposed reduction of 3.84 ha is not considered to be a significant impact to the TEC: The clearing of up to 3.84 ha of Banksia Woodlands TEC is not considered to represent a significant loss of the ecological community locally. The clearing is not considered to represent a significant reduction in the extent of the TEC regionally, with extensive patches of remnant native vegetation representative of the TEC remaining within the current patch. Several patches occur within the Jurien Water Reserve (GHD, 2020; Eco Logical 2023; Biota, 2024) and are likely to occur Drovers Cave National Park (Peggs, 1995). The proposed clearing represents only a small proportion (0.003%) of the extent of Banksia Woodlands TEC estimated to be present in the Shire of Dandaragan and in the Perth IBRA subregion (0.002%). The abstraction of groundwater from the Lesueur Sandstone aquifer will not impact on the surrounding remaining MNES as the vegetation is not hydraulically linked to this deep aquifer (DoW, 2009; 2017; Rutherford et al. 2005). In addition, the depth to groundwater at bore 29/01 is approximately 30-40 mbgl which is greater than the depth the vegetation can access groundwater (Groom, 2004; Groom *et al.,* 2000). As such, groundwater abstraction is unlikely to have an indirect impact on the surrounding remaining Banksia Woodlands TEC. While the proposed clearing will reduce the extent of the ecological community at the Project Area, the magnitude of the reduction is not considered to be significant at either a local (patch) or regional (bioregion) scale.	

Significant Impact Criteria	Assessment of Significance	Significance Summary
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	The conservation advice for the Banksia Woodlands TEC defines patches as "... a discrete and mostly continuous area of an ecological community. A patch may include small scale (less than 30 m) variations, gaps and disturbances, such as tracks, paths or breaks, or localised variations in vegetation that do not significantly alter the overall function of the ecological community. Such breaks are included in patch size calculations from the edge of canopy of 30 m or more..." (DEE, 2016a). The Project Area is located within Patch 5 of the Banksia Woodlands TEC, with four patches surveyed (Figure 5 of Attachment 2) (GHD, 2020; Eco Logical, 2023; Biota, 2024). Patch 5 has been subject to minor fragmentation associated with existing cleared tracks and degraded areas. The clearing associated with the Proposal minimises disturbance where possible in an east-west direction, maintaining connectivity between the remaining patch of Banksia Woodlands TEC. Clearing has been limited to 25 m width, of which approximately 8 m of this corridor will be revegetated leaving 17 m remaining for use as an access track and pipeline alignment. The proposal has been designed to utilise existing cleared areas where possible, whilst maintaining the integrity of the sand dune landscape and working with the highly constraining and variable topography on site. The Proposal will not cause permanent gaps of greater than 30 m as a result of clearing and therefore Patch 5 would still be considered one patch protected in accordance with the Approved Conservation Advice (DEE, 2016a). The abstraction of groundwater from the Lesueur Sandstone aquifer will not impact on the surrounding remaining MNES as the vegetation is not hydraulically linked to this deep aquifer (DoW, 2009; 2017; Rutherford et al. 2005). In addition, the depth to groundwater at bore 29/01 is approximately 30-	Not a significant impact.

Significant Impact Criteria	Assessment of Significance	Significance Summary
	40 mbgl which is greater than the depth the vegetation can access groundwater (Groom, 2004; Groom *et al.,* 2000). As such, groundwater abstraction is unlikely to have an indirect impact on the surrounding remaining Banksia Woodlands TEC. The Proposal will not cause significant additional fragmentation that would cause the remaining patch of the Banksia Woodlands TEC to become split into two or more patches or result in the patch losing protection under the EPBC Act. As such, the proposal is not considered to be significant.	
Adversely affect habitat critical to the survival of an ecological community	Habitat critical to the survival of the ecological community is defined within the Conservation Advice (TSSC 2016) as: '…all patches that meet the key diagnostic characteristics and condition thresholds for the ecological community …' Based on the above definition the patch of Banksia Woodland TEC, of which the Project Area is a part, could be considered as critical habitat. This is due to the patch containing vegetation in 'Good' or better condition and containing an upper storey that is dominated by Banksia species (360 Environmental, 2023). Given the small scale of clearing proposed, it is unlikely to be significant as the extent of the TEC proposed to be cleared would only result in a 12% reduction in the overall size of Patch 5 (32.0 ha) and less than 0.004% within the Shire of Dandaragan and 0.002 % within the IBRA subregion. Of the 3.84 ha of Banksia Woodlands TEC proposed to be cleared, 2.13 ha will be revegetated post-construction. Additionally, the proposed clearing of 3.84 ha will not result in the remnant patch 5 of Banksia Woodlands TEC becoming excluded from the current patch or no longer meeting the condition requirements of the Banksia Woodlands TEC.	Not a significant impact.

Significant Impact Criteria	Assessment of Significance	Significance Summary
	The abstraction of groundwater from the Lesueur Sandstone aquifer will not impact on the surrounding remaining MNES as the vegetation is not hydraulically linked to this deep aquifer (DoW, 2009; 2017; Rutherford et al. 2005). In addition, the depth to groundwater at bore 29/01 is approximately 30-40 mbgl which is greater than the depth the vegetation can access groundwater (Groom, 2004; Groom *et al.,* 2000). As such, groundwater abstraction is unlikely to have an indirect impact on the surrounding remaining Banksia Woodlands TEC.	
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	The proposed action includes the equipping of an existing water production bore, construction of a new pipeline and access track, new powerlines along Jurien Road and a new Water Treatment Plant with evaporation ponds. Following construction, 2.13 ha of the Project Area will be revegetated in accordance with the following guidelines and site surveys at a minimum: • A Guide to Preparing Revegetation Plans for Clearing Permits (DWER, 2018) • Carnaby's Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan (DEHWA, 2013). • Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological (DEE, 2016a) • CW03840 Jurien Bay Borefield Project: Spring Flora, Vegetation, Fauna and Black Cockatoo Habitat Survey (Eco Logical, 2023) • Water Corporation Jurien Bay Borefield Spring Surveys 2020 Biological Assessment (GHD, 2020). The proposal is not likely to cause a substantial alteration of surface water drainage patterns. The Project Area is within a sand dune landform which is subject to wind and water erosion. It is considered unlikely that there would be significant additional	Not a significant impact.

Significant Impact Criteria	Assessment of Significance	Significance Summary
	wind or water erosion from the construction of the site. This is primarily due to the area lacking steep slopes and its sandy soils being highly porous, both of these factors are antagonistic to the pooling and runoff of surface water (Samuel et al. 2014). The relatively small extent of the clearing area and the retention of the native vegetation within the bore site will help to minimise the amount of soil lost through wind erosion. The Proponent will also minimise erosion and dust generation through the implementation of best industry practices during construction and operation. The abstraction of groundwater from the Lesueur Sandstone aquifer will not impact on the surrounding remaining MNES as the vegetation is not hydraulically linked to this deep aquifer (DoW, 2009; 2017; Rutherford et al. 2005). The depth to groundwater at bore 29/01 is approximately 30-40 mbgl which is greater than the depth the vegetation can access groundwater (Groom, 2004; Groom *et al.,* 2000). The Banksia Woodlands TEC in the Project Area is unlikely to rely on groundwater as the current depth to groundwater is greater than the depth that Banksia species can access and the Project is unlikely to significantly alter groundwater levels that would indirectly impact on the TEC. As such, groundwater abstraction is unlikely to have an indirect impact on the surrounding remaining Banksia Woodlands TEC. Therefore, the proposal is not likely to modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example	The species composition of the Banksia Woodlands TEC within the survey areas was recorded as being in mostly Very Good and Good-Degraded condition (Figure 4 and Figure 5 of Attachment 2): • Pristine: 0.08 ha • Very Good: 2.33 ha • Good to Degraded: 1.29 ha	Not a significant impact

Significant Impact Criteria	Assessment of Significance	Significance Summary
through regular burning or flora or fauna harvesting	• Degraded/Completely Degraded: 0.04 ha (GHD, 2020; Eco Logical, 2023; Biota, 2024). Environmental management and mitigation measures will be implemented during construction to reduce the potential indirect impacts on the remaining Banksia Woodlands TEC. The minimum requirements are outlined in the Construction Environment Management Framework (Attachment 9) of which the Contractor's Construction Environment Management Plan (CEMP) will contain further construction specific environmental management measures. The proposed small clearing of up to 3.84 ha of Banksia Woodlands TEC within a wider patch of 32.0 ha total extent of Banksia Woodlands surveyed 40.16 ha, the proposed action is not considered to cause a substantial change in the species composition of the remaining patches of the TEC. Given the Banksia Woodlands TEC in the Project Area is unlikely to rely on groundwater, groundwater abstraction from the Lesueur Sandstone aquifer is unlikely to have an indirect impact on the surrounding remaining Banksia Woodlands TEC. The proposal will not result in a loss or decline of functionally important species of the remaining patches of Banksia Woodlands TEC, and no regular burning or flora/fauna harvesting is proposed.	
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: Assisting invasive species, that are harmful to the listed	The overall condition of the vegetation within the Project Area has been surveyed and ranged between Excellent to Completely Degraded/Cleared condition. Obvious signs of disturbance and significant signs of weed intrusions were noted throughout the Project Area during the field surveys (GHD, 2020; Eco Logical, 2023). The quality and integrity of the Banksia Woodlands TEC can be impacted from weed invasion and is listed as a potential threat (DEE, 2016a). The surveys	Not a significant impact

Significant Impact Criteria	Assessment of Significance	Significance Summary
ecological community, to become established, or Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit growth	identified weed species that are considered environmental weeds that are common along the Swan Coastal Plain with the exception of one species, Paterson's Curse (**Echium plantagineum*) declared under the *Biosecurity and Agricultural Management Act 2007*. One individual of Paterson's Curse was recorded and was removed by hand during the survey (Eco Logical, 2023). Given, the current significant depth to groundwater (30-50 m to below ground level), Given the Banksia Woodlands TEC in the Project Area is unlikely to rely on groundwater. Groundwater abstraction from the Lesueur Sandstone aquifer is unlikely to have an indirect impact on the surrounding remaining Banksia Woodlands TEC. Environmental management measures will be implemented as part of the Proposal to reduce the likelihood of the introduction or spread of harmful weed species into surrounding patches of the Banksia Woodlands TEC. The minimum requirements are provided in the CEMF (Attachment 9), of which the contractor will prepare a CEMP that will have further detailed measures. Environmental management for the Project will include: • Implementation of Dieback management practices during clearing and construction • Implementation of weed hygiene practices and ongoing weed control • Waste collection and removal practices to prevent native and non-native animals from accessing waste • Maintenance of firebreaks, implementation of hotwork procedures and availability of fire control equipment in the Project Area to minimise the risk of fire • Appropriate storage and disposal of hydrocarbons and chemicals • Monitoring of groundwater level and quality	

Significant Impact Criteria	Assessment of Significance	Significance Summary
	The Project is not expected to result in the introduction of disease, establishment of new invasive flora or fauna species or changes to the fire regime as these potential risks will be managed during implementation of the Project.	
Interfere with the recovery of an ecological community	The Department of the Environment (2014) note that a Recovery Plan has not been prepared for the Banksia Woodlands TEC as the Approved Conservation Advice sufficiently outlines the priority research and conservation actions needed for this TEC. Key threats to the Banksia Woodlands TEC identified in the Approved Conservation Advice (DoEE, 2016a) are: • Clearing and fragmentation • Dieback • Invasive species • Changes to fire regime (particularly increased fire frequency) • Hydrological degradation • Decline in pollinating and seed dispersing fauna • Climate change The Project will require clearing of 3.84 ha of Banksia Woodlands TEC. Given this clearing represents only 0.004% of the estimated extent of Banksia Woodlands TEC in the Shire of Dandaragan and the clearing will not create a gap greater than 30 m through the TEC, the Project is unlikely to interfere with the recovery of the TEC based on clearing and fragmentation of the community. In addition, 2.13 ha of native vegetation cleared will be revegetated to bring net direct impact to the Banksia Woodlands TEC as a result of the proposal that has a net impact of 1.71 ha. The proposal is not likely to interfere with the recovery of the Banksia Woodlands TEC.	Not a significant impact.

Significant Impact Criteria	Assessment of Significance	Significance Summary
	As discussed above, implementation of the Project may result in further lowering of the groundwater table in the vicinity of the borefield area. However, as the Banksia Woodlands TEC species are unlikely to be accessing the groundwater given the current significant depth to groundwater (30-50 m to below ground level), further lowering of the groundwater table is unlikely to adversely affect the Banksia Woodlands TEC or interfere with the recovery of the TEC based on hydrological degradation. The Project is not expected to result in the introduction of disease, establishment of new invasive flora or fauna species or changes to the fire regime as these potential risks will be managed during implementation of the Project. A Weed and Dieback Hygiene Management Plan will be prepared and implemented during the Construction phase of the project. The Project will not significantly impact on pollinating or seed dispersing fauna or significantly contribute to climate change.	

5 References

Department of Agriculture, Water and the Environment [DAWE]. (2022). *Referral Guideline for 3 WA Threatened Black Cockatoo Species*.

Department of Biodiversity, Conservation and Attractions (DBCA), 2023. Carnaby's Cockatoo Feed Areas Requiring Investigation. GIS Dataset. Government of Western Australia.

Department of Biodiversity, Conservation and Attractions [DBCA]. (2017a). *Geomorphic Wetlands Cervantes Coastal (DBCA-014)* – GIS Dataset.

Department of Biodiversity, Conservation and Attractions [DBCA]. (2017b). *RAMSAR Sites (DBCA-010)* – GIS Dataset.

Department of Climate Change, Energy, the Environment and Water [DCCEEW]. (2000). *Revision of the Interim Biogeographic Regionalisation of Australia (IBRA) and the Development of Version 5.1—-Summary Report*. Available at: https://www.dcceew.gov.au/environment/land/nrs/publications/revision-ibra-development-of-version-5-1-summary-report

Department of Climate Change, Energy, the Environment and Water [DCCEEW]. (2013). *Carnaby's Cockatoo (Calyptorhynchus latirostris) Recovery Plan*. Available at: https://www.dcceew.gov.au/environment/biodiversity/threatened/recovery-plans/calyptorhynchus-latirostris-recovery-plan

Department of the Environment. (2014). *Banksia Woodlands of the Swan Coastal Plain Ecological Community in Community and Species Profile and Threats Database*. Department of the Environment, Canberra. Available from: Banksia Woodlands of the Swan Coastal Plain ecological community.

Department of the Environment and Energy [DoEE]. (2016a). Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community. Canberra: Department of the Environment and Energy. Available from: https://www.environment.gov.au/biodiversity/threatened/communities/pubs/131-conservation-advice.pdf

Department of Environment and Conservation (DEC). 2008. Forest Black Cockatoo (Baudin's Cockatoo Calyptorhynchus baudinii and Forest Red-tailed Black Cockatoo Calyptorhynchus banksia naso) Recovery Plan, DEC, Kensington.

Department of the Environment and Energy [DoEE]. (2016b). *Banksia Woodlands of the Swan Coastal Plain: a nationally protected ecological community*. Commonwealth of Australia. Available from: https://www.agriculture.gov.au/sites/default/files/documents/banksia-woodlands-scp-guide.pdf

Department of the Environment and Energy [DoEE]. (2019a). Approved Conservation Advice (incorporating listing advice) for the Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain ecological community. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/153-conservation-advice.pdf.

Department of the Environment and Energy [DoEE]. (2019b). *EPBC Referral Guidance – Banksia Woodlands of the Swan Coastal Plain ecological community*. Canberra: Department of the Environment and Energy. Available from: https://www.dcceew.gov.au/environment/biodiversity/threatened/publications/epbc-referral-guidance-banksia-woodlands-swan-coastal-plain

Department of the Environment, Water, Heritage and the Arts [DEWHA]. (2013). *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance*. Available at: Significant Impact Guidelines 1.1 - Matters of National Environmental Significance - DCCEEW

Department of the Environment, Water, Heritage and the Arts. (2010). *Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act*. Available at: https://www.dcceew.gov.au/environment/epbc/publications/survey-guidelines-australias-threatened-birds

Department of Parks and Wildlife [DoPW]. (2013). *Carnaby's Cockatoo (Calyptorhynchus latirostris) Recovery Plan*. Department of Parks and Wildlife, Perth, Western Australia. Available at: https://www.dcceew.gov.au/environment/biodiversity/threatened/recovery-plans/calyptorhynchus-latirostris-recovery-plan

Department of Primary Industries and Regional Development [DPIRD]. (2018). *Pre-European Vegetation (DPIRD-006)* - GIS Dataset.

Department of Planning, Lands and Heritage [DPLH]. (2021). Shire of Dandaragan planning information. Government of Western Australia. Available at: https://www.wa.gov.au/government/document-collections/shire-of-dandaragan-planning-information

Department of Primary Industries and Regional Development. (2022). *Soil Landscape Mapping – Systems (DPIRD-064)* – GIS Dataset.

Department of Planning, Lands and Heritage [DPLH]. (2024). *Aboriginal Cultural Heritage Inquiry System*. Government of Western Australia. Available at: https://www.wa.gov.au/government/document-collections/find-aboriginal-cultural-heritage-wa

Department of Sustainability, Environment, Water, Population and Communities [DSEWPAC]. (2011a). Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the EPBC Act.

Department of Sustainability, Environment, Water, Population and Communities [DSEWPAC]. (2011b). Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the EPBC Act.

Department of Water (DoW), 2012. Hydrography. GIS dataset. Government of Western Australia

Department of Water and Environmental Regulation [DWER]. (2024a). *WRIMS – Surface Water Areas (DWER-082)* – GIS Dataset.

Department of Water and Environmental Regulation [DWER]. (2024b). *WRIMS – Groundwater Areas (DWER-085)* – GIS Dataset.

Department of Water and Environmental Regulation [DWER]. (2024c). *Public Drinking Water Source Areas (DWER-033)* – GIS Dataset.

Department of Water and Environmental Regulation (DWER), 2018. A Guide to Preparing

Revegetation Plans for Clearing Permits under Part V of the Environmental Protection Act 1986. Available from: https://www.der.wa.gov.au/images/documents/our-work/consultation/Revegetation-plan/A_Guide_to_Preparing_Revegetation_Plans_for_Clearing_Permits.pdf. Government of Western Australia.

DOPA Explorer. (2021). Digital Observatory for Protected Areas (DOPA) Explorer – Drovers Cave. Eucropean Commission, DOPA Explorer. Available from: https://dopa-explorer.jrc.ec.europa.eu/wdpa/580

Eco Logical Australia [Eco Logical]. (2023). CW03840 Jurien Bay Borefield Project: Spring Flora, Vegetation, Fauna and Black Cockatoo Habitat Survey. Prepared for Water Corporation.

Environmental Protection Authority [EPA]. (2016). *Technical Guidance - Flora and Vegetation surveys for Environmental Impact Assessment.* http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA Technical Guidance - Flora and Vegetation survey_Dec13.pdf

Environmental Protection Authority [EPA]. (2020). *Technical Guidance - Terrestrial vertebrate fauna surveys for environmental impact assessment*. Available at: https://www.epa.wa.gov.au/policies-guidance/technical-guidance-terrestrial-vertebrate-fauna-surveys-environmental-impact

GHD Pty Ltd [GHD]. (2020). Water Corporation – Jurien Bay Borefield Spring Surveys 2020 Biological Assessment. Prepared for Water Corporation.

Google Earth Pro. (2015). Google Earth Pro. Accessed 2nd August 2024.

Mitchell, D., Williams, K., & Desmond, A. (2002). *Swan Coastal Plain 2 (SWA2 – Swan Coastal Plain subregion).* Perth, Australia.

Natural Resource Management Western Australia (NRM WA). 2023. Dieback Information Delivery and Management System (DIDMS) Available from: https://didms.gaiaresources.com.au/staticpages/disclaimer/

Peggs, Alan. (1995). Consultative Environmental Review of the Proposed Clearing of Land on Victoria Location 10598 Cockleshell Gull Road Jurien, Shire of Dandaragan. Prepared for Mr Craig Underwood. Available from: https://www.epa.wa.gov.au/sites/default/files/PER_documentation/A0880_R0832_CER.pdf