

**Figure 13: Carnaby's Cockatoo foraging habitat recorded in the survey area**



**Legend**

 Survey Footprint	<b>CBC Foraging Quality</b>
	 Negligible
	 Low
	 Cleared

  
Scale: 1:20,000  
Datum/Projection: GDA 1994 MGA Zone 50

  
  
Project: 20PER16294-GM Date: 16/11/2021





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0 125 250 500  
Metres

Scale: 1:20,000  
Datum/Projection:  
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A TETRA TECH COMPANY


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## 4. Discussion and recommendations

### 4.1 Flora

A total of 167 taxa (165 native and one introduced) from 90 genera and 37 families were recorded within the survey area. Of these, 161 taxa were recorded from quadrats and five taxa were recorded from targeted and opportunistic collections. Average species richness per quadrat was 38.04 species, ranging from a low of 19 species at ELA12 to a high of 57 species at ELA02. Woodman (2013) recorded a range of species richness from 3 species to 47 species, demonstrating that the post fire regeneration for the current survey was very good. A species accumulation curve determined that approximately 88.93% of the flora species potentially present within the survey area were recorded, resulting in sufficient data to define and assess the presence, extent and significance of vegetation types within the survey area.

One Threatened flora species, *Paracaleana dixonii* (Endangered under the EPBC Act and Vulnerable under the BC Act) was recorded within the survey area from a database search and Woodman (2013). Eight flora species listed as Priority by DBCA were recorded within the survey area from the current field survey, including; *Micromyrtus rogeri* (P1), *Lasiopetalum ogilvieanum* (P1), *Guichenotia alba* (P3), *Mesomelaena stygia* subsp. *deflexa* (P3), *Stylidium drummondianum* (P3), *Banksia scabrella* (P4), *Eucalyptus macrocarpa* subsp. *elachantha* (P4), and *Stawellia dimorphantha* (P4).

***Paracaleana dixonii*** is listed as Endangered under the EPBC Act and Vulnerable under the BC Act. Endangered species are taxa considered to be facing a very high risk of extinction in the wild. Vulnerable species are species considered to be facing a high risk of extinction in the wild in the medium-term future (Appendix A). *Paracaleana dixonii* is a tuberous, perennial herb of 0.09-0.2 m in the Orchidaceae family (DBCA and WAH 2020). It has yellow-brown flowers from October to December or January (DBCA and WAH 2020). This species is known from 74 records across a range of 190 km, from Dongara to Dandaragan (DBCA 2007-2020). It has previously been recorded from grey sand over granite (DBCA and WAH 2020).

A database search indicates that *Paracaleana dixonii* was recorded from one location (24 plants) in the current survey area in 2011. The species was recorded in the AcEbHh vegetation community, which is described as *Allocasuarina campestris* tall sparse shrubland over *Eremaea beaufortioides*, *Calothamnus quadrifidus* subsp. *angustifolius*, *Isopogon tridens* mid sparse shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Ecdeiocolea monostachya* low open sedgeland. *Paracaleana dixonii* was also recorded in Woodman (2013) from 174 locations, totalling 263 individuals. This species was recorded in vegetation type 7a, 7b, 8, 10, 11, 12 and 13a, which correspond to the AcEbHh, EtAhHh, AcDdMI and EtBaHh vegetation communities. Species such as *Paracaleana dixonii* are cryptic in nature and therefore although not recorded during the current survey, it's occurrence at this location cannot be completely discounted. In addition, it is recognised that factors such as the recent prescribed burn throughout the survey area may also influence this species emergence currently and in the future.

***Micromyrtus rogeri*** is listed as P1 by DBCA. Priority 1 species are poorly known species that are known from one or a few locations (generally five or less) which are potentially at risk (Appendix A). *Micromyrtus rogeri* is a shrub of 0.2-0.4 m in the Myrtaceae family (DBCA and WAH 2020). It has white flowers from July to October (DBCA and WAH 2020). This species is currently known from 17 DBCA

records across a range of 175 km, from Dongara to Dandaragan (DBCA 2007-2020). It has previously been recorded from yellow-brown sandy soils, gravel, laterite, breakaways (DBCA and WAH 2020).

Within the survey area, *Micromyrtus rogeri* was recorded from 18-point locations, totalling 939 individuals. The species was recorded in the AcAhGp vegetation community, which is described as *Allocasuarina campestris* tall sparse shrubland over *Allocasuarina humilis*, *Hakea auriculata*, *Petrophile shuttleworthiana* mid open shrubland over *Gastrolobium plicatum* low open shrubland and *Ecdeiocolea monostachya*, *Schoenus armeria* low open sedgeland. *Micromyrtus rogeri* was also recorded in Woodman (2013) from 504 locations, totalling 17,174 individuals.

***Lasiopetalum ogilvieanum*** is listed as P1 by DBCA. *Lasiopetalum ogilvieanum* is a shrub 0.45-1.5 m in the Malvaceae family (DBCA and WAH 2020). It has pink-white flowers from July to October (DBCA and WAH 2020). This species is currently known from 21 DBCA records across a range of 85 km, north and south of Dongara (DBCA 2007-2020). It has previously been recorded from white/grey or yellow sand, stony loam on undulating plains, lateritic rises (DBCA and WAH 2020).

Within the survey area, *Lasiopetalum ogilvieanum* was recorded from 21-point locations, totalling 100 individuals. The species was recorded in the EtAhHh vegetation community, which is described as *Eucalyptus todtiana* mid open woodland over *Allocasuarina humilis*, *Banksia scabrella* (P4), *Calothamnus sanguineus* mid open shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Caustis dioica* low open sedgeland. *Lasiopetalum ogilvieanum* was also recorded in Woodman (2013) from 26 locations, totalling 113 individuals.

***Guichenotia alba*** is listed as P3 by DBCA. Priority 3 species are poorly-known species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat (Appendix A). *Guichenotia alba* is a slender, few-branched shrub 0.1-0.45 m in the Malvaceae family (DBCA and WAH 2020). It has white flowers from July to August (DBCA and WAH 2020). This species is currently known from 38 DBCA records across a range of 170 km from Dongara south (DBCA 2007-2020). It has previously been recorded from sandy and gravelly soils on low-lying flats (DBCA and WAH 2020).

Within the survey area, *Guichenotia alba* was recorded from 63-point locations, totalling 607 individuals. The species was recorded in the AcEbHh vegetation community, which is described as *Allocasuarina campestris* tall sparse shrubland over *Eremaea beaufortoides*, *Calothamnus quadrifidus* subsp. *angustifolius*, *Isopogon tridens* mid sparse shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Ecdeiocolea monostachya* low open sedgeland. *Guichenotia alba* was not recorded in Woodman (2013).

***Mesomelaena stygia* subsp. *deflexa*** is listed as P3 by DBCA. *Mesomelaena stygia* subsp. *deflexa* is a tufted perennial grass-like or herb (sedge) 0.1-0.5 m in the Cyperaceae family (DBCA and WAH 2020). It has brown-black flowers March to October (DBCA and WAH 2020). This species is currently known from 29 DBCA records across a range of 70 km from Dongara south (DBCA 2007-2020). It has previously been recorded from white, grey or lateritic sand, clay, gravel (DBCA and WAH 2020).

Within the survey area, *Mesomelaena stygia* subsp. *deflexa* was recorded from 55-point locations, totalling 4,648 individuals. The species was recorded in the EtAhHh vegetation community, which is

described as *Eucalyptus todtiana* mid open woodland over *Allocasuarina humilis*, *Banksia scabrella* (P4), *Calothamnus sanguineus* mid open shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Caustis dioica* low open sedgeland. *Mesomelaena stygia* subsp. *deflexa* was also recorded in Woodman (2013) from 514 locations, totalling 21,527 individuals.

***Stylidium drummondianum*** is listed as P3 by DBCA. *Stylidium drummondianum* is a rosetted perennial herb 0.05-0.22 m in the Stylidiaceae family (DBCA and WAH 2020). It has pink flowers August to October (DBCA and WAH 2020). This species is currently known from 40 DBCA records across a range of 175 km from Geraldton to Dongara (DBCA 2007-2020). It has previously been recorded from sand or clayey sand over laterite on upper hillslopes, breakaways in low heath, mallee shrubland (DBCA and WAH 2020).

Withing the survey area, *Stylidium drummondianum* was recorded from 10-point locations, totalling 54 individuals. The species was recorded in the EtAhHh, AcAhGp and AcEbHh vegetation communities. *Stylidium drummondianum* was also recorded in Woodman (2013) from 433 locations, totalling 9,294 individuals.

***Banksia scabrella*** is listed as P4 by DBCA. Priority 4 species are described as Rare, Near Threatened and other species in need of monitoring (Appendix A). *Banksia scabrella* is a much branched, lignotuberous shrub 0.6-2 m in the Proteaceae family (DBCA and WAH 2020). It has yellow and cream flowers from September to December or January (DBCA and WAH 2020). This species is known from 53 DBCA records across a range of 110 km from Geraldton to Dongara (DBCA 2007-2020). It has previously been recorded from white, grey or yellow sand, sometimes with lateritic gravel, on sandplains and lateritic ridges (DBCA and WAH 2020).

Withing the survey area, *Banksia scabrella* was recorded from 485-point locations, totalling 10,776 individuals. The species was recorded in the EtAhHh vegetation community, which is described as *Eucalyptus todtiana* mid open woodland over *Allocasuarina humilis*, *Banksia scabrella* (P4), *Calothamnus sanguineus* mid open shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Caustis dioica* low open sedgeland. *Banksia scabrella* was also recorded in Woodman (2013) from 463 locations, totalling 7,668 individuals.

***Eucalyptus macrocarpa* subsp. *elachantha*** is listed as P4 by DBCA. *Eucalyptus macrocarpa* subsp. *elachantha* is a spreading or sprawling mallee 0.8-4 m in the Myrtaceae family (DBCA and WAH 2020). It has smooth bark, grey over salmon pink, and red-pink flowers from August to September or November to December (DBCA and WAH 2020). This species is known from 73 DBCA records across a range of 230 km south of Geraldton to south of Dongara (DBCA 2007-2020). It has previously been recorded from white or grey sand over laterite on hillslopes, ridges and sandplains (DBCA and WAH 2020).

Within the survey area, *Eucalyptus macrocarpa* subsp. *elachantha* was recorded from one-point location, totalling ten individuals. The species was recorded in the AcEbHh vegetation community, which is described as *Allocasuarina campestris* tall sparse shrubland over *Eremaea beaufortioides*, *Calothamnus quadrifidus* subsp. *angustifolius*, *Isopogon tridens* mid sparse shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Ecdeiocolea monostachya* low open sedgeland. *Eucalyptus macrocarpa* subsp. *elachantha* was also recorded in Woodman (2013) from 121 locations, totalling 1,310 individuals.

***Stawellia dimorphantha*** is listed as P4 by DBCA. *Stawellia dimorphantha* is a stilt-rooted perennial herb 0.05-0.2 m in the Hemerocallidaceae family (DBCA and WAH 2020). It has purple/cream flowers from June to November (DBCA and WAH 2020). This species is known from 67 DBCA records across a range of 90 km north and south of Dongara (DBCA 2007-2020). It has previously been recorded from white, grey and yellow sand (DBCA and WAH 2020).

Within the survey area, *Stawellia dimorphantha* was recorded from 45-point locations, totalling 298 individuals. The species was recorded in the AcDdMI vegetation community, which is described as *Allocasuarina campestris* tall isolated shrubs over *Daviesia divaricata*, *Conospermum boreale*, *Beaufortia elegans* mid open shrubland over *Melaleuca leuropoma*, *Hibbertia hypericoides* low open shrub over *Ecdeiocolea monostachya* low open sedgeland. *Stawellia dimorphantha* was not recorded in Woodman (2013).

A further 53 species were identified from the likelihood of occurrence assessment as possibly occurring within the survey area. Of these, 11 species were considered as likely to occur, and 25 considered as having the potential to occur, based on the species habitat preferences and proximity of records to the survey area. The remaining 17 species are considered unlikely to occur (Appendix C).

One introduced (weed) flora species was recorded as occurring within the survey area, *Hypochaeris glabra*. This species is not listed as a Weed of National Significance (WoNS) or Declared Pest under the State BAM Act, and is listed on the Western Australian Organism List (WAOL) database as s11 (permitted). This species was recorded at a low density (0.01%) within the AcEbHh, EtAhHh and EtBaHh vegetation communities from within quadrats ELA01, ELA08, ELA14, ELA21, ELA24. It is likely this weed is being spread within the survey area via the movement of cattle and other introduced fauna species.

## 4.2 Vegetation

A total of six vegetation communities were delineated and mapped across the survey area. The most widespread vegetation community was AcEbHh, which occurred across 34.02% (72.2 ha) of the survey area. The least common vegetation community was AcAhGp, which occurred across 2.59% (5.5 ha) of the survey area. Vegetation communities within the survey area are not inferred to represent any known TECs or PECs listed under the EPBC Act, BC Act or by DBCA. This is supported by Woodman (2013) which also found no conservation significant communities across a larger area.

At a regional scale, the percentage impact to Beard (1976) vegetation associations (49, 378 and 379) and land systems (Mount Adams and Correy) as a result of the project is low (DPIRD 2020). Each of these land systems is well represented across the broader landscape, with the survey area representing a small percentage of the current extent of each (0.2% and 0.1% respectively). At a local scale, impacts to individual communities as a result of the project is also low. Of particular note is vegetation community EtAhHh which comprises *Banksia scabrella* as the main component. This community is similar to Woodman (2013) mapped VT 13a, of which 1,740.14 ha was mapped. Therefore, it is unlikely that the proposed pipeline would appreciably reduce the representativeness of either vegetation associations in the local area or indeed at a regional scale.

Vegetation within the survey area was classed as being in Excellent condition (208.7 ha; 98.35%), with a total of 3.5 ha (1.65% of the survey area) classed as Cleared. Minor disturbances included minimal presence of weeds and feral fauna (rabbit diggings, scats).

The recent fire has altered the structural elements of vegetation communities present within the survey area. A strong post-fire recovery was observed, with the majority of flora species expected to occur being present. However, their relative dominance and strata position is slightly different to what would otherwise be expected in an unburnt or indeed longer time since fire environment. In addition, flora species with more rapid post-fire recovery strategies were naturally more dominant than those which take longer to re-establish. For example, species such as *Grevillea biformis* subsp. *biformis* and *Conostylis* spp. were present during the current survey, however in other previous surveys, these were not considered dominant components of the vegetation. Therefore, other vegetation community mapping work undertaken in the general vicinity of the survey area (Woodman 2013) shows similarities but does not reflect these descriptions entirely.

### 4.3 Fauna

A total of 35 fauna species (31 native and four introduced) were recorded within the survey area. This number comprised 28 bird species, five mammal species and two reptile species. Of these, four mammal species are introduced; Cattle (*Bos taurus*), domestic Dog (*Canis lupus familiaris*), Goat (*Capra hircus*) and European Rabbit (*Oryctolagus cuniculus*).

A total of four fauna habitats were identified within the survey area. The most commonly occurring fauna habitat was Fauna habitat 2: *Banksia* spp. and occasional *Eucalyptus todtiana* mid open woodland over shrubs and sedgeland on sandy plains (89.5 ha; 44.15% of the survey area). Fauna habitat 3: *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on stony rises (40.8 ha; 20.13% of the survey area) was found to be the least common fauna habitat type occurring within the survey area.

No direct (observations) or indirect (scats, tracks, diggings) evidence of conservation significant fauna species were recorded within the survey area. Of the 46 fauna species identified from the desktop assessment as possibly occurring within the survey area, four species were considered having the potential to occur; Carnaby's Cockatoo (*Calyptorhynchus latirostris*; listed as EN under the EPBC Act and BC Act), Fork-tailed Swift (*Apus pacificus*; listed as MI under the EPBC Act and BC Act), Grey Falcon (*Falco hypoleucos*; listed as VU under the BC Act) and Peregrine Falcon (*Falco peregrinus*; listed as OS under the BC Act). Each of these species has a diverse and wide range of habitats, including those which occur within the survey area. The remaining 42 species were considered unlikely to occur (Appendix D).

The Fork-tailed Swift (*Apus pacificus*), Grey Falcon (*Falco hypoleucos*) and Peregrine Falcon (*Falco peregrinus*) have a diverse and wide range of habitats, including those which occur within the survey area (e.g. grassland). However, these species are not considered likely to occur within the survey area due to lack of access to appropriate nesting habitat, water and preferred prey species.

No individuals of Carnaby's Cockatoo were recorded within the survey area. No potential or confirmed breeding or roosting trees were recorded as occurring within the survey area. The survey area is in the non-breeding range of the Carnaby's Cockatoo (*Calyptorhynchus latirostris*), however Fauna habitat 2, totalling 95.2 ha (44.86% of the survey area), was assessed as providing 'Low' quality foraging habitat due to the presence of *Banksia* spp. and *Hakea* spp. (Table 3; SEWPac 2012; DotEE 2017). The recent fire has decreased the likelihood of the species utilising the survey area in the immediate future; however, *Banksia* spp. and *Hakea* spp. are predicted to increase in density quality and structural complexity over time. The remaining vegetated areas (113.6 ha, 53.53%) are considered as providing



'Negligible' quality foraging habitat of Carnaby's Cockatoo. Cleared areas (3.4 ha, 1.6%) provide 'Nil' quality foraging habitat for black cockatoo species. No foraging evidence was observed within the survey area.

Whilst the Malleefowl (*Leipoa ocellata*) was targeted in the survey area (Section 2.2.5), the habitat is not considered suitable for the species due to the lack of leaf litter and thicker vegetation. The recent fire has also decreased the likelihood of the species, as the effect of fire on Malleefowl is severe, with breeding in burnt areas usually reduced for at least 30 years (Benshemesh 2007).

The survey area broadly comprised a mixture of *Allocasuarina* shrubland, and *Banksia* or *Eucalyptus todtiana* woodland. Habitat within the survey area is unlikely to support conservation significant fauna species, except potentially low-quality foraging habitat for the Carnaby's Cockatoo (*Calyptorhynchus latirostris*). Based on results of the fauna survey and fauna values identified within the survey area, it is unlikely that the proposed pipeline would appreciably reduce or impact the representativeness of individual species or supporting habitat within the local area or across the broader landscape.

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