

## 4.1 Flora and Vegetation Survey

Biota Environmental Sciences (Biota) was commissioned to conduct a detailed terrestrial flora and vegetation survey of the development envelope. The first phase of the terrestrial flora and vegetation survey was carried out from 24<sup>th</sup> August – 5<sup>th</sup> September 2017. The second sampling phase of the survey will be undertaken in March-April 2018, following summer rainfall.

All surveys were completed as far as practicable in accordance with relevant Environmental Protection Authority (EPA) policy, specifically:

- Environmental Factor Guideline: Terrestrial Flora and Vegetation (EPA 2016a); and
- Technical Guide - Terrestrial Flora and Vegetation Surveys (EPA 2016b).

A total of 56 flora sampling quadrats were completed within the study area, representatively sampling the range of vegetation types present. Vegetation was also sampled via relevés, and traverses were completed to search for rare flora and compile detailed vegetation mapping notes. The work was undertaken by a team of experienced botanists who have completed many past surveys in the Pilbara and Kimberley regions.

### 4.1.1 Vegetation

The vegetation of the development envelope is in excellent condition, with virtually no weed invasion. Two land systems account for almost 90% of the development envelope by area: Nita and Little Sandy. The descriptions of these two main land systems broadly characterise the vegetation types present in the development envelope:

- Nita – Sandplains supporting shrubby spinifex grasslands with occasional trees.
- Little Sandy – Sandplains with linear and reticulate dunes supporting shrubby hard and soft spinifex grasslands.

Vegetation type delineation and mapping is currently in progress and will not be finalised until completion of the seasonal sampling work in 2018. A relatively small number of frequently repeated vegetation types were sampled during the first survey phase, mostly comprising open *Triodia* spp. hummock grasslands on sandplains, low-elevation dunes and laterite exposures, with varying densities of *Acacia*, *Hakea* and *Grevillea* spp. shrublands where an overstorey was present. None of the vegetation types present in the development envelope appear to correspond to Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs).

### 4.1.2 Flora

Specimen identifications from the first survey phase are currently in progress and a complete flora species list is not yet available. However, preliminary estimates place the total species count in the order of 150 taxa, which is in keeping with expectations for the locality.

Three of the species confirmed to date are listed as Priority species (Section 4.1.3).

### 4.1.3 Flora Species of Conservation Significance

None of the flora species recorded during the first survey phase are listed as Threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the State *Wildlife Conservation Act 1950* (Wildlife Conservation Act).

Three species listed by the Department of Biodiversity Conservation and Attractions (DBCA) as State Priority species were recorded:

- *Phyllanthus eremicus* (Priority 3) – 14 locations;
- *Terminalia kumpaja* (Priority 3) – 34 locations; and
- *Tribulopsis marliesiae* (Priority 3) – 19 locations.

All three Priority flora species appeared relatively common within the development envelope and are also known from previous records from elsewhere in the northern Pilbara and southern Kimberley regions.

Database searches (including NatureMap<sup>1</sup> and FloraBase<sup>2</sup>), as well as previous surveys in the vicinity of the development envelope, suggest a further 14 conservation significant flora species could potentially occur, however at present none of these have been documented from the habitats present in the development envelope.

## 4.2 Terrestrial Fauna Survey

Biota was commissioned to conduct a Level 2 terrestrial fauna survey and targeted sampling for conservation significant fauna and short-range endemic (SRE) fauna. Phase 1 of the terrestrial fauna survey was carried out from 24<sup>th</sup> August – 5<sup>th</sup> September 2017. The second sampling phase of the survey will be undertaken in March-April 2018, following summer rainfall.

All surveys were completed as far as practicable in accordance with relevant State and Commonwealth policy, specifically:

- Environmental Factor Guideline: Terrestrial Fauna (EPA 2016c);
- Technical Guide - Terrestrial Fauna Surveys (EPA 2016d);
- Technical Guide - Sampling of Short Range Endemic Invertebrates (EPA 2016e);
- Survey Guidelines for Australia's Threatened Bats (DSEWPaC 2010);
- Survey Guidelines for Australia's Threatened Birds (DEWHA 2010);
- Survey guidelines for Australia's Threatened Mammals (DSEWPaC 2011a); and
- Survey guidelines for Australia's Threatened Reptiles (DSEWPaC 2011b).

A total of 19 fauna trapping sites were installed across the development envelope, representatively sampling the range of habitat types present. Elliott, cage, pitfall and funnel traps were deployed across these sites and sampled for up to eight trap nights. Passive sampling methods (such as remote cameras and acoustic and ultrasonic recorders) were also strategically placed at locations thought to potentially support conservation significant fauna. Targeted sampling for potential SRE fauna was undertaken at prospective sites using the range of methods identified in EPA (2016e). The work was undertaken by a team of experienced zoologists who have completed many past surveys in the Pilbara and Kimberley regions.

<sup>1</sup> <https://naturemap.dpaw.wa.gov.au>

<sup>2</sup> <https://florabase.dpaw.wa.gov.au>

## 4.2.1 Vertebrate Fauna

One hundred and thirty-seven vertebrate fauna species were recorded across the development envelope, comprising one frog species, 60 reptiles, 46 avifauna and 30 mammals (including 18 ground mammals, eight bats and four introduced mammals).

The vertebrate fauna assemblage recorded in the development envelope is typical of that which would be expected for an area of similar size in this locality. The majority of species recorded are representative of the fauna commonly found within either the northern Pilbara or southern Kimberley regions. However, due to the lack of past fauna surveys in the locality, a number of species recorded, while not of elevated conservation significance, are outside of their previously known range.

### 4.2.1.1 Herpetofauna (Amphibians and Reptiles)

Sixty-one herpetofauna species were recorded, comprising one frog and 60 reptile species. The reptiles comprised seven dragon, 14 gecko, four legless lizard, 20 skink, six monitor, two blind snake, two python and five front-fanged snake species. The most abundant species recorded included the skink *Lerista bipes*, the dragon *Ctenophorus isolepis* and the gecko *Diplodactylus laevis*. One of the reptile species recorded during the first survey phase, *Lerista separanda*, is listed as a Priority species at State level (Section 4.2.2).

### 4.2.1.2 Avifauna

Forty-six avifauna species from 25 families were recorded, including 23 passerine and 23 non-passerine species. The most species-rich families were the Accipitridae (raptors) and Meliphagidae (honeyeaters and chats), each with five species. The most abundant bird species were the Singing Honeyeater (*Lichenostomus virescens*) and the Crimson Chat (*Epthianura tricolor*), which accounted for 28% and 19% respectively of all bird records from the development envelope. None of the bird species recorded during the first survey phase are of elevated conservation significance.

### 4.2.1.3 Ground Mammals

Twenty-two ground mammal species were recorded, comprising 18 native and four introduced species. The native mammal fauna consisted of three kangaroo species, nine other marsupial species, five rodent species and one canine species. Introduced mammal species recorded were the House Mouse, Camel, Fox and Feral Cat. The most abundant native mammals recorded from the development envelope were the Long-tailed Planigale (*Planigale ingrami*), the Spinifex Hopping-mouse (*Notomys alexis*) and the Sandy Inland Mouse (*Pseudomys hermannsburgensis*). Three of the native mammal species recorded are of conservation significance at both State and Commonwealth levels, and a further four are listed as Priority species in Western Australia (Section 4.2.2).

### 4.2.1.4 Bats

Eight bat species were identified from ultrasonic call recordings, including two from the family Emballonuridae, four from the family Molossidae and two from the family Vespertilionidae. The most frequently recorded species were the Common Sheath-tailed Bat (*Taphozous georgianus*) and Gould's Wattled Bat (*Chalinolobus gouldii*). Other commonly recorded species included the White-striped Free-tailed Bat (*Austronomus australis*), the Northern Free-tailed Bat (*Ozimops lumsdenae*) and the Little Broad-nosed Bat (*Scotorepens greyii*). None of the bat species recorded during the first survey phase are of elevated conservation significance.

#### 4.2.1.5 SRE Fauna

Relatively few potential SRE fauna specimens were collected during the first survey phase, which is consistent with the generally widespread and connected sandplain habitats that dominate the majority of the development envelope. A total of 22 mygalomorph spider specimens were recorded from nine locations, from a combination of burrow excavation and pitfall trapping. The specimens have not yet been identified to species-level but will be the subject of DNA sequencing to place them into context once additional material has been collected during the second survey phase in 2018.

#### 4.2.2 Fauna Species of Conservation Significance

Seven species of conservation significance were recorded in the development envelope, including three species listed as Threatened under the EPBC Act and the Wildlife Conservation Act, as well as four species listed on the DBCA Priority Fauna List: the Dampierland Plain Slider (*Lerista separanda*) (P2), Brush-tailed Mulgara (*Dasycercus blythi*) (P4), Northern Marsupial Mole (*Notoryctes caurinus*) (P4) and Western Pebble-mound Mouse (*Pseudomys chapmani*) (P4).

The recorded species listed as Threatened at both Commonwealth and State levels were:

- Bilby (*Macrotis lagotis*) – Vulnerable (Commonwealth); Vulnerable (State) – Recorded from multiple diggings, scats and burrows, as well as automatic camera records at three locations, on sandplain habitat associated with dense *Acacia* and *Senna* spp. shrubland.
- Black-flanked Rock Wallaby (*Petrogale lateralis lateralis*) – Endangered (Commonwealth); Endangered (State) – Recorded from scats, automatic camera records and sightings associated with rock pile habitat at nine locations, all occurring in relatively close proximity in the northeast of the development envelope.
- Northern Quoll (*Dasyurus hallucatus*) – Endangered (Commonwealth); Endangered (State) – Recorded from scats only, in rocky habitat at two locations.

Database searches (including NatureMap and Atlas of Living Australia), as well as previous surveys in the vicinity of the development envelope, suggest that a further two conservation significant species may potentially occur. These include the Night Parrot (*Pezoporus occidentalis*) (Endangered (Commonwealth); Endangered (State)) and Peregrine Falcon (*Falco peregrinus*) (Other Specially Protected (State)), however there is no evidence of these species utilising the development envelope to date.

### 4.3 Migratory Shorebird Survey

Eighty Mile Beach is a Wetland of International Importance under the Ramsar Convention, and includes the Mandora Salt Marsh extending inland to the north of the development envelope (Figure 2.1).

The site is well recognised as a significant stopover area for non-breeding migratory shorebirds globally and within Australia, second only to Roebuck Bay near Broome (Hale and Butcher 2009, RIS 2009). A search of the online EPBC Act Protected Matters Reporting Tool revealed four critically endangered, three endangered, two vulnerable and 37 migratory marine and wetland bird species, most of which are listed in one or more of the following international treaties for migratory birds: the Japan-Australia Migratory Bird Agreement, the China-Australia Migratory Bird Agreement and Republic of Korea-Australia Migratory Bird Agreement.

Potential impacts on migratory shorebird species, and their level and nature of use of the southern part of the Eighty Mile Beach Ramsar site, therefore requires specific consideration as part of the terrestrial fauna factor (Section 5.2), and a targeted study addressing this has been commenced.

The current scope of the ongoing investigations comprises:

1. Desktop review and searches of relevant literature to source and collate the most current available information on wader species utilising the East Asian-Australasian flyway, shorebird species flight heights, agility and visual acuity, and other recent risk assessments and impact monitoring work from other wind farm developments within Australia and globally.
2. Consultation with local and national bird specialists familiar with this Ramsar site, along with searches of existing public databases, to access and collate all relevant existing data on shorebird utilisation specific to the Eighty Mile Beach Ramsar site.
3. Spatial analysis of existing records of shorebirds flagged at the Eighty Mile Beach Ramsar site and coordinates where they have been subsequently recorded from points further south within Australia. The objective of this will be to develop a preliminary map of the potential movement routes followed by shorebirds after their arrival at the Ramsar site during southward migration, and any inferences that may be able to be reached on their relative utilisation, and conceptual return routes to the site when mustering prior to departure on northward migration.
4. Extension of annual shorebird counts completed at the Eighty Mile Beach Ramsar site in conjunction with local monitoring programs and specialists to extend 2017-2018 monitoring to the more southern parts of the site, which are proximal to the development envelope and not otherwise well surveyed.
5. Targeted avifauna field surveys are being conducted along the northwest boundary of the development envelope, the southeast boundary of Eighty Mile Beach part of the Ramsar site, and the southern boundary of the more inland Mandora Salt Marsh. This work comprises counts and species identification of all migratory shorebird and other avifauna sighted in those locations to supplement existing data. Where possible, this will be combined with ornithologist estimates of flying heights for each species. Audible acoustic call recorders have also been deployed long term along the northern portion of the development envelope. These units passively log bird calls and have been in place initially since 5<sup>th</sup> September 2017, with the first block of data downloaded on 30<sup>th</sup> October 2017. The targeted field work will be undertaken across two field mobilisations scheduled to coincide with the timing of wader southward and northward migration.

The findings of the ongoing migratory shorebird work are currently under analysis and will not be available until the second phase of work is undertaken during northward migration.