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# CLEARING PERMIT APPLICATION

## Exmouth sand quarry

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Appendix B : Exmouth M08/510 Biological Survey (Pilbara Ecological 2024)
Appendix C : Letter of authorisation – clearing permit application

# 1 BACKGROUND

Pindan sand extraction is currently being undertaken at the Exmouth Sand Supplies quarry ("the site"), within mining tenement M08/510. The site is approximately six kilometres (km) north of Exmouth, on the eastern side of the Cape Range peninsula, within the Shire of Exmouth (Hanson 2024) (Figure A). The site is 55.39 hectares (ha) in size and is located within unallocated Crown land.

The Exmouth Sand Supplies quarry operations are currently managed by the joint venture Exmouth Sand Supplies between Jakhaul Haulage Contractors Pty Ltd and KCJ Contracting Pty Ltd (Exmouth Sand Supplies 2023). John Kiesey, Andrea Kiesey, John Ogg and Kerrie Ogg are the tenement holders and manage the joint venture.

The tenement holders were granted a Purpose Permit CPS 7832/1 on 21 December 2017 by the Department of Mines, Industry Regulation and Safety, who found that the proposed clearing was not likely to be at variance with eight of the ten Clearing Principles and not at variance with two of the ten Clearing Principles. Purpose Permit CPS 7832/1 allowed for removal of up to 6.9 ha of native vegetation within a larger 7.46 ha extent and is now expired (Figure A). The tenement holders commenced sand excavation operations in 2018 and cleared up to 1.91 ha of native vegetation (Hanson 2024).

Hanson intend to continue the existing Pindan sand extraction and operations at the site in accordance with the Mining Proposal for Small Mining Operations; Exmouth Sand Supplies – Mining Proposal Tenement M08/510 (Hanson 2024). Once purchased from the current tenement holders, Hanson propose to operate the site within the Mining Proposal area of 6.77 ha (Figure 1) (Hanson 2024).

The existing disturbance area is mapped as 0.94 ha, as part of the cleared open pit area and access road (1.91 ha) has been covered by regrowth vegetation (Hanson 2024). The proposed future mining activity area is 3.96 ha, of which 3.88 ha is intended for the sand extraction operations.

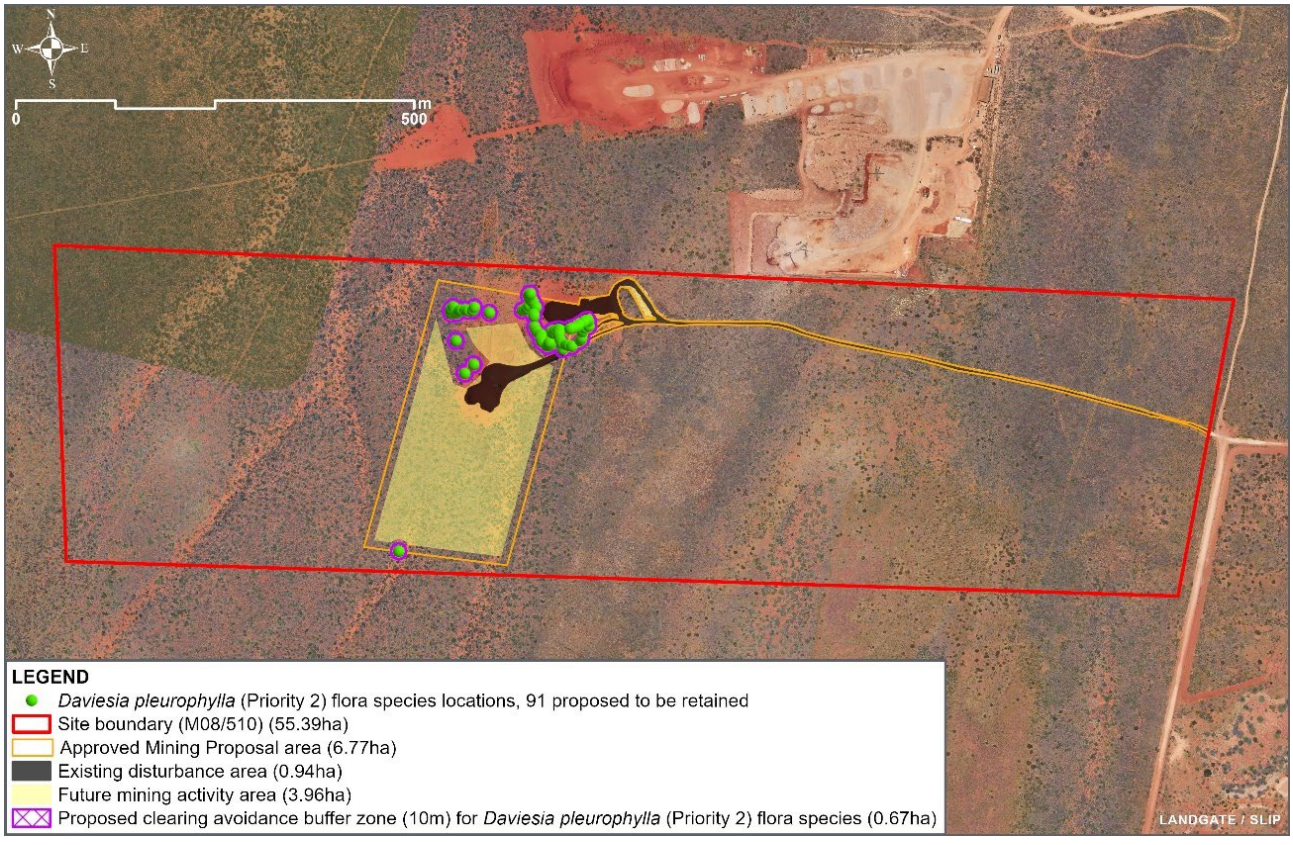



**Figure 1: Mine activity areas**

A biological assessment was undertaken by Pilbara Ecological in June 2024 within a survey footprint of 7.45 ha inside the site (Pilbara Ecological 2024) (Figure B). The biological assessment aimed to delineate key environmental values to support an environmental impact assessment of Hanson's proposed extraction and operations within the site.

Supporting the purpose permit clearing application, the following figures, appendices and shapefiles have been provided:

- Figures A to E
- Appendix A: Application for a Clearing Permit (Purpose Permit)
- Appendix B: Exmouth M08/510 Biological Survey (Pilbara Ecological 2024)
- Appendix C: Letter of authorisation – clearing permit application
- Attached: Shapefiles of proposed native vegetation clearing area, and larger footprint in which native vegetation is to be cleared.

# 2 LANDHOLDER CONTEXT

The site is located within mining tenement M08/510, which is held in equal shares by the tenement holders. The tenement holders intend to sell the mining tenement to Hanson and have provided authorisation for Hanson to do the following (Appendix C):

- Make the Application in respect of the Tenement in Hanson's own name; and
- Access the Tenement to undertake the clearing that is authorised by the clearing permit upon the Application being granted and post completion of the sale of the Tenement to Hanson.

## 2.1 Proposed clearing area

Within the 6.77 ha Mining Proposal area (Figure 1), only 6.35 ha comprises native vegetation, with the remaining 0.94 ha comprising existing disturbance areas (Figure B). Of the 6.35 ha of native vegetation, Hanson are proposing to clear up to 3.96 ha of native vegetation over a five-year period (Figure B). This includes areas of remnant vegetation, and regrowth vegetation within previously disturbed areas.

The proposed native vegetation clearing area of 3.96 ha ("the proposed NVCA") was designed to avoid the ninety-one (91) recorded locations of a conservation significant flora species, *Daviesia pleurophylla* (Priority 2), and to provide a sufficient area to source optimal sand volumes. Existing disturbed areas without regrowth vegetation present were excluded from the proposed NVCA.

A summary of the purpose permit clearing application is provided in Table 1.

**Table 1: Clearing proposal summary**

| | |
|---|---|
| **Location** | Mining tenement 08/510, Exmouth |
| **Approved mining disturbance area** | 6.77 ha, as per the Mining Proposal (Hanson 2024). |
| **Clearing area** | • Up to 3.96 ha of native vegetation to be cleared within a larger footprint (6.35 ha).<br>• Hanson are proposing to clear within a larger footprint (6.35 ha) which represents the entire Mining Proposal area while excluding all 91 recorded individuals of *Daviesia pleurophylla* (Priority 2) by a separation distance of at least 10 m.<br>• The proposed NVCA (3.96 ha) represents the area of native vegetation to be cleared within a larger footprint and was designed to minimise vegetation clearing as much as practicable, while still providing a sufficient area to source optimal sand volumes. |
| **Timing** | • Clearing will be undertaken once the Purpose Permit is granted and will continue over a period of five years. This is estimated to be from March 2025 to March 2030.<br>• Clearing will be undertaken in stages, in line with the staged approach for sand mining which will be driven by local/regional demand for sand and concrete (Hanson 2024).<br>• Clearing will not be undertaken unless sand mining commences within three months of the clearing being undertaken. |
| **Clearing method** | • The native vegetation will be cleared mechanically.<br>• Clearing will be undertaken in stages, in line with the staged approach for sand mining (Hanson 2024).<br>• The Mining Proposal (Hanson 2024) outlines the staged rehabilitation approach, which includes topsoil being stockpiled separately to the Pindan sand excavated materials, to be used in recontouring and rehabilitating the open pit areas. |
| **Purpose of clearing** | • For sand mining and associated activities.<br>• This is the same purpose as the expired Purpose Permit CPS 7832/1, no additional activities are proposed. |
| **Vegetation proposed to be cleared** | • Approximately 3.42 ha of vegetation type VT01 in Very Good condition (Pilbara Ecological 2024).<br>• Approximately 0.49 ha of vegetation type VT01 (and VT01 Inferred) in Poor (and Poor Inferred) condition (Pilbara Ecological 2024).<br>• Approximately 0.05 ha of vegetation type VT02 (and VT02 Inferred) in Good (and Good Inferred) condition (Pilbara Ecological 2024). |

# 3 EXISTING ENVIRONMENT

## 3.1 Geology and soils

The site's underlying geology is mapped at a 1:250,000 scale and is described as longitudinal and network dunes and residual sand plains – reddish-brown to yellowish quartz sand (Qe) (Van De Graff et al. 1980 and 1981).

Soil landscape mapping of Western Australia's Rangelands and Arid interior identified the Range system soil-landscape mapping unit (204Ra) over the site, described as dissected limestone plateaux, hills and ridges with gorges and steep stony slopes supporting hard spinifex, sparse shrubs and eucalypts (Department of Primary Industries and Regional Development (DPIRD) 2024).

## 3.2 Interim Biogeographic Regionalisation of Australia

The site is situated within the Cape Range subregion of the Carnarvon region of the Interim Biogeographic Regionalisation of Australia (IBRA) (DPIRD 2024). The Cape Range subregion is 2,547,911 ha in size and is characterised by a mosaic of saline alluvial plains with samphire and saltbush low shrublands, Bowgada low woodland on sandy ridges and plains, Snakewood scrub on clay flats, and tree to shrub steppe over hummock grasslands on and between red sand dune fields (Kendrick and Mau 2002).

## 3.3 Vegetation and flora

### 3.3.1 Vegetation

#### 3.3.1.1 Regional vegetation

The regional vegetation association mapping of J. S. Beard at a 1:250,000 scale identified that the site within the Cape Range vegetation association (662; Landgate 2024). The vegetation association is described as Hummock grassland with scattered low trees over dwarf shrubs or mixed short grass and spinifex mixed species, *Triodia* spp. According to the Government of Western Australia (2019), this vegetation association remains at approximately 99.06% of its pre-European extent at a state level and at 99.64% within the IBRA Cape Range subregion.

#### 3.3.1.2 Vegetation types

Pilbara Ecological undertook a flora and vegetation survey for the site in accordance with the Environmental Protection Authority's (EPA) Technical Guidance: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016a) and the Environmental Factor Guideline: Flora and Vegetation (EPA 2016b). Pilbara Ecological (2024) identified two vegetation types within the survey area, as illustrated in Figure C:

- VT01: *Banksia ashbyi* subsp. *boreoscaia*, *Duboisia hopwoodii*, *Grevillea stenobotrya* tall sparse shrubland over *Triodia* ?*angusta* sparse hummock grassland on red sand dunes.
- VT02: *Acacia sclerosperma* subsp. *sclerosperma*, *Acacia coriacea* subsp. *coriacea*, *Gyrostemon ramulosus* tall sparse shrubland over *Acacia gregorii* low sparse shrubland over *Triodia* ?*angusta* sparse hummock grassland on coastal sandplain.

#### 3.3.1.3 Vegetation condition

The vegetation condition ranged from Very Good to Poor, with much of the survey area mapped in Very Good condition (Pilbara Ecological 2024).

At the time of the survey, most of the survey area was recently burnt, within 6 to 12 months (Pilbara Ecological 2024). The vegetation was in the early re-establishment phase and was considered a survey limitation.

Approximately 3.91 ha of VT01 and 0.05 ha of VT02 will be permanently lost within the proposed NVCA, as summarised in Table 7.

**Table 2: Vegetation types and condition within the proposed NVCA**

| Vegetation type | Vegetation condition | Within the proposed NVCA (ha) |
|---|---|---|
| VT01 | Very Good | 3.42 |
| VT01 | Poor | 0.48 |
| Inferred* VT01 | Inferred* Poor | 0.009 |
| **VT01 subtotal** | | **3.91** |
| VT02 | Good | 0.005 |
| Inferred* VT02 | Inferred* Good | 0.04 |
| **VT02 subtotal** | | **0.05** |
| **Total area** | | **3.96** |

(Pilbara Ecological 2024)

* Minor portions of the proposed NVCA were not included in the Pilbara Ecological (2024) survey area. Therefore, they were inferred from reviewing the adjacent vegetation type and condition mapping and aerial imagery.

### 3.3.2 Conservation significant vegetation

The Cape Range (662) vegetation association mapped over the site is well represented at a state level and within the IBRA Cape Range subregion (99.06% and 99.64% of its pre-European extent remaining; Government of Western Australia 2019). This is significantly above the retention of 30% or more of the pre-clearing extent of each ecological community threshold level established in the National Objectives and Targets for Biodiversity Conservation 2001–2005 (Commonwealth of Australia 2001).

The desktop assessment identified no Threatened Ecological Communities (TECs) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or listed under the *Biodiversity Conservation Act 2016* (BC Act) within the survey area, and no Priority Ecological Communities (PECs) listed by the Department of Biodiversity, Conservation and Attractions (DBCA) within the survey area (Pilbara Ecological 2024). The two vegetation types described in Section 3.3.1.2 were not analogous with any known TEC or PEC.

The vegetation type VT01 was considered to be locally significant due to it being confined to a restricted landform and providing habitat for the conservation significant flora species, *Daviesia pleurophylla* (Priority 2).

Approximately 3.91 ha of locally significant vegetation type VT01 will be permanently lost within the proposed NVCA, as summarised in Table 7.

### 3.3.3 Flora

The survey recorded 63 flora taxa, comprised of 60 native species and 3 introduced species (Pilbara Ecological 2024). None of the introduced species were listed as Weeds of National Significance or Declared Pests under the *Biosecurity and Agriculture Management Act 2007*.

### 3.3.4 Conservation significant flora

#### 3.3.4.1 Threatened flora

The flora and vegetation survey recorded no Threatened flora species listed under the EPBC Act or BC Act within the survey area (Pilbara Ecological 2024).

### 3.3.4.2 Priority flora

The desktop assessment identified four Priority flora species listed by the DBCA with potential to occur within the survey area, including (Pilbara Ecological 2024):

- Occurs within site (recorded during survey and discussed further in Section 3.3.4.2.1):
  - *Daviesia pleurophylla* (Priority 2)
- Possible to occur (discussed further in Section 3.3.4.2.2):
  - *Acanthocarpus rupestris* (Priority 2)
  - *Verticordia serotina* (Priority 2)
  - *Corchorus congener* (Priority 3)
  - *Corynotheca flexuosissima* (Priority 3).

#### 3.3.4.2.1 Priority flora – *Daviesia pleurophylla*

**Within the site**

The flora and vegetation survey recorded one Priority 2 flora species, *Daviesia pleurophylla* within the site, with 91 individuals located within vegetation type VT01 and inferred VT01 (Figure C). The proposed NVCA has been designed to avoid all 91 individuals (100% of those recorded within the site) of *Daviesia pleurophylla* (Priority 2). A separation distance of at least 10 m, and up to a maximum of 40 m has been implemented to minimise the risk of indirect impacts to these species.

**Regional occurrences**

The *Daviesia pleurophylla* is endemic to the Cape Range peninsula where it is found on sand dunes (Western Australian Herbarium 1998-). *Daviesia leurophylla* has been recorded elsewhere on the Cape Range peninsula, with eleven Herbarium specimens collected from 1978 to 2019 and found from the tip of the peninsula to south of the Warnangura National Park (Cape Range). Nine of these specimens are from within 10 km of the site, and the furthest specimen was collected approximately 69 km to the south-southwest of the site. A review of other ecological surveys in the Cape Range peninsula have been undertaken to provide an indication of the total species numbers on the peninsula. The surveys summarised in Table 3 identified over 250 *Daviesia pleurophylla* individuals on the Cape Range peninsula.

**Table 3: Survey records of *Daviesia pleurophylla* in the Cape Range peninsula**

| Survey | Survey findings | Proximity to site |
|---|---|---|
| Exmouth Lighthouse Resort Borefield – Ecological Survey Report (Strategen-JBS&G 2020). | • Local populations with 45 individuals were recorded on 13 June 2020.<br>• Found in a similar vegetation type to VT01, described as *Grevillea stenobotrya* and *Banksia ashbyi* open low shrubland over *Triodia angusta* hummock grassland | The *Daviesia pleurophylla* populations are located approximately 4.5 km north-west of the site. |
| Yardie Creek Road Realignment – Biological Survey (Ecoscape (Australia) Pty Ltd (Ecoscape) 2021). | • A single population with at least 111 plants recorded during 17 to 21 August 2020.<br>• Found in a similar vegetation type to VT01, described as *Banksia ashbyi* subsp. *boreoscaia*, *Grevillea stenobotrya* and *Acacia coriacea* subsp. *coriacea* mid open shrubland over *Triodia glabra* low hummock grassland. | The *Daviesia pleurophylla* population is located approximately 5.9 km north of the site. |
| Ningaloo Lighthouse Development Environmental Surveys (Ecoscape 2018). | • A continuous population estimated at over 100 plants, where the total population would be in the 1000s, was recorded during 9 to 14 July 2018.<br>• Found in a similar vegetation type to VT01, described as *Banksia ashbyi* subsp. *boreoscaia* and *Daviesia pleurophylla* tall sparse shrubland over *Triodia glabra*, *Scaevola sericophylla* and *Acacia gregorii* mid hummock grassland/low shrubland | The *Daviesia pleurophylla* population is located approximately 6 km north of the site. |

| Survey | Survey findings | Proximity to site |
|---|---|---|
| Cape Range, Western Australia 2019: Bush Blitz expedition report (Bush Blitz 2021)<br>Cape Range Bush Blitz Vascular Plants (Keighery and Lilburn 2019). | • The *Daviesia pleurophylla* was recorded as locally common during 17 to 27 June 2019 within the Learmonth Air Weapons Range.<br>• The findings of the Bush Blitz indicated there was a large range extension of *Daviesia pleurophylla* from the tip of the Cape to the Learmonth Air Weapons Range. | The Learmonth Air Weapons Range is located approximately 69 km to the south-southwest of the site. |
| Biodiversity values of Unallocated Crown Land on the Cape Range peninsula (Meissner 2010) | *Daviesia pleurophylla* was recorded within two quadrats. | The two quadrats are located approximately 2.7 km and 4.3 km west-northwest of the site. |

Habitat for the *Daviesia pleurophylla* is reasonably well represented at the local scale as there is approximately 2,700 ha of the vegetation association 662 which is underlain by dunes and sand plains (geological unit Qe) within a 10 km radius of the site (Van De Graff et al. 1981; Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) 2024; Landgate 2024). Habitat is also well represented and protected at the regional scale, as there is (Landgate 2024):

- Approximately 12,800 ha of vegetation association 662 within the Warnangura National Park (Cape Range), located 40 km south-southwest of the site, where a minor portion (approximately 3,500 ha or 27%) is underlain by geological unit Qe (Van De Graff et al. 1980; DEMIRS 2024). *Daviesia pleurophylla* has been recorded within the Warnangura National Park (Department of Environment and Conservation and Conservation Commission of Western Australia (DEC and CCWA) 2010; Western Australian Herbarium 1998-).
- Approximately 18,500 ha of vegetation association 662 within the Nyinggulara National Park located 75 km south-southwest of the site, where the majority (approximately 11,000 ha or 60%) is underlain by geological unit Qe (Van De Graff et al. 1980; DEMIRS 2024).

Based on the large extent of suitable habitat on the Cape Range peninsula and known populations recorded in the North West Cape, it is likely that this species is present in other areas of similar vegetation on the Cape Range peninsula.

Direct impacts to the 91 individuals of *Daviesia pleurophylla* (Priority 2) within the site have been avoided. Based on the large extent of suitable habitat on the Cape Range peninsula, proposed clearing of 3.96 ha of native vegetation is unlikely to significantly impact (either directly or indirectly) the overall *Daviesia pleurophylla* distribution and population numbers.

### 3.3.4.2.2 Priority flora with potential to occur

As most of the survey area was recently burnt at the time of assessment, Pilbara Ecological (2024) advised that there remains potential for three other Priority flora species to possibly occur within the survey area as suitable habitat is present:

- *Verticordia serotina* (Priority 2). Habitat described as red sand and sand dunes.
- *Corchorus congener* (Priority 3). Habitat described as sand, red sandy loam with limestone and sand dunes and plains.
- *Corynotheca flexuosissima* (Priority 3). Habitat described as red or white sand, limestone and costal sand dunes.

These Priority flora species have been identified in other ecological surveys in the North West Cape and in the wider Cape Range peninsula (Table 4).

**Table 4: Survey records of Priority flora species in the Cape Range peninsula**

| Priority flora species | Survey / Information source | Survey findings | Proximity to site |
|---|---|---|---|
| *Verticordia serotina* (Priority 2) | Florabase (Western Australian Herbarium 1998-) | Identified in the Warnangura National Park (Cape Range). | Located approximately 40 km south-southwest of the site |
| *Corchorus congener* (Priority 3) | Ningaloo Lighthouse Development Environmental Surveys (Ecoscape 2018) | A population of two individuals. | Located approximately 6.9 km north of the site. |
| | Yardie Creek Road Realignment – Biological Survey (Ecoscape 2021). | A population of 15 individuals. | Located approximately 6.5 km north of the site. |
| | Learmonth (Exmouth) Line Rebuild Flora and Fauna Survey (GHD 2019). | Seven individuals from six locations. | Located approximately 27 km south of the site. |
| | Nyinggulu (Ningaloo) Coastal Reserves: Red Bluff to Winderabandi joint management plan 101 (DBCA 2022)<br>Florabase (Western Australian Herbarium 1998-) | In the coastal conservation and recreation reserves along the Nyinggulu (Ningaloo) Coast (DBCA 2022), and the Warnangura National Park (Cape Range) and Nyinggulara National Park (Western Australian Herbarium 1998-). | • Located over 100 km south-southwest of the site.<br>• Located approximately 40 km south-southwest of the site.<br>• Located approximately 75 km south-southwest of the site. |
| | CPS 7946/3 Clearing Permit Decision Report (Department of Water and Environmental Regulation (DWER) 2018). | Approximately 2,395 individual plants identified at 1,200 locations. | Located approximately 43 km south of the site. |
| *Corynotheca flexuosissima* (Priority 3) | Ningaloo Lighthouse Development Environmental Surveys (Ecoscape 2018). | Identified in four floristic quadrats proximate to the coastline. | The closest floristic quadrat located approximately 6.9 km north of the site. |

As stated in Section 3.3.4.2, habitat for the Priority flora species is well represented at the local and regional scale.

Based on the large extent of suitable habitat on the Cape Range peninsula and recorded populations recorded in the North West Cape, it is likely that these species are present in other areas. The proposed clearing of 3.96 ha of native vegetation is unlikely to significantly impact the Priority flora species population numbers, if they occur at the site during the post-fire re-establishment of vegetation.

### 3.3.5 Significant flora – Range extension flora

Seven flora species recorded were identified by Pilbara Ecological as range extensions, although none were of conservation significance (Pilbara Ecological 2024). While most range extensions were limited to less than 150 km, the most significant were that of *Polymeria lanata*, *Panicum australiense* var. *australiense* and *Urochloa holosericea* subsp. *velutina*, as they marked the western range of the northern Australian species.

The flora species recorded as range extensions are listed in Table 5. Additional records of two flora species, *Paractaenum refractum* and *Olax aurantia*, were observed over 6 km north of the site in 2018 and 2020, therefore the site records of these species may not represent range extensions of the species (Ecoscape 2018 and 2021).

The range extension flora species records are considered significant flora by DWER, as they represent populations that are at the end of the plant's geographic range (Department of Environment Regulation (DER) 2014). The proposed NVCA will likely impact at least three of the seven range extension flora species in Table 5:

- *Alyogyne pinoniana* var. *pinoniana*
- *Setaria surgens*
- *Urochloa holosericea* subsp. *Velutina*.

The remaining four flora species records have been either observed outside the proposed NVCA (*Panicum australiense* var. *australiense* and *Olax aurantia* at EQ02 and *Polymeria lanata* at ER03) and therefore will be avoided or have been recorded further north than the site (*Paractaenum refractum* and *Olax aurantia*).

**Table 5: Range extensions for species recorded within survey area**

| Species | Range extension | Current recorded distribution | Additional records from ecological surveys in the North West Cape |
|---|---|---|---|
| *Alyogyne pinoniana* var. *pinoniana* | ~127km NW | There are 184 records in Australia, 68 records for WA, 16 records for Carnarvon bioregion. Distribution extends from coastal WA across into central NT and SA. Nearest recorded specimen to the survey area is from Cane River Conservation Park.<br>Not previously vouchered from the North West Cape. This record (from the survey area) marks the north-western range extent for the species. | N/A |
| *Panicum australiense* var. *australiense* | ~93km WSW | There are 40 records for WA. Two records for Carnarvon bioregion. Distribution extends across northern WA from Gascoyne to Kimberley bioregions. Nearest recorded specimen to survey area is from ~18km SSW of Onslow.<br>Not previously vouchered from the North West Cape, this record marks the western range extent for the species. | N/A |
| *Paractaenum refractum* | ~88km NW | There are 524 records for Australia. 97 records for WA. 11 records for Carnarvon bioregion. Nearest recorded specimen to survey area is from Giralia Station.<br>Not previously vouchered from the North West Cape. | *Paractaenum refractum* was recorded approximately 6.4 km north of the site by Ecoscape (2021). This record could be considered to mark the northern range extent for the species. |
| *Olax aurantia* | ~33km N | There are 39 records for WA. Four records for Carnarvon bioregion. Distribution extends from south of Jurien Bay to the North West Cape with specimens predominantly from the Geraldton Sandplains bioregion. Nearest recorded specimen to survey area is from ~33km south near the Learmonth Aerodrome. While not a significant range extension, the specimen from the survey area marks the northern range extent for the species. | • *Olax aurantia* was recorded approximately 6.6 km north of the site by Ecoscape (2018). This record could be considered to mark the northern range extent for the species.<br>• Records on the North West Cape form a known disjunct population separated from the main southwest distribution by approximately 500 km (Ecoscape 2018 and 2021). |
| *Polymeria lanata* | ~162km W | There are 90 records in Australia. 45 records for WA. Not recorded in Carnarvon bioregion. Distribution extends across northern Australia from WA to Queensland. Nearest recorded specimen to survey area is from Cane River Conservation Park.<br>Not previously vouchered from the North West Cape. This record (from the survey area) marks the western range extent for the species. | N/A |
| *Setaria surgens* | ~135km N | Common and widespread species across northern half of Australia, particularly eastern Queensland. 1,183 records for Australia. 82 records for WA. Three records for Carnarvon bioregion. Nearest recorded specimen to survey area is from 135km south near Winning Pool.<br>While survey area specimen is within the north-south range for the species, it has not previously been vouchered from the North West Cape. | N/A |

| Species | Range extension | Current recorded distribution | Additional records from ecological surveys in the North West Cape |
|---|---|---|---|
| *Urochloa holosericea* subsp. *velutina* | ~100km | There are 152 records in Australia. 45 records for WA. Not recorded in Carnarvon bioregion. Distribution extends across northern Australia from WA to Queensland. Nearest recorded specimen to Survey Area is from ~16km SSW of Onslow.<br>Not previously vouchered from the North West Cape. This record (from the Survey Area) marks the western range extent for the species. | N/A |

(Pilbara Ecological 2024)

## 3.4 Terrestrial fauna

### 3.4.1 Fauna and fauna habitat

Pilbara Ecological undertook a basic fauna survey of the site in accordance with the EPA's Technical Guidance: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA 2020) and the Environmental Factor Guideline: Fauna (EPA 2016c). Pilbara Ecological (2024) identified two broad fauna habitats within the survey area, as illustrated in Figure E:

- HT01: Tall shrubland on sand dunes:
  - Associated with vegetation type VT01
  - This habitat type includes dune crest and swale vegetated with sparse spinifex hummocks and shrubs. The tall shrubs provide habitat for small birds. The red sand dunes may provide habitat for *Aprasia rostrata*, Ningaloo worm lizard (Priority 3), and other reptile species.
- HT02: Tall shrubland on coastal plain:
  - Associated with vegetation type VT02
  - This habitat type is characterised by spinifex hummocks and tall shrubs. The tall shrubs provide habitat for small birds. The red sandy plain may provide habitat for *Aprasia rostrata*, Ningaloo worm lizard (Priority 3), and other reptile species.

The fauna survey opportunistically recorded four fauna species, including *Bos taurus* (cow), *Dromaius novaehollandiae* (Emu), *Falco cenchroides* (Nankeen kestrel) and *Merops ornatus* (Rainbow Bee-eater) (Pilbara Ecological 2024).

### 3.4.2 Conservation significant fauna

#### 3.4.2.1 Threatened, migratory and specially protected fauna

The basic fauna survey recorded no Threatened, Migratory or Specially protected fauna species listed under the EPBC Act or BC Act within the survey area, and no evidence of such fauna species was noted (burrows, diggings, tracks and scats) (Pilbara Ecological 2024).

Pilbara Ecological (2024) advised that two fauna species listed under the EPBC Act and BC Act as Migratory and under the BC Act as Specially protected species could possibly occur within the survey area as potentially suitable foraging habitat is present:

- *Falco peregrinus* (peregrine falcon) (Species otherwise in need of special protection (other specially protected) under the BC Act)
- *Pandion haliaetus* (osprey) (Migratory under the EPBC Act and BC Act).

Approximately 3.96 ha of potentially suitable foraging habitat (HT01 and HT02) for the peregrine falcon and osprey will be permanently lost within the proposed NVCA. However, these species are not expected to be significantly impacted by the proposed clearing of native vegetation, as discussed in Table 6.

Hanson are proposing to clear native vegetation in stages, with rehabilitation occurring progressively as sand extraction stages are completed (Hanson 2024). The targeted and staggered clearing activities is intended to minimise disturbance to local fauna, such as the peregrine falcon and osprey and their prey species if present.

#### 3.4.2.2 Priority fauna

The basic fauna survey recorded no priority fauna species listed by the DBCA, and no evidence of such fauna species was noted (burrows, diggings, tracks and scats) (Pilbara Ecological 2024).

Pilbara Ecological (2024) advised that one fauna species listed by the DBCA as a priority species was likely to occur within the survey area as suitable habitat is present:

- *Aprasia rostrata* (Ningaloo worm lizard) (Priority 3).

Approximately 3.96 ha of potentially suitable habitat (HT01 and HT02) for the Ningaloo worm lizard will be permanently lost within the proposed NVCA. However, the species is not expected to be significantly impacted by the proposed clearing of native vegetation, as discussed in Table 6.

Hanson are proposing to clear up to 3.96 ha of native vegetation in stages, with rehabilitation occurring progressively as sand extraction stages are completed (Hanson 2024). The targeted and staggered clearing activities is intended to minimise disturbance to local fauna, such as the Ningaloo worm lizard if present.

**Table 6: Listed significant fauna likely to or possibly occurring within the survey area and likelihood of significant impact**

| Species and status | Likelihood of occurrence (post survey) | Comments | Potential habitat type in survey area | Likelihood of significant impact |
|---|---|---|---|---|
| **Birds** | | | | |
| *Falco peregrinus* (peregrine falcon)<br>Species otherwise in need of special protection (other specially protected) under the BC Act | Possible – foraging only | The peregrine falcon is a widespread species across Australia. This species can forage over a wide range of habitats and can maintain a large home range. Suitable nesting habitat includes cliff ledges, granite outcrops, quarries and large trees with old raven or Wedge-tailed Eagle nests (Johnstone and Storr 1998).<br>The Peregrine falcon preys on birds, and occasionally rabbits and large insects (BirdLife Australia 2023a). Peregrine falcons typically hunt over open country, can fly and soar strongly at great heights and reach high speed stoops in pursuit of prey.<br>The nearest record of this species is approximately 7 km from the survey area (Pilbara Ecological 2024).<br>While there is no suitable nesting habitat within the Survey Area, it is possible this species forages over the survey area. | HT01, HT02 | **Unlikely**<br>The proposed NVCA contains two broad fauna habitats, tall shrubland on sand dunes (HT01) and tall shrubland on coastal plain (HT02), over which the peregrine falcon may hunt for prey. The site does not comprise suitable breeding habitat for this species as it does not comprise large trees or cliffs.<br>However, this species is unlikely to rely on the aerial habitats over the proposed NVCA of 3.96 ha considering the wide range of habitats that the peregrine falcon can occupy and the large extents of remnant native vegetation present at the local and regional scale, such as:<br>• Approximately 3,500 ha of the vegetation association 662 within a 10 km radius of the site (Landgate 2024)<br>• Approximately 281,000 ha of the vegetation association 662 within the IBRA Cape Range subregion (Government of Western Australia 2019) |
| *Pandion haliaetus* (osprey)<br>Migratory under the EPBC Act and BC Act | Possible – foraging only | Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. Nests are constructed in a variety of natural and artificial sites including in dead or partly dead trees or bushes; on cliffs, rocks, rock stacks or islets; on the ground on rocky headlands, coral cays, deserted beaches, sandhills or saltmarshes; and on artificial nest platforms, pylons, jetties, lighthouses, navigation towers, cranes, exposed shipwrecks and offshore drilling rigs.<br>Ospreys prey on mostly fish, and sometimes small terrestrial vertebrates, seabirds and crustacea (BirdLife Australia 2023b).<br>The nearest record of this species is less than 4 km from the survey area (Pilbara Ecological 2024).<br>There is no suitable nesting habitat within the survey area. It is possible this species forages over the survey area. | HT01, HT02 | **Unlikely**<br>The proposed NVCA contains two broad fauna habitats, tall shrubland on sand dunes (HT01) and tall shrubland on coastal plain (HT02), over which the osprey may hunt for prey. The site does not comprise any suitable breeding habitat for this species.<br>However, this species is unlikely to rely on the aerial habitats over the proposed NVCA of 3.96 ha considering there are no surface wetlands or waterways within or near the proposed NVCA (Pilbara Ecological 2024) and the large extents of remnant native vegetation present at the local and regional scale, such as:<br>• Approximately 3,500 ha of the vegetation association 662 within a 10 km radius of the site (Landgate 2024). |

| Species and status | Likelihood of occurrence (post survey) | Comments | Potential habitat type in survey area | Likelihood of significant impact |
|---|---|---|---|---|
| | | | | • Approximately 281,000 ha of the vegetation association 662 within the IBRA Cape Range subregion (Government of Western Australia 2019) |
| **Reptiles** | | | | |
| *Aprasia rostrata* (Ningaloo worm lizard)<br>Priority 3 | Likely | This species occupies a variety of sandy habitats including red and white sand dunes. The Ningaloo worm lizard is known to occur on Hermite Island, located approximately 210 km to the north-east of the site (Department of the Environment 2024). Hermite Island is characterised by highly calcareous sandstone, the higher parts are rocky with other areas consisting of flat, dried mud, like the bed of a dried-up lake. *Triodia* hummock grassland is dominant on much of the island, with shrubs, tussock grasses and herbs growing in the gullies.<br>Suitable habitat exists within the survey area and the nearest record is 400 m from the survey area. | HT01, HT02 | **Unlikely**<br>The Ningaloo worm lizard is unlikely to be significantly impacted by the proposed NVCA of 3.96 ha considering the large extents of remnant native vegetation present at the local and regional scale, such as:<br>• Approximately 3,500 ha of the vegetation association 662 within a 10 km radius of the site (Landgate 2024)<br>• Approximately 281,000 ha of the vegetation association 662 within the IBRA Cape Range subregion (Government of Western Australia 2019).<br>There is also a large extent of the site's underlying geology present at the local scale and regional scale, such as:<br>• Approximately 4,100 ha of geological unit Qe within a 10 km radius (Van De Graff et al. 1981; DEMIRS 2024).<br>• Approximately 177,000 ha of geological unit Qe on the Cape Range peninsula (Van De Graff et al. 1980; DEMIRS 2024).<br>This underlying geology could potentially provide a variety of sandy habitats for the Ningaloo worm lizard. |

(Pilbara Ecological 2024)

## 3.5 Subterranean fauna

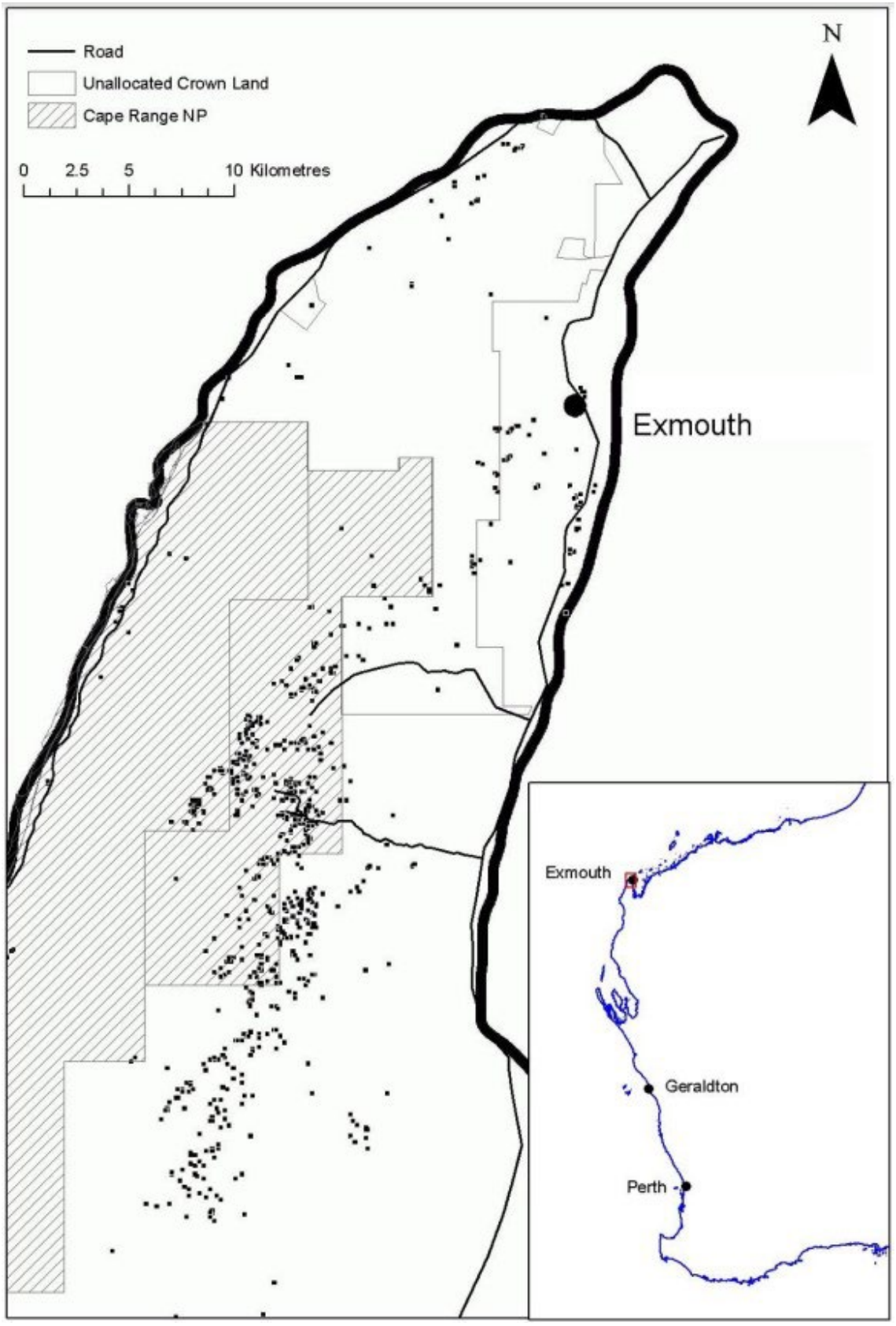
The Cape Range peninsula is known for its unique and mostly endemic stygofauna and troglofaunal species (Meissner 2010). Stygofauna species are subterranean aquatic fauna, while troglofaunal species live in caves and other small cavities within the limestone of the peninsula.

The site is located within the area mapped as Cape Range Subterranean Waterways and therefore, there may be stygofauna or troglofauna species present in groundwater below the site (Landgate 2024). The fixed red sand dunes of Pleistocene age, which is characteristic of the site's geology (Section 3.1), overlie parts of the northern and southern extents of the Cape Range Subterranean Waterways, and beneath which both troglobites and stygobites are found (Humphreys 2000).

There are no karst features present within the site (Exmouth Sand Supplies 2014). The geological mapping and indicative mapping of karst features on the Cape Range peninsula indicates that the nearest limestone areas are located approximately 1.5 km to the south-west (Figure 2). The proposed native vegetation clearing is not expected to impact any troglofaunal species if present under the site, as the mining activities will only extract the surface sand (i.e., Pindan sand dunes) and will not disturb the underlying limestone bedrock (Hanson 2024).

Most recorded stygofauna are found in the fresh-to-brackish groundwater lens that sits above the deeper saline groundwater of the Cape Range peninsula coastal plains (EPA 1999). There are no bores installed within the site, as such its underlying groundwater quality and likely presence of stygofauna species has not been monitored. No records exist for stygofauna closer than approximately 4 km from the site (Exmouth Sand Supplies 2014). The proposed native vegetation clearing is not expected to impact any stygofauna species if present under the site, as there will be no dewatering of the groundwater table, and all mining activities will remain above the groundwater table which is estimated at 7 m below the base of dunes (Hanson 2024).

Water may be required to be trucked to each mining stage in a water cart (Hanson 2024). There are no groundwater licences or abstraction bores located within the site (DWER 2024a and 2024b). Hanson does not immediately require a groundwater licence for the site (J. Halleen, personal communication, 4 October 2024). Hanson can, if required, secure water from their Learmonth quarry, located approximately 42 km south of the site. In the future, Hanson may apply for a groundwater licence of approximately 5,000 kilolitres and consideration of the potential impacts to subterranean fauna (if present) would be considered as part of any future groundwater abstraction.




(source: Meissner 2010)

**Figure 2: Location of karst features on Cape Range peninsula**

## 3.6 Surface water features

There are no surface wetlands or surface water features within the site (Pilbara Ecological 2024; Landgate 2024). The site intersects the Cape Range Subterranean Waterways, which is listed on the Directory of Important Wetlands in Australia - Western Australia (Landgate 2024). The wetland is described as the subterranean waterways, sinkholes, general groundwater and artificial wells of the coastal plain and foothills of Cape Range and is approximately 175,000 ha in size (Jaensch 1992).

The proposed native vegetation clearing is not expected to impact the Cape Range Subterranean Waterways, as there will be no dewatering of the groundwater table, and all mining activities will remain above the groundwater table which is estimated at 7 m below the base of dunes (Hanson 2024).

## 3.7 Conservation areas

There are no DBCA managed lands within the site (Landgate 2024). The nearest DBCA managed land is the Bundegi Coastal Park, located approximately 700 m to the east and runs along approximately 5 km on the eastern coast of Cape Range. The Bundegi Coastal Park forms part of the Ningaloo Coast World Heritage Area, which covers 604,500 ha and spans more than 300 km along the remote Western Australian coast (Department of Climate Change, Energy, the Environment and Water (DCCEEW) 2021).

The site is located within an Environmentally Sensitive Area (ESA), which is known as the Cape Range and Adjacent Coastal Plain and is listed on the Register of the National Estate (Non-statutory archive) for its natural values (Landgate 2024; DCCEEW 2024). The Cape Range and Adjacent Coastal Plain is approximately 183,000 ha in size, and the proposed NVCA of 3.96 ha is unlikely to significantly impact the natural values of this ESA or any other conservation area.

# 4 PROPOSED AVOIDANCE AND MITIGATION MEASURES

Hanson have undertaken, and are proposing to undertake, several avoidance and mitigation measures to minimise the need for and scale of the proposed clearing of native vegetation. These measures are listed below.

- Avoidance measures:
  - Direct impacts to the conservation significant flora species, *Daviesia pleurophylla* (Priority 2) have been avoided through design of the NVCA. All 91 recorded locations of *Daviesia pleurophylla* (Priority 2) have been excluded from the NVCA.
  - Potential indirect impacts to *Daviesia pleurophylla* (Priority 2) have been avoided through implementation of a separation distance of at least 10 m, and up to a maximum of 40 m between the recoded plant locations and NVCA boundary. The future mining activity area (Figure 1 and Figure A) was reduced as much as possible to maximise the separation distances to the Priority 2 flora species while also providing sufficient area to source optimal sand volumes.
  - The existing cleared site internal access track will be used by Hanson, therefore avoiding additional clearing of native vegetation to create new access tracks.
  - The mining operations will be centred around the existing quarry which has been previously disturbed, therefore avoiding additional clearing of native vegetation to undertake sand mining.
  - The future mining area has been designed to minimise vegetation clearing as much as practicable, while still providing a sufficient area to source optimal sand volumes. Careful design of the future mining activity area has allowed for retention of 1.87 ha native vegetation within the Mining Proposal area.
- Mitigation measures (Hanson 2024):
  - Clearing will be undertaken in stages, in line with the staged approach for sand mining which will be driven by local/regional demand for sand and concrete. Clearing will not be undertaken unless sand mining commences within three months of the clearing being undertaken. This will reduce the area exposed to wind erosion.
  - A water cart will be available, if required, to mitigate dust risks within the sand excavation area and along the access road.
  - Road speed limits for the access roads and quarry will be in place, which will minimise dust generation.
  - Vehicle hygiene and weed control measures will be implemented during all phases of the project. This will limit the potential for spread or introduction of weed species to surrounding areas.
  - Site personnel will be inducted in fire management procedures to prevent fires from starting and to control and contain any unplanned or unintentional fires within and adjacent to the tenement.
  - Post mining, the retained topsoil will be used in the rehabilitation of the excavated pit / access road areas to re-establish native vegetation species. Rehabilitation activities including reforming of the landform, compaction of the quarry pit and batters and the facilitating the revegetation of native species will occur post each mining stage.

# 5 ASSESSMENT AGAINST THE 10 CLEARING PRINCIPLES

Table 7 provides an assessment of the proposed clearing activities against the 10 Clearing Principles as outlined in Schedule 5 of the EP Act to determine whether the proposed clearing is at variance to the principles.

**Table 7: Assessment of the proposed NVCA against the 10 Clearing Principles**

| Principle | Assessment | Outcome |
|---|---|---|
| a. Native vegetation should not be cleared if it comprises a high level of biological diversity | **The proposed NVCA of 3.96 ha is unlikely to contain native vegetation comprised of a high level of biological diversity.**<br>• The site is located within a Biodiversity Hotspot, the Carnarvon Basin (DER 2014). The flora and vegetation survey recorded 63 flora taxa, comprised of 60 native species and 3 introduced species (Pilbara Ecological 2024). The native species represented 49 genera and 24 families. A review of the Dandjoo database indicates that there are over 350 flora species located within a 10 km radius of the site (DBCA 2024). The vegetation and landform types within the proposed NVCA are well represented at the local and regional scale and it is considered likely that the flora species within the site are well represented elsewhere on the peninsula. Furthermore, the Cape Range (662) vegetation association mapped over the site is well represented at a state level and within the IBRA Cape Range subregion (99.06% and 99.64% of its pre-European extent remaining; Government of Western Australia 2019). This is significantly above the retention of 30% or more of the pre-clearing extent of each ecological community threshold level established in the National Objectives and Targets for Biodiversity Conservation 2001–2005 (Commonwealth of Australia 2001).<br>• None of the introduced flora species were listed as Weeds of National Significance or Declared Pests under the *Biosecurity and Agriculture Management Act 2007*.<br>• Approximately 3.96 ha of vegetation in Poor to Very Good condition will be cleared in the proposed NVCA (Pilbara Ecological 2024). The vegetation within proposed NVCA has been disturbed by weeds, established tracks, previous clearing and bushfires, and there are large extents of vegetation in similar or better condition surrounding the site. The weeds present are dominated by *Cenchrus ciliaris* (Buffel Grass) (Pilbara Ecological 2024). Weeds have the potential to out-compete native species and reduce the biodiversity of an area. This risk will be mitigated by implementing vehicle hygiene and weed control measures during all phases of the project. This will limit the potential for spread or introduction of weed species to surrounding areas.<br>• There are no TECs, PECs or Threatened flora species listed under the EPBC Act or BC Act or listed by the DBCA identified within the site (Pilbara Ecological 2024).<br>• Approximately 3.91 ha of the vegetation type VT01 will be cleared, and Pilbara Ecological (2024) considered the vegetation type to be locally significant due to it being confined to a restricted landform (red sand dunes) and providing habitat for the conservation significant flora species, *Daviesia pleurophylla* (Priority 2). The proposed NVCA is unlikely to adversely impact the local significance of this vegetation type as:<br>– A portion of the vegetation type VT01 will be retained within the Mining Proposal area (1.87 ha of native vegetation).<br>– All 91 individuals of *Daviesia pleurophylla* (Priority 2) will be avoided.<br>– Suitable habitat for the *Daviesia pleurophylla* is reasonably well represented at the local scale as there is approximately 2,700 ha of the vegetation association 662 which is underlain by dunes and sand plains (geological unit Qe) within a 10 km radius of the site (Van De Graff et al. 1981; DEMIRS 2024; Landgate 2024).<br>– Suitable habitat for the *Daviesia pleurophylla* is well represented and protected at the regional scale, where there is at least (Van De Graff et al. 1980; DEMIRS 2024; Western Australian Herbarium 1998-).<br>○ 3,500 ha within approximately 12,800 ha of vegetation association 662 underlain by geological unit Qe within the Warnangura National Park (Cape Range). Located 40 km south-southwest of the site.<br>○ 11,000 ha within approximately 18,500 ha of vegetation association 662 underlain by geological unit Qe within the Nyinggulara National Park. Located 75 km south-southwest of the site.<br>• Priority flora species are a measure of biodiversity values (DER 2014).<br>– The site contains 91 individuals of *Daviesia pleurophylla* (Priority 2), however they are not considered to represent a significant population of priority flora as there are over 250 to 1,000s of *Daviesia pleurophylla* individuals recorded in the Cape Range peninsula (Table 3). Despite this, the proposed NVCA avoids directly impacting all 91 individuals of *Daviesia pleurophylla* (Priority 2) by a separation distance of at least 10 m, and up to a maximum of 40 m. Several individuals of *Daviesia pleurophylla* (Priority 2) are located adjacent to the existing access roads and quarry areas which has been actively mined since 2018. This suggests that they are unlikely to be indirectly impacted by the proposed clearing and mining activities.<br>– Three Priority flora species may possibly occur within the site as suitable habitat is present, *Verticordia serotina* (Priority 2), *Corchorus congener* (Priority 3), and *Corynotheca flexuosissima* (Priority 3) (Pilbara Ecological 2024). As stated above, habitat for the Priority flora species is well represented at the local and regional scale. Based on the large extent of suitable habitat on the Cape Range peninsula and known populations recorded in the North West Cape, it is likely that these species are present in other areas. The proposed clearing of 3.96 ha of native vegetation is unlikely to significantly impact the Priority flora species population numbers, if they occur at the site during the post-fire re-establishment of vegetation.<br>• Other significant flora such as uncommon or range-restricted species are a measure of biodiversity values (DER 2014).<br>– The proposed NVCA will likely impact at least three of the seven range extension flora species records (Table 5); *Alyogyne pinoniana* var. *pinoniana*, *Setaria surgens* and *Urochloa holosericea* subsp. *velutina*. The remaining four flora species records have been either observed outside the proposed NVCA (*Panicum australiense* var. *australiense* and *Olax aurantia* at EQ02 and *Polymeria lanata* at ER03) and therefore will be avoided or have been recorded further north than the site (*Paractaenum refractum* and *Olax aurantia*) (Ecoscape 2018 and 2021).<br>– These flora species are common and are not range-restricted (Table 5). The proposed NVCA is unlikely to significantly impact upon the extent of the common flora species.<br>• The basic fauna survey identified only two broad fauna habitats and recorded four fauna taxa, with no conservation significant fauna found (Pilbara Ecological 2024).<br>• The site is located within a Biodiversity Hotspot, the Carnarvon Basin (DER 2014). The vegetation and landform types within the proposed NVCA are well represented at the local and regional scale. The level of biodiversity within the proposed NVCA is considered similar to the surrounding areas, and the small area of proposed clearing is unlikely to have any significant impact on flora or fauna diversity at a local or regional scale. | The proposed NVCA is unlikely to be at variance to this Principle. |
| b. Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia. | **The proposed NVCA of 3.96 ha is unlikely to comprise the whole or a part of, or is necessary for the maintenance of, a significant habitat for native fauna species.**<br>• Based on a desktop assessment, Pilbara Ecological (2024) identified 80 conservation significant fauna species which may be present. This included 25 Threatened species, 57 Migratory species, three Priority 2 species, two Priority 3 species and five Priority 4 species. The site's survey recorded four fauna species, including *Bos taurus* (cow), *Dromaius novaehollandiae* (Emu), *Falco cenchroides* (Nankeen kestrel) and *Merops ornatus* (Rainbow Bee-eater) (Pilbara Ecological 2024).<br>• There were no conservation significant fauna species listed under the EPBC Act or BC Act or listed by the DBCA identified within the site and no evidence of such fauna species was noted (burrows, diggings, tracks and scats) (Pilbara Ecological 2024).<br>• Approximately 3.91 ha of the fauna habitat type HT01 (and HT01 Inferred) and 0.05 ha of the fauna habitat type HT02 (and HT02 Inferred) will be cleared. Pilbara Ecological (2024) considered that the fauna habitat types represent suitable habitat for three conservation significant fauna which could possibly occur or are likely to occur:<br>– Possible to occur | The proposed NVCA is unlikely to be at variance to this Principle. |

| Principle | Assessment | Outcome |
|---|---|---|
| | ○ *Falco peregrinus* (peregrine falcon) (Species otherwise in need of special protection (other specially protected) under the BC Act)<br>○ *Pandion haliaetus* (osprey) (Migratory under the EPBC Act and BC Act)<br>– Likely to occur<br>○ *Aprasia rostrata* (Ningaloo worm lizard) (Priority 3)<br>• The three conservation significant fauna species are unlikely to be significantly impacted by the proposed NVCA as the 3.96 ha of vegetation to be cleared does not represent significant habitat for the species and there are large extents of suitable habitat present at the local and regional scale (Table 6). | |
| c. Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora | **The proposed NVCA of 3.96 ha does not include, nor is necessary for the continued existence of, rare flora.**<br>• There is no Threatened flora species listed under the EPBC Act or BC Act identified within the site (Pilbara Ecological 2024).<br>• No Threatened flora species were identified in the database searches within a 40 km radius of the site or identified as having potential to occur within the site (Pilbara Ecological 2024). | The proposed NVCA is not at variance to this Principle. |
| d. Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community. | **The proposed NVCA of 3.96 ha does not comprise the whole or a part of, nor is necessary for the maintenance of, a threatened ecological community.**<br>• There is no TECs listed under the EPBC Act or BC Act identified within the site (Pilbara Ecological 2024).<br>• No TECs listed under the EPBC Act were identified in the database searches within a 40 km radius of the site (Pilbara Ecological 2024). One TEC listed under the BC Act was identified in a database search within a 40 km radius of the site, the Critically Endangered Camerons Cave Troglobitic Community TEC. The Camerons Cave Troglobitic Community TEC is located approximately 8.5 km south of the site. | The proposed NVCA is not at variance to this Principle. |
| e. Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared. | **The proposed NVCA of 3.96 ha does not represent a significant remnant of native vegetation in an area that has been extensively cleared.**<br>• The regional vegetation association mapping of J. S. Beard at a 1:250,000 scale identified the site within the Cape Range vegetation association (662; Landgate 2024). The vegetation association is described as Hummock grassland with scattered low trees over dwarf shrubs or mixed short grass and spinifex mixed species, *Triodia* spp.<br>• The Cape Range (662) vegetation association is well represented at a state level and within the IBRA Cape Range subregion (99.06% and 99.64% of its pre-European extent remaining; Government of Western Australia 2019). | The proposed NVCA is not at variance to this Principle. |
| f. Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland. | **The proposed NVCA of 3.96 ha does not represent vegetation growing in, or in association with, an environment associated with a watercourse or wetland.**<br>• There are no surface wetlands or surface water features (watercourses) within or near the site (Pilbara Ecological 2024; Landgate 2024).<br>• The site intersects the Cape Range Subterranean Waterways, which is listed on the Directory of Important Wetlands in Australia - Western Australia (Landgate 2024). The wetland is described as the subterranean waterways, sinkholes, general groundwater and artificial wells of the coastal plain and foothills of Cape Range (Jaensch 1992).<br>• The proposed native vegetation clearing is not expected to impact the Cape Range Subterranean Waterways, as there will be no dewatering of the groundwater table, and all mining activities will remain above the groundwater table which is estimated at 7 m below the base of dunes (Hanson 2024). It is unlikely that the vegetation to be cleared is growing in association with this wetland. | The proposed NVCA is not at variance to this Principle. |
| g. Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation | **The proposed NVCA of 3.96 ha is unlikely to cause appreciable land degradation.**<br>• Appreciable land degradation from vegetation clearing can include soil erosion, salinity, nutrient export, acidification, waterlogging and flooding (DER 2014).<br>• The proposed NVCA's geology is mapped as longitudinal and network dunes and residual sand plains. The highly permeable sandy soils of the proposed NVCA reduces the likelihood of surface water runoff however, cleared areas are likely to be subject to higher rates of wind erosion. Also, the proposed NVCA is approximately 2.6 km west from the coast, potentially exposing the area to prevailing winds. Wind erosion risk will be minimised by:<br>– Undertaking clearing in stages in line with the staged approach for sand mining which will be driven by local/regional demand for sand and concrete.<br>– Ensuring clearing will not be undertaken unless sand mining commences within three months of the clearing being undertaken.<br>– Using a water cart as required to mitigate dust risks within the sand excavation area and along the access road.<br>• The proposed NVCA is not anticipated to cause appreciable land degradation such as increased salinity, nutrient export, acidification, waterlogging or flooding as (Hanson 2024):<br>– No chemicals or dangerous goods will be stored or used at the site.<br>– The sand mining operation will focus on the Pindan sand dunes, and no materials capable of generating acid and metalliferous drainage will be extracted. The proposed NVCA is located approximately 2.5 km west of an area mapped as High to moderate risk of disturbing Potential Acid Sulfate Soil within 3 m of the ground surface (Landgate 2024).<br>– Waterlogging and flooding are not anticipated to occur due to vegetation clearing, as the proposed NVCA is characterised by highly permeable sandy soils, the groundwater table is estimated at 7 m below the base of dunes and all mining activities will remain above the groundwater table.<br>– Salinity is not anticipated to occur due to vegetation clearing as the proposed NVCA is mapped as having low chance of moderate to extreme risk of salinity at surface (DPIRD 2024) and it is within an area mapped as having a groundwater salinity level of 500-1000 mg/L Total Dissolved Solids (fresh water). | The proposed NVCA is unlikely to be at variance to this Principle. |
| h. Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area. | **The proposed NVCA of 3.96 ha is unlikely to have an impact on the environmental values of any adjacent or nearby conservation area.**<br>• There are no DBCA managed lands within the proposed NVCA (Landgate 2024). The nearest DBCA managed land is the Bundegi Coastal Park, which runs along approximately 5 km on the eastern coast of Cape Range and is located approximately 1.4 km east of the proposed NVCA. The Bundegi Coastal Park forms part of the Ningaloo Coast World Heritage Area, which covers 604,500 ha and spans more than 300 km along the remote Western Australian coast (DCCEEW 2021).<br>• The proposed NVCA is within an ESA, which is known as the Cape Range and Adjacent Coastal Plain and is listed on the Register of the National Estate (Non-statutory archive) for its natural values (Landgate 2024; DCCEEW 2024). The Cape Range and Adjacent Coastal Plain is approximately 183,000 ha in size, and the proposed NVCA of 3.96 ha is unlikely to significantly impact the natural values of this ESA or any other conservation area. | The proposed NVCA is unlikely to be at variance to this Principle. |
| i. Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water | **The proposed NVCA of 3.96 ha is unlikely to cause deterioration in the quality of surface or underground water**<br>• There is no Public Drinking Water Source Area (PDWSA) mapped within the proposed NVCA (Landgate 2024). The nearest PDWSA is located approximately 6 km south, the Exmouth Water Reserve.<br>• There are no surface wetlands or surface water features (watercourses) within or near the site (Pilbara Ecological 2024; Landgate 2024). The site intersects the Cape Range Subterranean Waterways, which is listed on the Directory of Important Wetlands in Australia - Western Australia (Landgate 2024). The proposed native vegetation clearing is not | The proposed NVCA is unlikely to be at variance to this Principle. |

| Principle | Assessment | Outcome |
|---|---|---|
| | expected to impact the Cape Range Subterranean Waterways, as there will be no dewatering of the groundwater table, and all mining activities will remain above the groundwater table which is estimated at 7 m below the base of dunes (Hanson 2024).<br>• Furthermore, the risk of hydrocarbon or another chemical spills to groundwater will be minimised by having no chemicals or dangerous goods stored or used at the site and in the event of a spill, appropriate investigations and remediation will be undertaken (i.e., the removal of the spill material and soils) to ensure there are no impacts to the receiving environment because of any spill (Hanson 2024). The site will be operated in accordance with the Mining Proposal, which will minimise the potential risks to groundwater and surface water quality. | |
| j. Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding | **The proposed NVCA of 3.96 ha is unlikely to cause, or exacerbate, the incidence of flooding**<br>• Flooding is not anticipated to be caused or exacerbated by clearing the proposed NVCA, as the area is characterised by highly permeable sandy soils, the groundwater table is estimated at 7 m below the base of dunes and all mining activities will remain above the groundwater table.<br>• Cyclonic activity can be significant within the Cape Range peninsula, however the proposed NVCA is not likely to increase the incidence or intensity of these events. | The proposed NVCA is unlikely to be at variance to this Principle. |

# 6 POTENTIAL CUMULATIVE IMPACTS

The EPA has provided strategic advice under Section 16(e) of the *Environmental Protection Act 1986* on the potential cumulative impacts of proposed activities and developments on the environmental, social and cultural values of Exmouth Gulf (EPA 2021). The EPA recommended:

- A very high level of protection for the eastern and southern portion of Exmouth Gulf and adjacent hinterland areas.
- Any future activities and development must be compatible with the protection of the key values.
- An integrated management approach is required to ensure the conservation and enhancement of the key values of Exmouth Gulf.

RPS has assessed the proposed clearing against the key values that are of particular concern to the EPA due to the cumulative pressures in the locality (Table 8).

**Table 8: Key environmental values of the Exmouth Gulf which are relevant to the proposed clearing**

| Theme | Factor | Key values of concern | Key pressures of concern | Relevance to proposed clearing |
|---|---|---|---|---|
| Sea | Benthic communities and habitats | Blue-green algal mats | Clearing/disturbance; mining footprint | Not relevant to the proposed clearing, as the proposed NVCA is not located in a marine environment, nor in a coastal environment proximate to blue-green algal mats or salt flats. |
| | | Coral | Climate change (e.g., marine heatwaves) | |
| | | Mangroves | Climate change (e.g., tropical storms and cyclones) | |
| | | Salt flats | Clearing/disturbance; mining footprints | |
| | | Samphires | Climate change (e.g., tropical storms and cyclones) | |
| | | Seagrass | Climate change (e.g., marine heatwaves; tropical storms and cyclones) | |
| | Marine fauna | Coral trout | Recreational fishing; climate change (e.g. marine heatwaves) | Not relevant to the proposed clearing, as the proposed NVCA is not located in a marine environment. |
| | | Dolphins | Port infrastructure (including channels); noise pollution (e.g., shipping) | |
| | | Humpback whales | Noise pollution (e.g., shipping); disturbance, including vessel strikes (e.g., tourism / visitation and shipping) | |
| | | Manta rays | Pollution – rubbish | |
| | | Red emperor | Recreational fishing | |
| | | Sawfish | Climate change (e.g., marine heatwaves) | |
| | | Seabirds and shorebirds | Shipping pollution (e.g., oil, fuel, antifoul); light pollution (e.g., shipping); disturbance – damage (e.g., tourism/visitation) | |
| | | Marine turtles | Light pollution (e.g., shipping, residential and tourism); pollution – rubbish; climate change (e.g., tropical storms and cyclones) | |
| | | Tuskfish | Recreational fishing | |
| | | Sediment quality | Shipping pollution (e.g., oil, fuel, antifoul) | |

| Theme | Factor | Key values of concern | Key pressures of concern | Relevance to proposed clearing |
|---|---|---|---|---|
| | Marine environmental quality | Water quality | Shipping pollution (e.g., oil, fuel, antifoul) | Not relevant to the proposed clearing, as the proposed NVCA is not located in a marine environment. |
| | Coastal processes | Nutrient flow | Clearing/disturbance; mining footprints | Not relevant to the proposed clearing, as the proposed NVCA is located over 2.5 km from the coastline and is unlikely to cause appreciable land degradation (Section 5). |
| Land | Flora and vegetation | Coastal dunes | Development footprints, including roads (especially tourism); off-road driving | Approximately 3.91 ha of vegetation type VT01 (found on red sand dunes) will be removed from the proposed NVCA.<br>The proposed clearing is not considered to present a significant risk to coastal dunes in Exmouth Gulf due to the small area of proposed clearing and as similar vegetation and surface geology is well represented and protected at the regional scale (Section 5). |
| | | Coastal plains | Development footprints, including roads (especially tourism); off-road driving | Approximately 0.05 ha of vegetation type VT02 (found on coastal sandplain) will be removed from the proposed NVCA.<br>The proposed clearing is not considered to present a significant risk to coastal dunes in Exmouth Gulf due to the small area of proposed clearing and as similar vegetation and surface geology is well represented and protected at the regional scale (Section 5). |
| | | Limestone cliffs and gullies | Development footprints, including roads (especially industrial and tourism); overgrazing | Not relevant to the proposed clearing, as there is no limestone cliffs or gullies present within or adjacent to the proposed NVCA. |
| | | Threatened/ priority flora | Climate change (e.g., tropical storms and cyclones; fire); development footprints, including roads (especially industrial and tourism); overgrazing; pests/ feral animals; off-road driving. | The flora and vegetation survey recorded one Priority 2 flora species, Daviesia pleurophylla within the site (Section 3.3.4). The proposed NVCA has been designed to avoid all 91 individuals (100% of those recorded within the site) of Daviesia pleurophylla. |
| | Terrestrial fauna | Birds | Atmospheric temperature | Not relevant to the proposed clearing. No significant habitat for bird species will be cleared within the proposed NVCA (Section 3.4.2).<br>The proposed clearing will not have a significant impact on atmospheric temperatures. |
| | | Reptiles | Light pollution (especially tourism and residential); overgrazing; pests/ feral animals | Not relevant to the proposed clearing. No significant habitat for reptile species will be cleared within the proposed NVCA (Section 3.4.2).<br>The clearing is not proposed to be undertaken at night (Hanson 2024). Security lighting may be required at night and will be angled back to the site to minimise light impacts. |
| | Landforms | Karst systems | Groundwater drawdown (industrial, residential and tourism) | Not relevant to the proposed clearing, as it will not require any groundwater abstraction. |

| Theme | Factor | Key values of concern | Key pressures of concern | Relevance to proposed clearing |
|---|---|---|---|---|
| | Subterranean fauna | Stygofauna | Groundwater drawdown (industrial, residential and tourism) | Not relevant to the proposed clearing. The proposed NVCA is mapped as Cape Range Subterranean Waterways and therefore, there may be stygofauna present in groundwater below the site. The proposed clearing will not require any dewatering and therefore is unlikely to impact stygofauna (Section 3.5). |
| | | Troglofauna | Groundwater drawdown (industrial, residential and tourism) | Not relevant to the proposed clearing. The proposed NVCA is mapped as Cape Range Subterranean Waterways and therefore, there may be troglofauna present in groundwater below the site. The proposed clearing will not require any dewatering and therefore is unlikely to impact troglofaunal (Section 3.5). |
| Water | Inland waters | Groundwater systems | Contamination; potable water use (especially from tourism/visitation) | Not relevant to the proposed clearing. There is no PDWSA mapped within the proposed NVCA, and the proposed clearing will not require any groundwater abstraction (Section 3.5).<br>In the event of a chemical or hydrocarbon spill, appropriate investigations and remediation will be undertaken (i.e., the removal of the spill material and soils) to ensure there are no impacts to the receiving environment because of any spill (Hanson 2024). The site will be operated in accordance with the Mining Proposal, which will minimise the potential risks to groundwater and surface water quality. |
| | | Surface water systems | Contamination | Not relevant to the proposed clearing. There is no surface wetlands or surface water features within the proposed NVCA. Although the proposed NVCA is mapped within the Cape Range Subterranean Waterways wetland, The proposed clearing will not require any dewatering and therefore is unlikely to impact this wetland (Section 3.6). |
| People | Social surroundings | Intrinsic / wilderness amenity | Development footprints, including roads (especially industrial and tourism); light pollution (residential, industrial and tourism); off-road driving. | There are no Aboriginal Cultural Heritage (ACH) places on the ACH Register, ACH Lodged or ACH Historic lists within and adjacent to the proposed NVCA (Landgate 2024).<br>The proposed NVCA is within the Cape Range and Adjacent Coastal Plain, which is listed on the Register of the National Estate (Non-statutory archive) for its natural values. The proposed clearing of is unlikely to significantly impact the natural values of this area or any other conservation area (Section 3.7). |
| | Human health | Potable water | Potable water use (especially from tourism/ visitation) | Not relevant to the proposed clearing. There is no PDWSA mapped within the proposed NVCA, and the proposed clearing will not require any groundwater abstraction (Section 3.5). |

# 7 CONCLUDING REMARKS

The proposed NVCA has been partially disturbed by historic mining activities since 2018. Hanson plan to undertake sand mining and associated activities across a five-year period while minimising the clearing of native vegetation. No significant impacts to flora and vegetation have been achieved through design of the proposed NVCA to avoid 91 Priority 2 flora species records (100% of the records) and avoiding clearing of a portion of the existing vegetation within the Mining Proposal area (1.87 ha of native vegetation).

The proposed NVCA was assessed to be not at variance with four Clearing Principles, (c), (d), (e) and (f), and unlikely to be at variance with six Clearing Principles, (a), (b), (g), (h), (i) and (j).

We trust this information is sufficient for your purposes, however, should you require further details or clarification, please do not hesitate to contact Hanson or the report author.

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# Figures


**Figure A**

**Site location**

GDA2020 MGA Zone 50

0 50 100 200 m

**Job Number: AU213015830.001**
**Date: 3/10/2024**
**Scale: Overview 1:4,000 Map 1:4,000 @ A3**
**Created by: CLARE.THATCHER**
**Source: Orthophoto - Nearmap, 2024**

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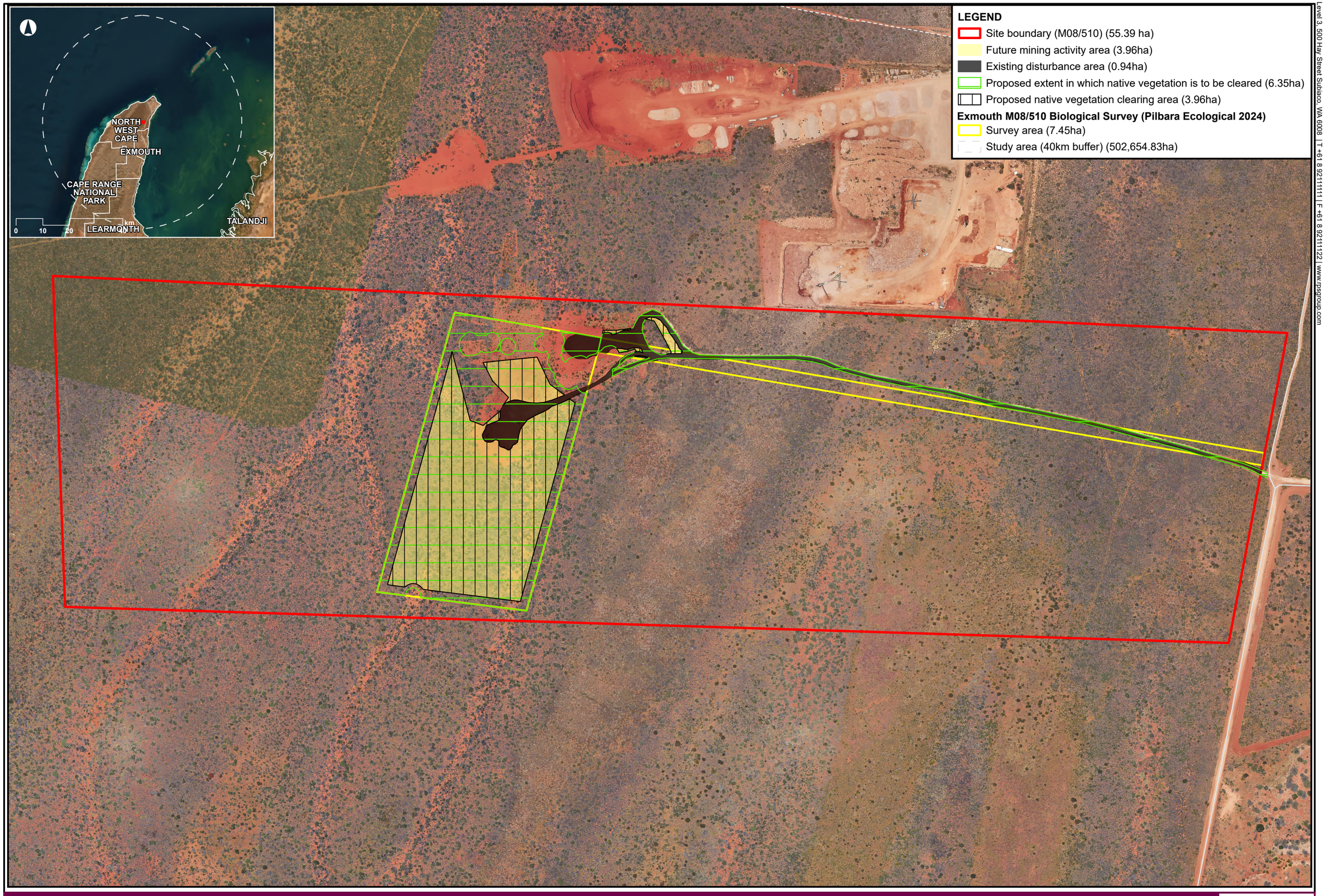


# Figure B

## Proposed native vegetation clearing area and biological survey

GDA2020 MGA Zone 50

0 50 100 200 m

Job Number: AU213015830.001
Date: 3/10/2024
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Created by: CLARE.THATCHER
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INSET MAP

**LEGEND**

- Site boundary (M08/510) (55.39ha)
- Proposed clearing avoidance buffer zone (10m) for *Daviesia pleurophylla* (Priority 2) flora species (0.67ha)
- Proposed extent in which native vegetation is to be cleared (6.35ha)
- Proposed native vegetation clearing area (3.96ha)

**Exmouth M08/510 Biological Survey (Pilbara Ecological 2024)**

Vegetation type

- Cleared (0.94ha)
- VT01: *Banksia ashbyi* subsp. *boreoscaia, Duboisia hopwoodii, Grevillea stenobotrya* tall sparse shrubland over *Triodia ?angusta* sparse hummock grassland on red sand dunes. (5.81ha)
- Inferred VT01 (0.01ha)
- VT02: *Acacia sclerosperma* subsp. *sclerosperma, Acacia coriacea* subsp. *coriacea, Gyrostemon ramulosus* tall sparse shrubland over *Acacia gregorii* low sparse shrubland over *Triodia ?angusta* sparse hummock grassland on coastal sandplain (1.07ha)
- Inferred VT02 (0.05ha)

**Priority flora**

- *Daviesia pleurophylla* (Priority 2) flora species locations, 91 proposed to be retained

# Figure C

## Vegetation type mapping and Priority flora species locations

GDA2020 MGA Zone 50

0 50 100 200 m

Job Number: AU213015830.001
Date: 2/10/2024
Scale: Overview 1:4,000 Map 1:4,000 @ A3
Created by: CLARE.THATCHER
Source: Orthophoto - Nearmap, 2024

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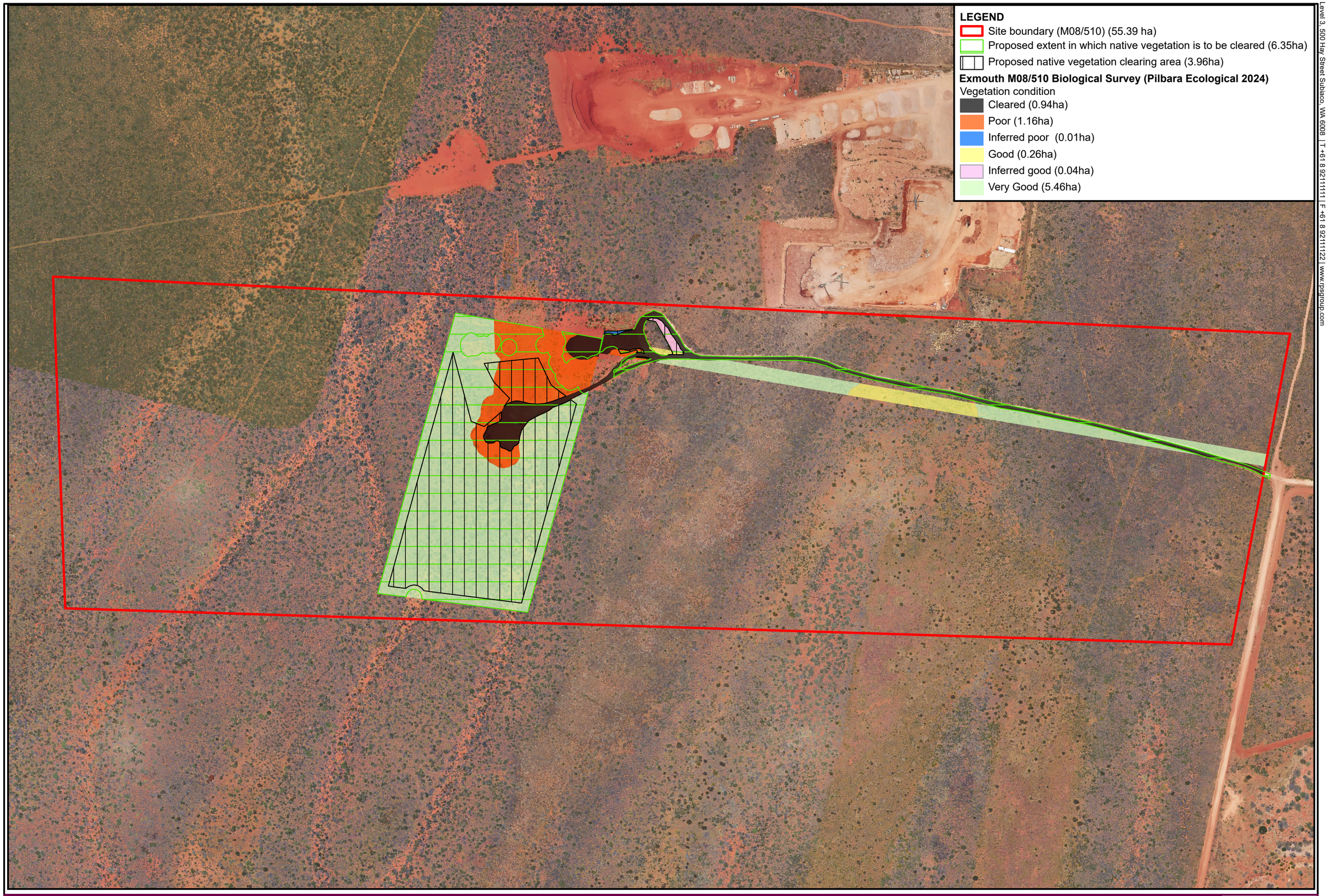


# Figure D

## Vegetation condition mapping

GDA2020 MGA Zone 50

0 50 100 200 m

Job Number: AU213015830.001
Date: 3/10/2024
Scale: Overview 1:4,000 Map 1:4,000 @ A3
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**LEGEND**

- Site boundary (M08/510) (55.39 ha)
- Proposed extent in which native vegetation is to be cleared (6.35ha)
- Proposed native vegetation clearing area (3.96ha)

**Exmouth M08/510 Biological Survey (Pilbara Ecological 2024)**

Fauna habitat

- Cleared (0.94ha)
- HT01: Tall shrubland on sand dunes (5.81ha)
- HT01 Inferred: Tall shrubland on sand dunes (0.01ha)
- HT02: Tall shrubland on coastal plain (1.07ha)
- HT02 Inferred: Tall shrubland on coastal plain (0.04ha)

# Figure E

## Fauna habitat mapping

GDA2020 MGA Zone 50

0 50 100 200 m

Job Number: AU213015830.001
Date: 4/10/2024
Scale: Overview 1:4,000 Map 1:4,000 @ A3
Created by: CLARE.THATCHER
Source: Orthophoto - Nearmap, 2024

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# Appendix A:
## Application for a Clearing Permit (Purpose Permit)

GOVERNMENT OF WESTERN AUSTRALIA

Department of **Water and Environmental Regulation**

Department of **Energy, Mines, Industry Regulation and Safety**

# Application for new permit or referral to clear native vegetation

This is the form to submit a referral of proposed clearing or apply for a clearing permit under Part V of the *Environmental Protection Act 1986* (EP Act).

Before you submit this form, please check you have completed all the fields for the form type and fully prepared any required supporting documents (maps etc.). The Department of Water and Environmental Regulation (DWER) or Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) will return/decline any forms that are not correctly completed.

To find out more about the stages of assessment for clearing permit forms, see the *Procedure: Native vegetation clearing permits*.

## Part 1 – Form type

| | |
|---|---|
| Select your form type.<br><br>**Note**: Where appropriate in this form, and unless stated otherwise, the terms 'application' and 'applicant' also mean 'referral' and 'referrer' respectively. | ☐ Referral of proposed clearing (section 51DA of the EP Act)<br><br>☐ Application for an area permit (section 51E of the EP Act)<br><br>☒ Application for a purpose permit (section 51E of the EP Act) |

| | |
|---|---|
| Which department are you submitting this form to?<br><br>If the clearing is for mineral and petroleum activities authorised under the *Mining Act 1978*, the various petroleum Acts, and/or a State Agreement with areas covered by either mineral or petroleum tenure granted under one of the abovementioned Acts, select 'Department of Energy, Mines, Industry Regulation and Safety'.<br><br>For all other clearing activities, select 'Department of Water and Environmental Regulation'. | ☒ Department of Energy, Mines, Industry Regulation and Safety<br><br>☐ Department of Water and Environmental Regulation |

## Part 2 – Applicant details

### 2.1 Applicant name

**For area permits:**

If granted, the name(s) of (all) landowner(s) will be listed as 'permit holders' on the permit.

**For purpose permits:**

If granted, the name(s) of (all) applicant(s) will go on the permit.

☐ Applying as an individual – complete the following:

| | | |
|---|---|---|
| Title | ☐ Mr ☐ Mrs ☐ Ms ☐ Other: | |
| Name(s) | | |

☒ Applying as a body corporate or other entity formed at law – complete the following:

| | |
|---|---|
| Name | Hanson Construction Materials Pty Ltd |
| Australian Company Number (ACN) | 009679734 |

☐ Applying as a government entity (e.g. government department, local government authority, or other statutory body)

| | |
|---|---|
| Name | |

### 2.2 Applicant contact details

Provide the contact details for the above (primary contact).

| | | | |
|---|---|---|---|
| Title | ☐ Mr ☐ Mrs ☒ Ms ☐ Other: | | |
| First name | Rachel | | |
| Last name | McSkimming | | |
| Position | Development Manager | | |
| Company name | Hanson Construction Materials Pty Ltd | | |
| Phone number | | Mobile | 0400 151 314 |
| Email address | rachel.mcskimming@hanson.com.au | | |

### 2.3 Applicant contact postal details

Provide the postal address for the above individual, body corporate or local government authority (primary contact).

| | |
|---|---|
| Address line 1 | Level 1, 35 Great Eastern Highway |
| Address line 2 | |

| | | | |
|---|---|---|---|
| Suburb | Rivervale | | |
| State | Western Australia | Postcode | 6103 |

### 2.4 Applicant contact – registered business address

If applying as a company, incorporated body, local government authority or public authority, please also supply the registered business office address.

| | | | |
|---|---|---|---|
| Address line 1 | Level 1, 35 Great Eastern Highway | | |
| Address line 2 | | | |
| Suburb | Rivervale | | |
| State | Western Australia | Postcode | 6103 |
| Phone number | 08 9311 8811 | Mobile | |

### 2.5 Electronic correspondence consent

DWER/DEMIRS prefer to send all correspondence via email. We request that you consent to receiving all correspondence relating to instruments and notices under Part V of the EP Act via email. Please indicate your consent in this section of the form.

| | |
|---|---|
| I consent that all written correspondence between myself (the applicant) and DWER/DEMIRS (as applicable) about the subject of this form will be exclusively via email, using the email address provided above. | ☒ Yes ☐ No |

### 2.6 Contact details for enquiries

If different from the applicant's contact details, enter the contact details of a person with whom DWER/DEMIRS should liaise with (e.g. a consultant).

| | |
|---|---|
| Same as applicant's contact details | ☐ Yes ☒ No |

If 'No' – complete the following:

| | | | |
|---|---|---|---|
| Title | ☐ Mr ☐ Mrs ☒ Ms ☐ Other: | | |
| Contact name | Margaret McCormack | | |
| Position (if applicable) | Senior Environmental Consultant | | |
| Company name (if applicable) | RPS | | |
| Phone number | 08 9211 3544 | Mobile | |

| | | | |
|---|---|---|---|
| Email address | margaret.mccormack@rpsconsulting.com | | |
| Business or postal address line 1 | Level 3, 500 Hay Street | | |
| Business or postal address line 2 | | | |
| Suburb | Subiaco | | |
| State | Western Australia | Postcode | 6008 |

## Part 3 – Land details

- You must accurately describe the location of the land where your clearing is proposed.
- Provide copies of associated documents registered against the Certificate of Title (limitations, interests, encumbrances or notifications) where the clearing may impact them (i.e. caveats within freehold Lots).
- If you have a large number of properties, please provide the relevant details for each property in a separately attached supporting document.

| | |
|---|---|
| I have a large number of properties and have given the relevant details in an attached supporting document. | ☐ Yes – skip to Part 4 ☒ No |

If 'No' – complete the following:

| | | | |
|---|---|---|---|
| **Land description**<br>Provide the following details, as applicable, for all properties:<br>– volume and folio number<br>– lot or location number(s)<br>– crown lease or reserve number<br>– pastoral lease number<br>– mining tenement number | The Exmouth sand quarry is located within a mining tenement, Mining Lease M 08/510 | | |
| Street address – Line 1 | | | |
| Street address – Line 2 | | | |
| Suburb | | | |
| State | | Postcode | |
| Local government area(s) | Shire of Exmouth | | |
| Land zoning | 'Environmental conservation reserve' under the Shire of Exmouth's Local Planning Scheme No. 4 | | |

## Part 4 – Relationship to landowner

Tell us which of the following options best describes you as the person completing and submitting this form. If you are filling out this form on behalf of the applicant, answer this question as though you are the applicant.

Proof of ownership may include:

- a certificate of title
- a pastoral or mining lease
- public authority that has care, control or management of the land
- other form of lease, land tenure or specific arrangement.

| **Relationship to landowner**<br>**(select one of the following options)** | **Complete the following** |
|---|---|
| ☐ I am the landowner | ☐ Attach proof of ownership |
| ☐ I am lodging a form on behalf of the landowner (e.g. a consultant) | ☐ Attach proof of ownership |
| ☐ I am acting on the landowner's behalf and will be jointly responsible for the clearing permit (i.e. joint form) | ☐ Attach proof of ownership<br>☐ Attach a letter, in which the landowner authorises you to act on their behalf and acknowledge they will be jointly responsible for the clearing permit |
| ☒ I am likely to become the landowner | ☒ Attach evidence of the pending transfer of ownership, including details of current proprietor on certificate of title, and/or contract of sale ('offer and acceptance') |
| ☐ I will undertake the clearing activities with the landowner's authority and will be the permit holder | ☐ Attach proof of ownership<br>☐ Attach a letter, in which the landowner authorises you to access and clear native vegetation within the property(ies) as detailed in section 3.1 (if the applicant is not the landowner) |
| ☐ I am a person with multiple land parcels within which clearing is proposed | ☐ Attach proof of ownership and/or<br>☐ Attach letters, in which the landowner authorises you to access and clear native vegetation within the properties as detailed in section 3.1 (if the applicant is not the landowner) |
| ☐ I will undertake the clearing activities through the exercise of power conferred by different legislation (e.g. the *Energy Operators (Powers) Act 1979*) | ☐ Provide relevant legislative details: |

## Part 5 – Proposed clearing

### 5.1 Maps and/or spatial data

| | |
|---|---|
| Select which map type(s) you will attach with your form.<br><br>Note: DWER/DEMIRS will decline/return forms (as applicable) if you do not provide sufficient information for this question. | ☒ An ESRI shapefile with the following properties (preferred)<br>• Geometry type: polygon shape<br>• Coordinate system: Geocentric Datum of Australia (GDA) 2020 (geographic latitude/longitude)<br>• Datum: GDA 2020<br>☒ An aerial photograph or map with a north arrow, clearly marking the proposed clearing area<br>Note:<br>• An ESRI shapefile must use one of the following filename extensions: .shp, .shx, .dbf, and/or .prj<br>• You must provide an ESRI shapefile if the form requires an assessment under an *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) accredited process. See Part 8 of this form for more information. |

### 5.2 Size

- If you propose to clear a patch(es) of vegetation, enter a hectare value for the total size of the area (mark number of trees as zero). For example, “clearing of 5 hectares”.
- If you propose to clear only individual trees (i.e. the shrubs, grasses, groundcover plants will remain intact), provide the number of trees. For example, “clearing of 10 trees”. If any shrubs, grasses, and/or groundcover plants **may** be damaged in the clearing process, enter the total area only.
- If you propose to clear an area of native vegetation within a larger footprint, enter the hectare value for the total size of the area to be cleared (mark number of trees as zero) and the size of the footprint. For example, 5 hectares of clearing within a 10-hectare footprint. This option is only available for purpose permit applications.
- Enter values for **both** number of trees and the size of the area **only if** you are clearing individual trees in one area **and** a patch of vegetation in a different area.
- Please note the following area conversions/calculations:

| | |
|---|---|
| 1 hectare = 10,000 $m^2$ | Area of circle = 3.14 x $radius^2$ |
| 1 acre = 0.4 hectares/4,000 $m^2$ | Area of a rectangle = length x width |
| 1 tree = 0.01 hectares/100 $m^2$ | Area of a triangle = ½ length x perpendicular height |

| | |
|---|---|
| Total area of clearing proposed (hectares) | **Clearing of up to 3.96 ha of native vegetation within a larger 6.35 ha extent (Figure B).** |
| Footprint of clearing (hectares) (purpose permit only) | **6.35 ha** |
| Number of individual trees to be cleared | **0** |

Note: Calculate the area of a tree based on the area encompassed by the tree’s drip line; that being the outermost circumference of the tree’s canopy.

### 5.3 Purpose

| | |
|---|---|
| Provide the reason for proposed clearing (e.g. road construction, grazing and pasture, hazard reduction, horticulture, timber harvesting etc.).<br><br>If applicable, provide any additional project overview or explain in detail the activities on the property (e.g. provide context of work proposed and describe how clearing will contribute to overall work activities onsite etc.). | For sand mining and associated activities. |
| Specify what the final land use will be after clearing | Sand quarry. |

### 5.4 Method

| | |
|---|---|
| Proposed method of clearing (i.e. burning, cutting, draining, flooding, grazing, mechanical clearing/bulldozing or other – specify) | Mechanical clearing |

### 5.5 Timeframe

| | |
|---|---|
| Period within which you propose to do the clearing (e.g. 1/7/2022 to 30/8/2024) | Start date: March 2025<br><br>End date: March 2030 |

Note: The clearing referral process is not suitable for any clearing that is expected to take longer than two years.

### 5.6 Pre-application scoping

Historic clearing of native vegetation in the Swan Coastal Plain and Avon Wheatbelt Interim Biogeographic Regionalisation for Australia (IBRA) bioregions has been extensive. DWER/DEMIRS strongly recommends a pre-application meeting if you propose to clear native vegetation within these bioregions.

| | |
|---|---|
| Do you propose to clear native vegetation within the Swan Coastal Plain or Avon Wheatbelt bioregions? | ☐ Yes – complete section below<br><br>☐ I have had a pre-application meeting with DWER/DEMIRS<br><br>Insert date of meeting and officer name(s):<br><br>☐ I have contacted DWER/DEMIRS in relation to a pre-application meeting and been advised that a meeting is unnecessary in this case.<br><br>Insert date of conversation and officer name(s): |

| | |
|---|---|
| | ☐I have not had a pre-application meeting with DWER/DEMIRS. I understand that this may increase the likelihood of requests for further information and/or delays in assessment.<br><br>☒ No – proceed to next question. |

## Part 6 – Mitigation hierarchy

### 6.1 Avoidance and mitigation

Explain how you have, or will, put avoidance and mitigation measures in place to eliminate, reduce, or otherwise mitigate the need for and scale of the proposed clearing of native vegetation.

Attach supporting documents to substantiate your explanation.

Your explanation should demonstrate you have planned the project so that the least clearing possible is to be undertaken. The following questions may help you frame your explanation:

- Why did you select this location and amount of clearing?
- What alternatives to clearing – e.g. engineering solutions – did you consider? (Attach design drawings where applicable)
- What changes, if any, did you make to the location or amount of clearing to reduce the impacts of the clearing?

Note: If you do not demonstrate adequate efforts to avoid and mitigate clearing, DWER/DEMIRS will ask you to do so during the validation of this application. Offsets will only be considered by DWER/DEMIRS as a last resort, once avoidance and minimisation measures have been clearly demonstrated.

| | |
|---|---|
| Provide the avoidance details (e.g. retention of vegetation on property) | • Direct impacts to the conservation significant flora species, *Daviesia pleurophylla* (Priority 2) have been avoided through design of the NVCA. All 91 recorded locations of *Daviesia pleurophylla* (Priority 2) have been excluded from the NVCA.<br><br>• Potential indirect impacts to *Daviesia pleurophylla* (Priority 2) have been avoided through implementation of a separation distance of at least 10 m, and up to a maximum of 40 m between the recoded plant locations and NVCA boundary. The future mining activity area (Figure 1 and Figure A) was reduced as much as possible to maximise the separation distances to the Priority 2 flora species while also providing sufficient area to source optimal sand volumes.<br><br>• The existing cleared site internal access track will be used by Hanson, therefore avoiding additional clearing of native vegetation to create new access tracks.<br><br>• The mining operations will be centred around the existing quarry which has been previously disturbed, therefore avoiding additional clearing of native vegetation to undertake sand mining.<br><br>• The future mining area has been designed to minimise vegetation clearing is much as practicable, while still providing a sufficient area to source optimal sand volumes. Careful design of the future mining activity area has allowed for retention of 1.87 ha native vegetation |

| | |
|---|---|
| | within the Mining Proposal area. |
| Provide the mitigation details (e.g. management of weed spread, rehabilitation) | • Clearing will be undertaken in stages, in line with the staged approach for sand mining which will be driven by local/regional demand for sand and concrete. Clearing will not be undertaken unless sand mining commences within three months of the clearing being undertaken. This will reduce the area exposed to wind erosion.<br>• A water cart will be available, if required, to mitigate dust risks within the sand excavation area and along the access road.<br>• Road speed limits for the access roads and quarry will be in place, which will minimise dust generation.<br>• Vehicle hygiene and weed control measures will be implemented during all phases of the project. This will limit the potential for spread or introduction of weed species to surrounding areas.<br>• Site personnel will be inducted in fire management procedures to prevent fires from starting and to control and contain any unplanned or unintentional fires within and adjacent to the tenement.<br>• Post mining, the retained topsoil will be used in the rehabilitation of the excavated pit / access road areas to re-establish native vegetation species. Rehabilitation activities including reforming of the landform, compaction of the quarry pit and batters and the facilitating the revegetation of native species will occur post each mining stage. |

### 6.2 Offsets

| | |
|---|---|
| Do you want to submit a clearing offset proposal with your form? | ☐ Yes ☒ No |
| If 'Yes' – please complete and attach Appendix A of the *Clearing of native vegetation offsets procedure* guideline as a supporting document for your form. | ☐ Appendix A attached |

## Part 7 – Surveys for assessments (IBSA and IMSA)

| | |
|---|---|
| Do you want to submit marine or biodiversity surveys in support of your form? | ☒ Yes ☐ No – skip to Part 8 |

### 7.1 Biodiversity surveys

If you want to submit any biodiversity surveys to support this form, you must follow the Environmental Protection Authority's (EPA) *Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments* (IBSA). If you do not meet the IBSA requirements, DWER/DEMIRS will decline/return your form.

Please provide the IBSA number(s) – or submission number(s) if the IBSA number has not yet been issued – in the space provided. Note that a submission number is not confirmation that a biodiversity survey has been accepted and is not the same as an IBSA number. IBSA numbers

are only issued once a survey has been accepted. Once an IBSA number is issued, please notify DWER/DEMIRS. Please note DWER/DEMIRS will suspend the assessment timeframes for your application until you provide the IBSA number(s).

| | |
|---|---|
| Have you submitted all the biodiversity surveys that support this form to the Index of Biodiversity Surveys for Assessment? | ☐ Yes<br>☐ Not applicable |
| Provide an IBSA number (preferred) or a submission number(s) | IBSA-2024-0414 |

**7.2 Marine surveys**

If you want to submit any marine surveys to support this form, you must follow the EPA's *Instructions for the preparation of data packages for the Index of Marine Surveys for Assessments* (IMSA). If you do not meet the IMSA requirements, DWER/DEMIRS will decline/return your form.

| | |
|---|---|
| Have you prepared all the marine surveys that support this form in accordance with the EPA's *Instructions for the preparation of data packages for the Index of Marine Surveys for Assessments*? | ☐ Yes<br>☒ Not applicable |

## Part 8 – Assessment bilateral agreement

The native vegetation clearing processes under Part V of the EP Act have been accredited by the Commonwealth of Australia under the EPBC Act and so can be assessed under an assessment bilateral agreement.

To be assessed this way, the proposed clearing action must have been referred to the Commonwealth under the EPBC Act and deemed a '**controlled action**' before you submit this form. DWER/DEMIRS will decline to deal with your application without the proposed clearing first being deemed a controlled action.

For further information, see DWER's guidance on the assessment bilateral agreement.

| | |
|---|---|
| Do you want your proposed clearing action assessed in accordance with, or under, an EPBC Act Accredited Process, such as the assessment bilateral agreement or accredited assessment? | ☐ Yes<br>☒ No – skip to Part 9 |
| Is your proposed clearing a controlled action?<br>If 'Yes', please make sure you have entered all the mandatory details in the Annex C7 form | ☐ Yes<br>EPBC number:<br>☐ Annex C7 form attached<br>☐ No (DWER/DEMIRS cannot assess the application under an EPBC Act Accredited Process) |

| | |
|---|---|
| List the controlling provisions identified in the notification of the controlled action decision | |

## Part 9 – Other approvals

### 9.1 Environmental impact assessment (Part IV of the EP Act)

Clearing may be referred to the EPA if it is considered to be part of a 'significant proposal', as defined by section 37B(1) of the EP Act, or will likely to be part of a larger development. An example is when the clearing is for a road to a future mine.

Section 37B(1) of the EP Act defines a 'significant proposal' as "a proposal likely, if implemented, to have a significant effect on the environment". If a decision-making authority (e.g. DWER/DEMIRS) considers the proposal in this form is likely to constitute a 'significant proposal', under section 38(5) of the EP Act they must refer the proposal to the EPA under Part IV, if such a referral has not already been made.

| | |
|---|---|
| Has the proposed clearing or any related matter been referred to the EPA? | ☐ Yes<br>Enter details: [ ]<br>☒ No – complete question below. |
| If 'No' – do you intend to refer the proposal to the EPA? | ☐ Yes – intend to refer (proposal is a 'significant proposal')<br>☐ Yes – intend to refer (proposal will require a section 45C amendment to the current Ministerial Statement)<br>☐ No – a current valid Ministerial Statement applies<br>Enter Ministerial Statement number: [ ]<br>☒ No – not a significant proposal |

### 9.2 Other approvals – works approval, licence or registration (Part V Division 3 of the EP Act)

| | |
|---|---|
| Have you applied or do you intend to apply for a works approval, licence, registration or an amendment to any of the above, under Part V Division 3 of the EP Act?<br>It is an offence to perform any action that would cause a premises to become a prescribed premises of a type listed in Schedule 1 of the Environmental Protection Regulations 1987, unless that action is done in accordance with a works approval, licence or registration. For further guidance, see DWER's *Procedure: Prescribed premises works approvals and licences* and | ☐ Yes<br>Application reference: [ ]<br>☐ No – a valid works approval applies<br>☐ No – a valid licence applies<br>☐ No – a valid registration applies<br>☒ No – not required |

| | |
|---|---|
| *Guideline: Industry regulation guide to licensing*. | |

### 9.3 Water licences and permits (*Rights in Water and Irrigation Act 1914)*

| | |
|---|---|
| Have you applied or do you intend to apply for:<br>• a licence or amendment to a licence to take water (surface water or groundwater)<br>• a licence or amendment to a licence to construct wells (including bores and soaks), or<br>• a permit or amendment to a permit to interfere with the bed and banks of a watercourse?<br>For further guidance on water licences and permits under the *Rights in Water and Irrigation Act 1914*, see DWER's *Procedure: Water licences and permits*. | ☐ Yes<br>☐ No – a current valid licence applies<br>Licence number:<br>☒ Not applicable |

### 9.4 Planning and other approvals

| | |
|---|---|
| Has the proposal obtained all relevant planning approvals and/or have you applied for all relevant planning approvals (e.g. Development Approval, Extractive Industry Licence, etc.)? | ☐ Yes<br>Enter details:<br>☐ No – planning approval is not required<br>Enter details:<br>☒ Not applicable |

## Part 10 – Prescribed fee

### 10.1 Referral or application?

| | |
|---|---|
| There are no prescribed fees for referrals.<br>Is this form a referral of proposed clearing or an application for a new permit? | ☐ Referral – skip to Part 11<br>☒ Application – continue and complete Part 10 |

### 10.2 Calculating the application fees

You must pay the prescribed fee at the time you submit the application form. DWER/DEMIRS will decline to deal with your application if you do not pay the prescribed fee.

Please calculate the prescribed fee using the online clearing permit fee calculator tool.

For further guidance, see DWER's online clearing fees frequently asked questions.

| | |
|---|---|
| Calculated fee: | $2,600 |

### 10.3 Payment method

Fees are payable to:

- **DWER** for all clearing purposes other than mineral and petroleum activities

  or

- **DEMIRS** for mineral and petroleum clearing activities under the *Mining Act 1978*, various petroleum Acts, or State Agreements.

| | |
|---|---|
| Please indicate how you would like to pay your application fee. Select one option only.<br><br>**DWER** will only accept fees paid via either:<br>• DWER's BPoint system<br>• secure EFT payment, or<br>• cheque/money order.<br><br>**DMIRS** will only accept fees paid via secure credit card payment at the DMIRS online payment and application lodgement portal.<br><br>Do not send cash in the mail. | ☐ **(DWER)** Secure credit card payment through BPoint<br><br>See www.dwer.wa.gov.au/make-a-payment.<br><br>Receipt number: _____<br>Date of payment: _____<br><br>☐ **(DWER)** Secure EFT payment<br><br>See www.dwer.wa.gov.au/make-a-payment for payment details.<br><br>State the name of the intended permit holder clearly in the EFT payment subject.<br><br>Date of payment: _____<br><br>☐ **(DWER)** Cheque/money order<br><br>Please make cheques or money orders payable to the **Department of Water and Environmental Regulation**.<br><br>☒ **(DEMIRS)** Secure credit card payment online at the DMIRS online payment and application lodgement portal.<br><br>**Please note:** All DEMIRS applications will be paid online and submitted simultaneously. Please save this application form, along with any supporting documents, and have them ready for the submission portal. Use the link above to pay for and submit your application.<br><br>A receipt will be issued upon submission only. Please ensure this receipt is saved for your records. |

For further information on fees, go to the clearing permit fees frequently asked questions page on DWER's website.

## Part 11 – Form checklist

Please ensure you have included the following as part of your form. You may also attach additional information to support the assessment of your proposal; for example, reports on salinity, fauna or flora studies or other environmental reports for the site. You should submit these in electronic format on a suitable portable digital storage device.

### Required

☒ Proof of land ownership (see attachment requirements in Part 4).

☒ An aerial photograph and/or map with a north arrow that clearly shows the areas of vegetation for proposed clearing or an ESRI shapefile (see Part 5).

☒ If this form is a permit application, payment of the prescribed fee (see Part 10).

☒ Signed the legal declaration on the application form confirming that the information provided is correct (see Part 13).

### As required

☐ Copy of written authority to act on behalf of landowner (see Part 4).

☒ Evidence of the pending transfer of land ownership, such as the offer and acceptance, or written notice from the current landowner.

☐ If you want the form to be assessed under the assessment bilateral agreement, include all details the Annex C7 form asks for, such as 'Proposed clearing action and impact assessment details' and 'Consultation' information.

☐ If the form includes a proposal for clearing offsets, include Appendix A of the *Clearing of native vegetation - offsets procedure* guideline.

☒ If you want to submit any biodiversity surveys to support this form, the relevant IBSA number(s). Do not include the survey reports themselves.

### Additional supporting information

☐ Photos of the area.

☐ Aboriginal cultural heritage surveys, if undertaken.

☒ Any other additional supporting information.

## Part 12 – Request for exemption from publication

The information you submit as part of this form will be made publicly available. If you wish to submit commercially or otherwise sensitive or confidential information, please identify the information in this section, and include a written statement of the reasons why you request each item of information be kept confidential.

DWER/DEMIRS will take reasonable steps under Part 3 of the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (the Clearing Regulations) to protect confidential material and/or otherwise sensitive information (such as information of a kind listed under regulation 13 of the Clearing Regulations).

However, please note that DWER/DEMIRS cannot commit to redacting all personal information from all supporting documents. We advise you to remove all personal information, including signatures, from any supporting documents before you submit them to us. Please note that all the information you submit may become the subject of an application for release under the *Freedom of Information Act 1992* (WA) (FOI Act).

**You must identify all information in this form or attached supporting documents that you propose to be exempt from public disclosure in the table below. You must then attach a**

**separate redacted version of this form and its supporting documents. This is in addition to the unredacted version(s) you submit to DWER/DEMIRS (as applicable) for assessment. You must specify the grounds for claiming an exemption in accordance with Part 3 of the Clearing Regulations.**

<table>
<tr><td>Is any information in this form or in any attached supporting documents confidential or commercially sensitive?</td><td>☒ Yes<br><table><tr><td>Specify what part of this form or relevant attachment</td><td>• 2.2 Applicant contact details, 2.3 Applicant contact postal details, 2.4 Applicant contact – registered business address, 2.6 Contact details for enquiries and Part 13 Declaration.<br>• Clearing permit application report’s Figure C Vegetation type mapping and Priority flora species locations.<br>• Appendix B: Exmouth M08/510 Biological Survey (Pilbara Ecological 2024)’s Figure 13 Location of Significant Flora.<br>• Appendix C: Letter of authorisation – clearing permit application.</td></tr><tr><td>Specify grounds for claiming exemption from publication</td><td>• Contains personal information.<br>• Contains environmentally sensitive information, the locations of Priority 2 flora species records.</td></tr></table><br>☐ No</td></tr>
<tr><td>Attach file(s) with the relevant confidential information redacted</td><td>☒ File name: AU213015830.001_Clearing permit application_Rev 0_241018_Report_Redacted<br>☐ File name:<br>☐ File name:</td></tr>
</table>

## Part 13 – Declaration

### General

I / We declare and acknowledge that:

- the information I / we have provided in this form is true and correct
- I / we have legal authority to sign on behalf of the applicant (where authorisation provided)
- I / we have been authorised to make this form by the owner of the land (as applicable)
- I / we have not altered the requirements and instructions set out in this form
- I / we have provided a valid email address in Part 2 for receipt of correspondence via email from DWER/DEMIRS in relation to this form
- successful delivery to my / our server constitutes receipt of correspondence and service of any statutory notices or instruments, and
- giving or causing to be given information that to my knowledge is false or misleading is an offence under section 112 of the EP Act and may incur a penalty of up to $50,000.

### Publication

I / We declare and/or acknowledge that:

- this form (including all attachments) will be a public document and may be published, except for personal information including personal signatures, email and home addresses and any documents verifying my / our identity
- the marine surveys provided in accordance with Part 7 will be published and used for the purposes of the IMSA project, in accordance with your declaration made in the Metadata and Licensing Statement
- all necessary consents for the publication of information have been obtained from the relevant third parties
- the specification of the information identified in Part 12 constitutes a written request under regulation 11(2) of the Clearing Regulations not to publish that information due to its confidential or otherwise sensitive nature
- subsequent information provided to DWER/DEMIRS in relation to this form will be a public document and will be published under regulation 8A of the Clearing Regulations, unless accompanied by a further written request under regulation 11(2) by the referrer or applicant that that information be treated as confidential
- in accordance with the requirements of regulations 11, 12 and 13 of the Clearing Regulations, DWER/DEMIRS must refrain from publishing bank account details or confidential material (as defined under regulation 11(1) of the Clearing Regulations)
- DWER/DEMIRS may refrain from publishing:
    - certain otherwise sensitive information identified in Part 12, if satisfied it is desirable to not publish due to the confidential nature of the information
    - personal information or certain otherwise sensitive information listed under regulation 13 of the Clearing Regulations.

| | |
|---|---|
| Are you signing as an individual or a company?<br><br>Note 1: If an individual landowner is applying, all landowners as listed on Certificate of Title must sign this form.<br><br>Note 2: If a company or other entity is applying, a person expressly authorised or authorised to execute on behalf of a body corporate must sign this form. | ☐ An individual<br><br>☒ A company<br><br>☐ Other entity formed at law |

☒ I / We hereby declare, the information provided is correct.

| | | | |
|---|---|---|---|
| Signature |  | | |
| Name | Rachel McSkimming | | |
| Date declaration signed | 21.10.2024 | | |
| Position (if applicable) | Development Manager | | |
| Company or organisation (if applicable) | Hanson Construction Materials Pty Ltd | ACN: | 009679734 |

Note that all persons who will be listed on any clearing permit granted for this application as holders of the permit must sign the application form. If more than one signature is required, attach all signatures together in a separate attachment.

## Part 14 – Submission

### 14.1 Method of submission

| | |
|---|---|
| Confirm how you will submit your form (mark one option only).<br><br>**To submit to DWER:**<br><br>Files larger than 50MB cannot be received via email. You can email DWER to make other arrangements for electronic transfer.<br><br>**To submit to DEMIRS:**<br><br>The DEMIRS online portal can accept 1024MB for each attachment. Files larger than 45MB cannot be received via email. You can email DEMIRS to make other arrangements for electronic transfer. | ☐ A signed, electronic copy of the form, including all attachments, has been submitted via the applicable email address specified below **(if submitting form to DWER)**. |
| | ☐ A signed, electronic copy of the form has been submitted via the applicable email address specified below, and attachments have been submitted via File Transfer, or electronically by other means as arranged with the relevant department **(if submitting form to DWER)**. |
| | ☐ A full, signed hard copy has been sent to the applicable postal address specified below **(if submitting form to DWER)**. |
| | ☒ A signed electronic copy of the form, fee payment, and any supporting documentation has been saved and uploaded to the *DMIRS online payment and application lodgement portal* **(if** |

| | |
|---|---|
| | **submitting form to DEMIRS)**. |

### 14.2 Submission details

- Please retain a copy of this form for your records.
- DWER/DEMIRS will decline or return incomplete forms that do not meet the requirements for a valid referral or permit application (as applicable).
- If you do not have enough space on any part of this form, please continue on a separate sheet of paper and attach it to this form.

| | |
|---|---|
| **Department of Water and Environmental Regulation**<br><br>Forms for all clearing purposes (other than mining and petroleum activities) may be submitted via:<br><br>**Email:** info@dwer.wa.gov.au<br><br>or<br><br>**Post:**<br>Department of Water and Environmental Regulation<br>Locked Bag 10<br>Joondalup DC WA 6919<br><br>If you have any questions about lodging your form, please contact DWER via:<br><br>**Email:** info@dwer.wa.gov.au<br><br>**Phone:** (08) 6364 7000<br>For more information: www.dwer.wa.gov.au | **Department of Energy, Mines, Industry Regulation and Safety**<br><br>Forms related to mining and petroleum clearing activities (under delegation) can be lodged online via the *DMIRS online payment and application lodgement portal*.<br><br>If you have any questions about lodging your form, please contact DEMIRS via:<br><br>**Email:** nvab@dmirs.wa.gov.au<br><br>**Phone:** (08) 9222 3535<br>For more information: www.dmirs.wa.gov.au |

# Appendix B:
## Exmouth M08/510 Biological Survey (Pilbara Ecological 2024)

Pilbara
ECOLOGICAL

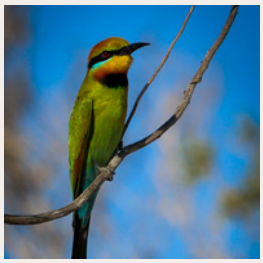
# Exmouth M08/510 Biological Survey

**Prepared for Hanson Australia**

**July 2024**



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# Executive Summary

Hanson Construction Materials Pty Ltd (Hanson) proposes to extract sand within mining tenement M08/510, situated 6.5 km north of Exmouth on the North West Cape. Hanson commissioned Pilbara Ecological to undertake a biological assessment of M08/510 (the Survey Area) to delineate key environmental values (vegetation, flora, fauna, soils and surface water) to support the clearing permit (and associated impact assessment) under Part V of the *Environmental Protection Act 1986* (EP Act). A detailed flora and vegetation survey, targeted flora survey and basic fauna survey were conducted on 21st June 2024.

The Survey Area consists of one polygon, totalling 7.45 ha and is located within the Carnarvon bioregion of Western Australia. Figure 2 illustrates the 7.45 ha Survey Area within tenement M08/510.

**Key Results**

- A total of 63 flora taxa (including species, subspecies, varieties and forms) representing 24 families and 49 genera were recorded in the Survey Area.
- No Threatened flora (EPBC Act or BC Act) were recorded. One Priority flora species was confirmed;
    - *Daviesia pleurophylla* (P2).
- A post-survey likelihood of occurrence assessment indicated that three Priority flora species may 'possibly' occur within the Survey Area:
    - *Verticordia serotina* (P2)
    - *Corchorus congener* (P3)
    - *Corynotheca flexuosissima* (P3)
- Three introduced taxa were recorded within the Survey Area, none listed as Weeds of National Significance (WoNS) or Declared Pests under the *Biosecurity and Agriculture Management Act 2007* (BAM Act).
- Two vegetation types were identified within the Survey Area. The VT01 vegetation type was dominant, comprising ~78% (5.82 ha) of the Survey Area and is described as: *Banksia ashbyi* subsp*. boreoscaia, Duboisia hopwoodii, Grevillea stenobotrya* tall sparse shrubland over *Triodia ?angusta* sparse hummock grassland.
- The vegetation types mapped within the Survey Area were not representative of any Commonwealth or State-listed Threatened or Priority Ecological Communities (TECs/PECs), however, vegetation type VT01 is considered to be locally significant due to its presence on a restricted landform (red sand dunes) and its provision of habitat for *Daviesia pleurophylla* (P2).
- Vegetation condition ranged from 'Poor' to 'Very Good' with approximately 0.56 ha (7.5%) of the Survey Area having been cleared of vegetation.
- No fauna species (or evidence) listed as significant were recorded during the field survey.
- A post-survey likelihood of occurrence assessment indicated one fauna species of significance was considered 'likely' to occur within the Survey Area;
    - *Aprasia rostrata,* Ningaloo worm lizard (P3), while an additional two significant species may 'possibly' occur within the Survey Area;
    - *Falco peregrinus,* Peregrine Falcon (OS)
    - *Pandion haliaetus,* Osprey (MI)
- The Survey Area is situated in an Environmentally Sensitive Area (ESA) (listed on the Register of the National Estate) and intersects the 'Cape Range Subterranean Waterways' wetland which is listed on the Directory of Important Wetlands of Australia.

# 1 Introduction

## 1.1 Project Background

Hanson Australia (Hanson) proposes to extract sand within the mining tenement M08/510. Hanson commissioned Pilbara Ecological to undertake a biological assessment of a 7.45 ha portion of mining tenement M08/510 (hereafter referred to as the Survey Area) for the following purposes:

1. Delineate key vegetation, flora, fauna, soils and surface water values within the Survey Area.
2. Support a clearing permit (and associated impact assessment) under Part V of the EP Act.

## 1.2 Spatial Scope and Terminology

The Survey Area consists of one polygon, totalling 7.45 ha, covering the proposed area for upgrade. The Survey Area is situated 6.5 km north of Exmouth on the North West Cape. The Study Area represents the 40 km buffer around the Survey Area where biological data was interrogated. Definitions for the spatial extents referenced in this report, and their associated level of survey effort are outlined in Table 1 and presented in Figure 1.

**Table 1 Spatial Extents and Terminology**

| Terminology | Size (ha) | Definition of Spatial Extent | Survey Effort |
|---|---|---|---|
| Survey Area | 7.45 | Exmouth M08/510 (Figure 2). | • Detailed flora and vegetation survey and targeted flora survey.<br>• Basic fauna survey |
| Study Area | 504,320 | A 40km buffer around the Survey Area. | • Desktop background information gathered from database sources. |

## 1.3 Objectives

This report details the methods, results and key findings from the biological survey. The objectives of the biological survey were to delineate key flora and vegetation, fauna, soils and surface water values. The biological survey included mapping of vegetation condition, vegetation communities and fauna habitat within the Survey Area and delineating any significant flora, vegetation and fauna.

The specific objectives of this study were as follows:

1. Undertake a desktop assessment to:
    - collate existing records of significant flora, vegetation and fauna intercepting the Study Area using relevant databases and spatial datasets;
    - assess the likelihood of occurrence of significant flora and fauna species identified through the desktop assessment.
2. Undertake a field survey to:
    - complete sampling of vegetation within the Survey Area, including quadrat and/or relevé sampling;
    - map the dominant vegetation units in the Survey Area;

- map the vegetation condition using the EPA (2016a) condition rating scale;
- compile a list of vascular flora species recorded in the Survey Area;
- conduct targeted searches for Threatened and Priority flora within the Survey Area;
- identify any vegetation units of significance in the Survey Area;
- record locations of Weeds of National Significance (WoNS) and/or Declared Pests under the BAM Act;
- map fauna habitats for the survey and contextual area, based on the vegetation mapping, and identify habitats suitable for significant fauna; and,
- generate an inventory of all fauna observed (native and non-native), based on sightings, scats, tracks and other evidence.

3. Provide a comprehensive report outlining key findings from the biological survey.

4. Supply all supporting data to Hanson in the relevant data standards.

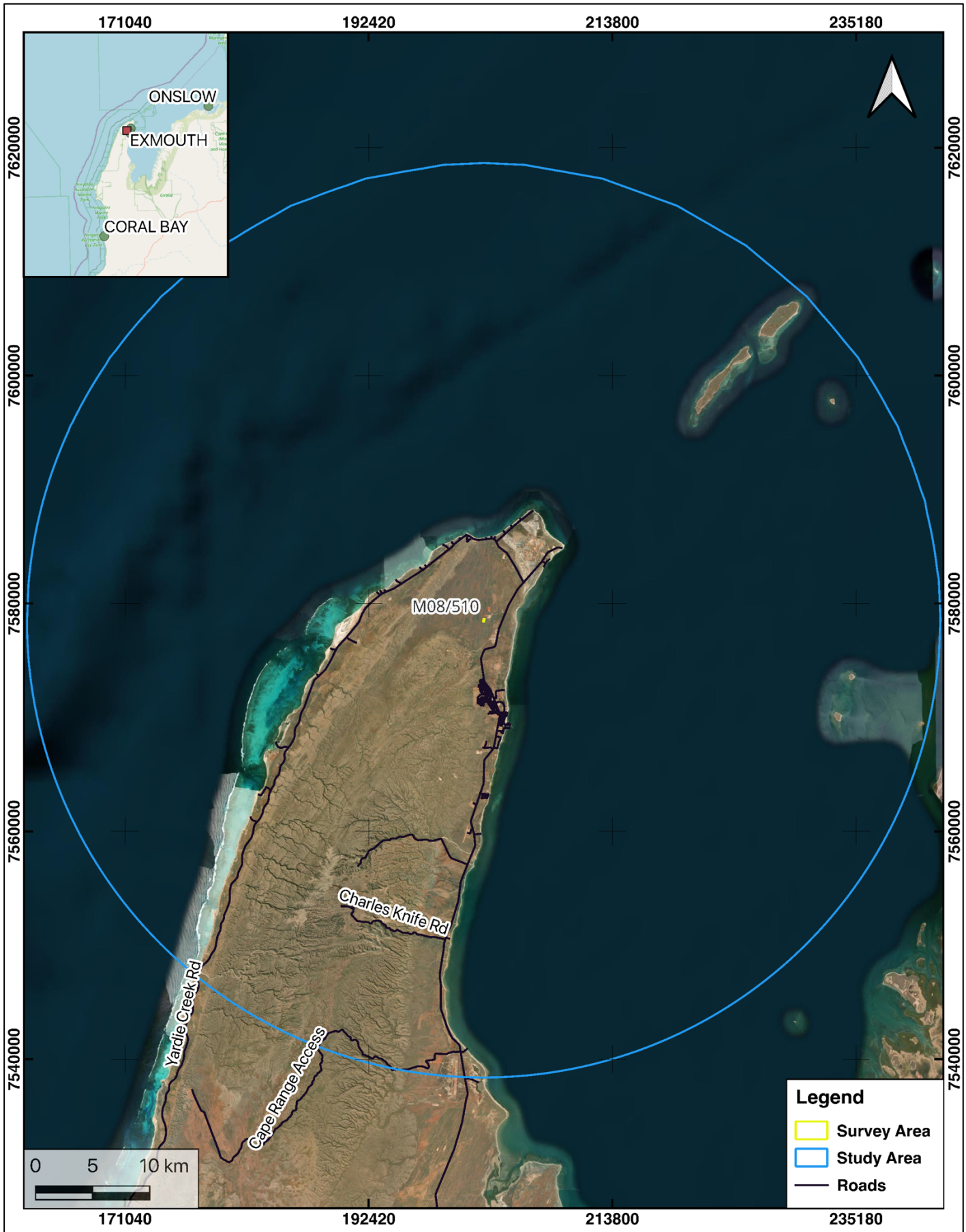


**Figure 1 Location of Exmouth Study Area and Spatial Extents**

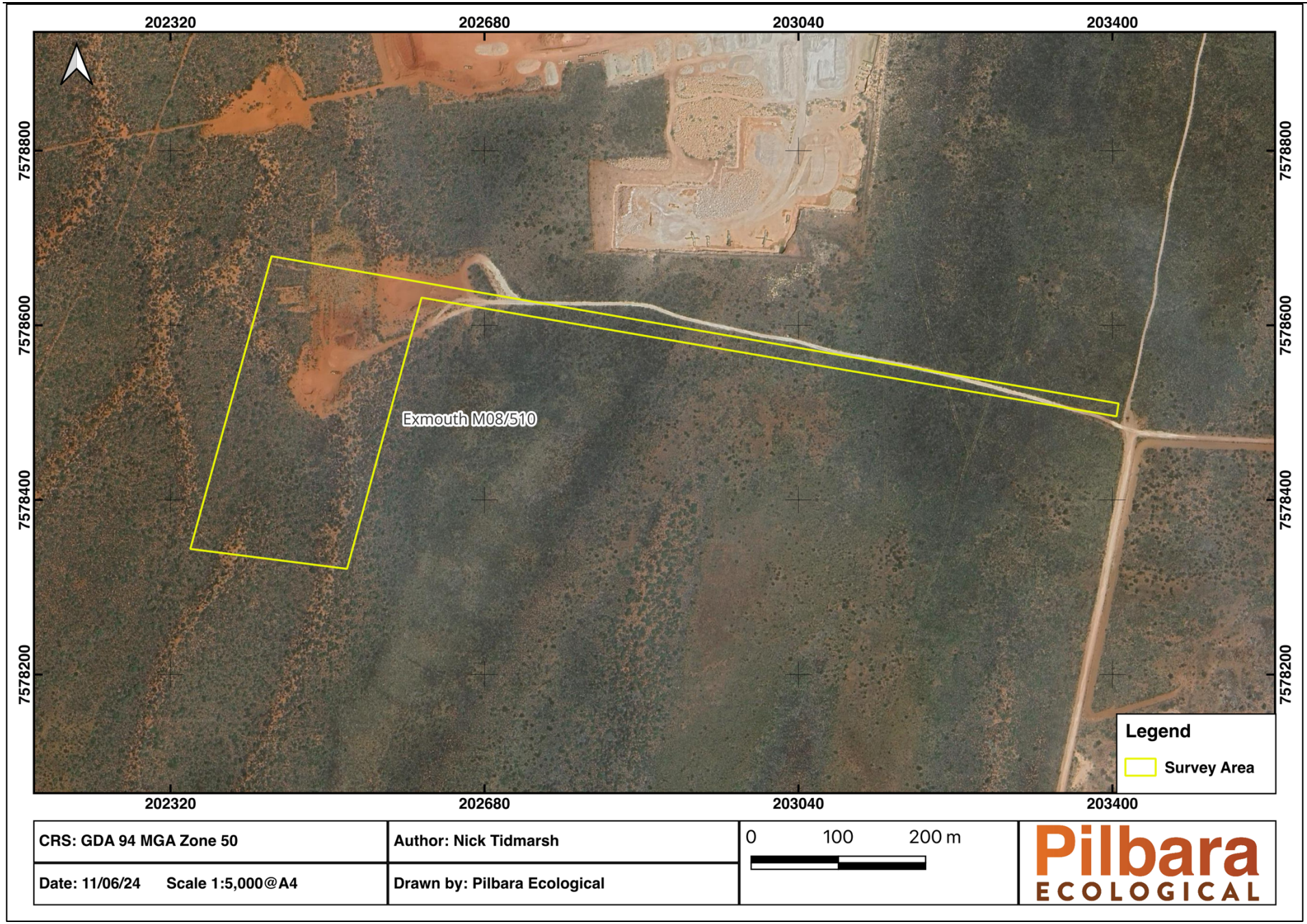


**Figure 2 Exmouth M08/510 Survey Area**

# 2 Methods

## 2.1 Desktop Study

Prior to conducting the field survey, a desktop study was conducted to identify significant ecological features and/or constraints within or surrounding the Survey Area. The following databases were reviewed:

- Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) to identify communities/species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) potentially occurring within the Study Area (40 km buffer) (Appendix 1) (DCCEEW 2024a).
- Department of Biodiversity, Conservation and Attraction's (DBCA) NatureMap database for flora and fauna previously recorded in the Study Area (40 km buffer) (Appendix 1) (DBCA 2024a).
- Database searches from DBCA's Species and Communities Branch (40 km buffer):
    - Threatened and Priority flora
    - Threatened and Priority fauna
    - Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs).
- Atlas of Living Australia (ALA) database (ALA 2024).
- Index of Biodiversity Surveys for Assessment database.
- Existing data sets containing pre-European vegetation, land systems, soils and hydrological considerations.

The methodology for the flora and vegetation survey component of the biological survey was consistent with 'Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment' (EPA 2016a) and 'Environmental Factor Guideline – Flora and Vegetation' (EPA 2016b).

The basic fauna survey was conducted according to 'Technical Guidance: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment Fauna' (EPA 2020) and 'Environmental Factor Guideline: Fauna' (EPA 2016c).

## 2.2 Likelihood of Occurrence Assessment

A pre-survey likelihood of occurrence assessment was conducted for flora and fauna species of significance identified during the desktop study. The likelihood of occurrence assessment was based on:

- The broad soil type or habitat usually associated with the species;
- The broad landforms usually associated with the species;
- Vegetation associations the species is commonly found in; and
- Distance of Survey Area to known records of the species.

The likelihood of occurrence tables are presented in Appendix 2a (Flora) and 2b (Fauna). The categories of likelihood of occurrence are presented in Table 2.

**Table 2 Pre-survey Significant Flora and Fauna Likelihood of Occurrence Ratings**

| Likelihood Rating | Description |
|---|---|
| **Recorded** | Species has previously been recorded within the Survey Area. |
| **Likely** | There are existing records of the species in close proximity (less than 5 km) to the Survey Area and the Survey Area contains suitable habitat. |
| **Possible** | The Survey Area contains suitable habitat; however, the species is not recorded within close proximity to the Survey Area. |
| **Unlikely** | The Survey Area does not contain suitable habitat or contains only a small area of suitable habitat, and the species is not recorded within 20 km. |
| **Highly Unlikely** | The species is restricted to very specific habitats that are not present in the Survey Area. |

## 2.3 Field Survey

Ecologists Nick Tidmarsh (FB62000254) and Brydie Brennan (Reg 62 Licence No FB62000660) conducted a detailed and targeted flora survey and basic fauna survey of the Survey Area on 21st June 2024. Following the field survey, the likelihood of occurrence assessments for significant flora and fauna species were updated considering the pre-survey assessments, ground truthing of soil, vegetation and habitats present within the Survey Area and consideration of survey effort and survey timing.

Survey data was recorded in the field in GDA 94 projection using Fulcrum on an Ipad (8th Gen.) supported by a Garmin GPS (+/- 2m).

### 2.3.1 Quadrats and Relevés

The field survey data was collected through a combination of three relevés, two 50m x 50m quadrats and traverses walked at approximately 25m distance apart. Mapping notes were also captured in the field to delineate ecological features further. Attributes recorded in the field are provided in Table 3. The relevé and quadrat raw data is provided in Appendix 3.

**Table 3 Attributes Recorded in the Field**

| Data Type | Description |
|---|---|
| **Collection attributes** | Recorder, date, photographs, site ID |
| **Location** | Coordinates recorded by Garmin GPS (GDA 94) +/- 3m |
| **Physical features** | Soil, slope, landform |
| **Vegetation condition** | Vegetation condition was assessed using the Trudgen scale (1988) adapted for use in the Eremaean Province (EPA 2016b) |
| **Flora** | List of all species within the relevé/quadrat including maximum height and cover |
| **Disturbance** | Level and nature of disturbance e.g., weeds, clearing, grazing, fire age |
| **Fauna** | Record habitat, fauna observations |

### 2.3.2 Targeted Flora Searches

Targeted flora searches were conducted across the Survey Area at approximately 25-50m intervals for significant flora identified during the desktop study. Information pertaining to the preferred habitats of significant flora was used to provide focus to the targeted searches. Where a flora species was considered to have the potential to be a significant species, the following information was collected:

- Location (GPS point for individuals, polygon for populations).
- Description of surrounding vegetation association/condition.
- Estimation of population size.
- Specimen for identification and vouchering.
- Photo of plant in situ.

### 2.3.3 Vegetation Type Mapping

Vegetation type mapping was conducted in the field using map notes created on Fulcrum and utilising ESRI satellite imagery (QGIS 3.16.6). Classification of vegetation types was based on dominant growth form, height, cover and a maximum of three species for the three traditional strata. (i.e., Upper, Mid and Ground) in reference to the Australian Vegetation Attribute Manual Version 7.0 (NVIS Technical Working Group 2017).

### 2.3.4 Vegetation Condition Mapping

Vegetation condition was mapped in the field using map notes created on Fulcrum based on the Trudgen scale (1988) adapted for use in the Eremaean Province (EPA 2016b). The vegetation condition scale is provided in Table 4. The vegetation condition ratings relate to vegetation structure, the level of disturbance and weed cover at each structural layer and the ability of the vegetation unit to regenerate. Vegetation condition ranges from 'Excellent', the highest rating, to 'Completely Degraded', the lowest. Areas completely devoid of vegetation were mapped as cleared.

**Table 4 Vegetation Condition Rating Scale (Trudgen 1988, in EPA 2016b)**

| Vegetation Condition | Description |
|---|---|
| **Excellent** | Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement. |
| **Very Good** | Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks. |
| **Good** | More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds. |
| **Poor** | Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds. |
| **Degraded** | Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species. |
| **Completely Degraded** | Areas that are completely or almost completely without native species in the structure of their vegetation, i.e., areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs. |

### 2.3.5 Basic Fauna Survey and Habitat Mapping

A basic fauna survey and habitat mapping was conducted across the Survey Area. Observations of fauna, or evidence of fauna presence were noted opportunistically as well as in conjunction with the detailed and targeted flora surveys. A habitat assessment was conducted at each quadrat and relevé location. The assessment of fauna evidence included observations of tracks, scats, burrows and other traces of fauna habitation. Each habitat type present was photographed, mapped and assessed for its ecological values, including an assessment of:

- Soils and geology.
- Landforms such as flowlines, hill slopes and plains.
- Prescence of refuge including ground covers, rocks/boulders, fallen timber and/or hollow bearing trees.
- Habitat connectivity and presence of wildlife corridors.
- Evaluation of the habitat's value for significant fauna.

### 2.3.6 Limitations

In line with the EPA's Technical Guidance for 'Flora and Vegetation Surveys for Environmental Impact Assessment' (EPA 2016b) and 'Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment' (EPA 2020), potential constraints and limitations of this biological survey are presented in Table 5.

**Table 5 Limitations and Constraints**

| Limitations/Constraints | Limitation for this Survey | Comments |
|---|---|---|
| **Availability of contextual information at a regional and local scale** | No | The desktop review provided adequate contextual information. |
| **Competency/experience of the team carrying out the survey** | No | Nick Tidmarsh (14 years experience), Brydie Brennan (2 years), Pierre-Louis de Kock (Taxonomy) (17 years). |
| **Proportion of flora identified, recorded and/or collected** | No | All vascular flora observed within the Survey Area were recorded. Where species could not be conclusively identified in the field, collections were made. The majority of flora were able to be identified to the lowest level within the current taxonomic framework. |
| **Scope and completeness** | No | The Survey Area was able to be surveyed in full. Appendix 4 presents tracklogs showing survey effort. |
| **Remoteness and/or access problems** | No | The Survey Area was fully accessible. |
| **Timing, weather, season, cycle** | No | The biological survey was conducted during June 2024 which is within the optimal survey period for the region. Rainfall received in the three months prior to the field survey (April to June) was 107.2mm which was comparable with the long-term average for this same period (~105mm). |
| **Disturbances which affected the results of the survey** | No | 0.56 ha of the Survey Area was cleared and therefore not mapped for vegetation or habitat values. The majority of the Survey Area was recently burnt at the time of assessment (6-12 months). The vegetation was in the early re-establishment phase and was considered a limitation. |

# 3 Desktop Study Results

## 3.1 Physical Environment

### 3.1.1 Climate

The Survey Area is in the Gascoyne region of Western Australia. The Gascoyne experiences a moderate arid tropical, climate. The closest Bureau of Meteorology (BoM) weather recording station with monthly statistics is Exmouth town (Station No. 5051) located 6.5 km south of the Survey Area. Rainfall and temperature data from the 12 months prior to the survey were compared to long-term climate averages (1968-current) (Figure 3) (BoM 2024).

The field survey was undertaken in June 2024, which is within the recommended season for botanical surveys in the Eremaean Botanical Province (EPA 2016a). Rainfall received in the three months prior to the field survey (April to June) was 107.2mm (Figure 3). The conditions at the time of the survey were considered adequate for the collection of annual flora species. Temperatures leading up to the biological survey fluctuated around the long term mean.

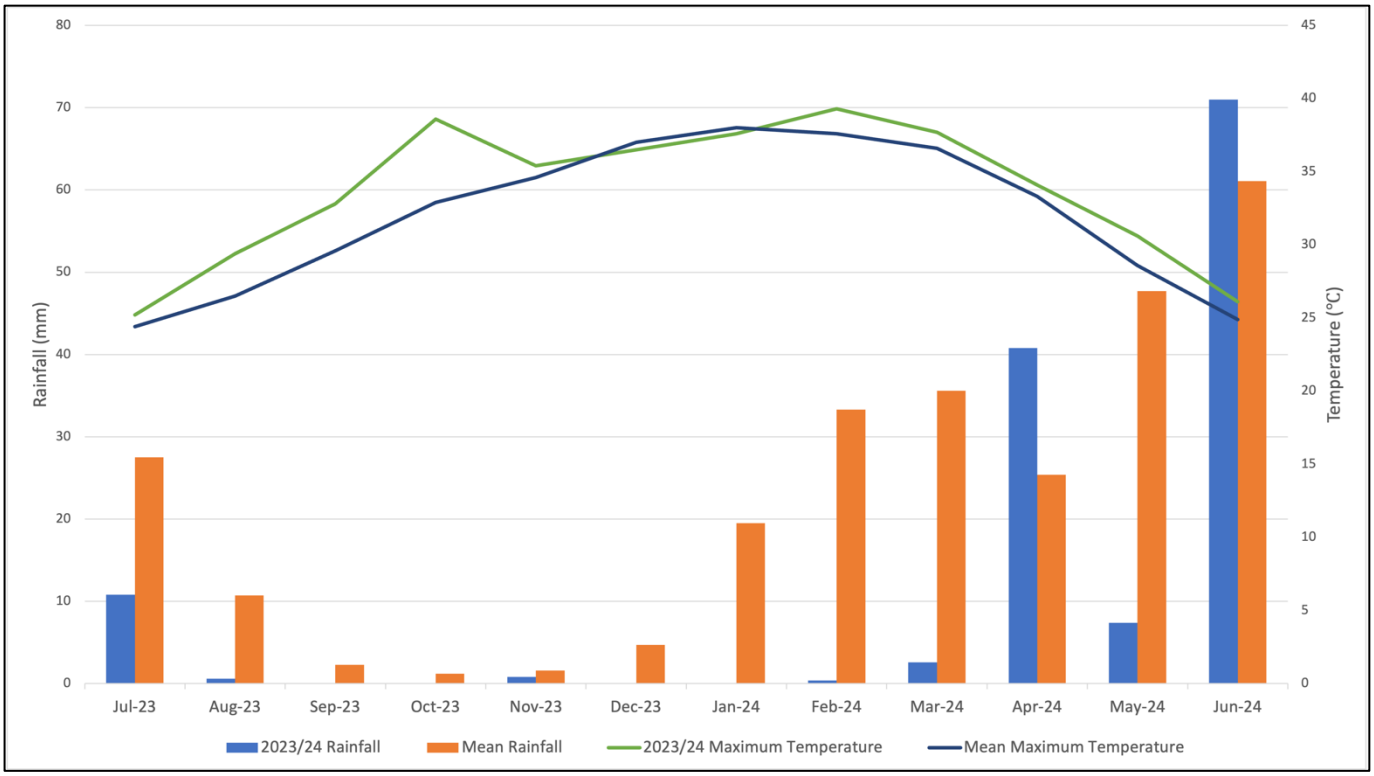


**Figure 3 Climate Data Recorded from Exmouth Town (Station 5051)**

### 3.1.2 Geology and Soils

The Survey Area is located across three regolith geological units;

- Er-WC: Eolian sandplain (majority of Survey Area);
- C-WCP: Colluvium derived from different rock types including gravel, sand, silt and clay; and
- M-WCP: Coral reef/bioherm (DEMIRS 2024).

The Australian Soil Resource Information System (CSIRO 2014) describes broad soil types (units). The Survey Area is located across two soil units (Fy2 and BB10), as described in Table 6 and presented in Figure 4.

**Table 6 Description and Extents of Soil Units within the Survey Area (CSIRO 2014)**

| Soil Unit | Description | Extent in Survey Area | |
|---|---|---|---|
| | | Area (ha) | Proportion (%) |
| Fy2 | Rugged limestone ranges steeply dissected and with cliff faces forming their margins. The area is dominated by bare limestone and there are pockets of shallow calcareous loams (Um1.3) | 6.32 | 84.83 |
| BB10 | Narrow coastal plain flanking unit Fy2; some saline flats and a few sand dunes: chief soils appear to be shallow loams on limestone (Um5. 11) and (Um5.5 l) with sands (Uc5.11) also overlying limestone. There are some red sands (Uc5.1) in dunes and a coastal fringe of recent shelly sand (Uc1.11) | 1.13 | 15.17 |
| **TOTAL** | | **7.45** | **100%** |

### 3.1.3 Land Systems

The Department of Agriculture Western Australia conducted land systems mapping and condition assessment of the Carnarvon Basin between 1980 and 1982 (Payne *et al,* 1987). Land systems were classified according to their topography, soils and vegetation. In total, 89 land systems have been described for the region.

The Survey Area intersects one land system; the Range Land System (Table 7 and Figure 5).

**Table 7 Extent of Land Systems Present Within the Survey Area**

| Land System | Description | Extent in Survey Area | |
|---|---|---|---|
| | | Area (ha) | Proportion (%) |
| **Range Land System** | Dissected limestone plateaux, hills and ridges with gorges and steep stony slopes supporting hard spinifex, sparse shrubs and eucalypts. | 7.45 | 100% |
| **TOTAL** | | **7.45** | **100%** |

### 3.1.4 Hydrology and Hydrogeology

The Survey Area is located on the North West Cape within the Coastal hydrographic catchment of the Lyndon-Minilya Rivers Basin (DPIRD 2024). No surface water features (tributaries, streams etc) exist in the immediate area (DWER 2018a).

The Exmouth aquifer occupies the northern part of the Exmouth peninsula (North West Cape), underlying Cape Range and the adjacent coastal plains and extending south to Yardie Creek. The aquifer is fresh (salinity < 1000 mg/L TDS) under the central part of the Range and sits approximately 10 m above sea level. Groundwater extends to a depth much greater than 100 m below sea level. Under the adjacent coastal plains, the depth of the freshwater aquifer is reduced and it is underlain by seawater (Bennelongia 2008). The Survey Area lies within an area with a groundwater salinity level of 500 – 1000 mg/L TDS (DWER 2018b).

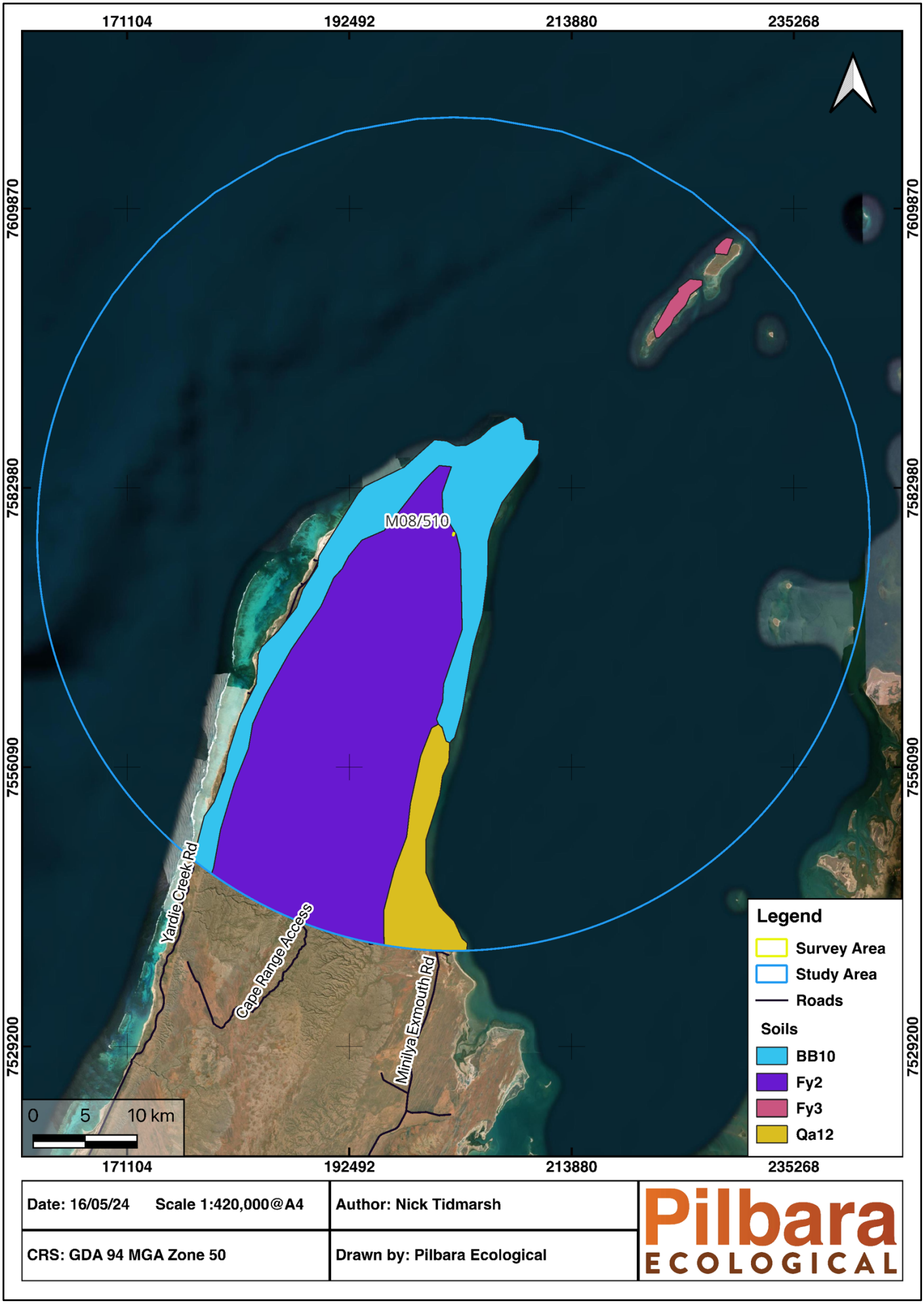


**Figure 4 Soil Units of the Study Area**

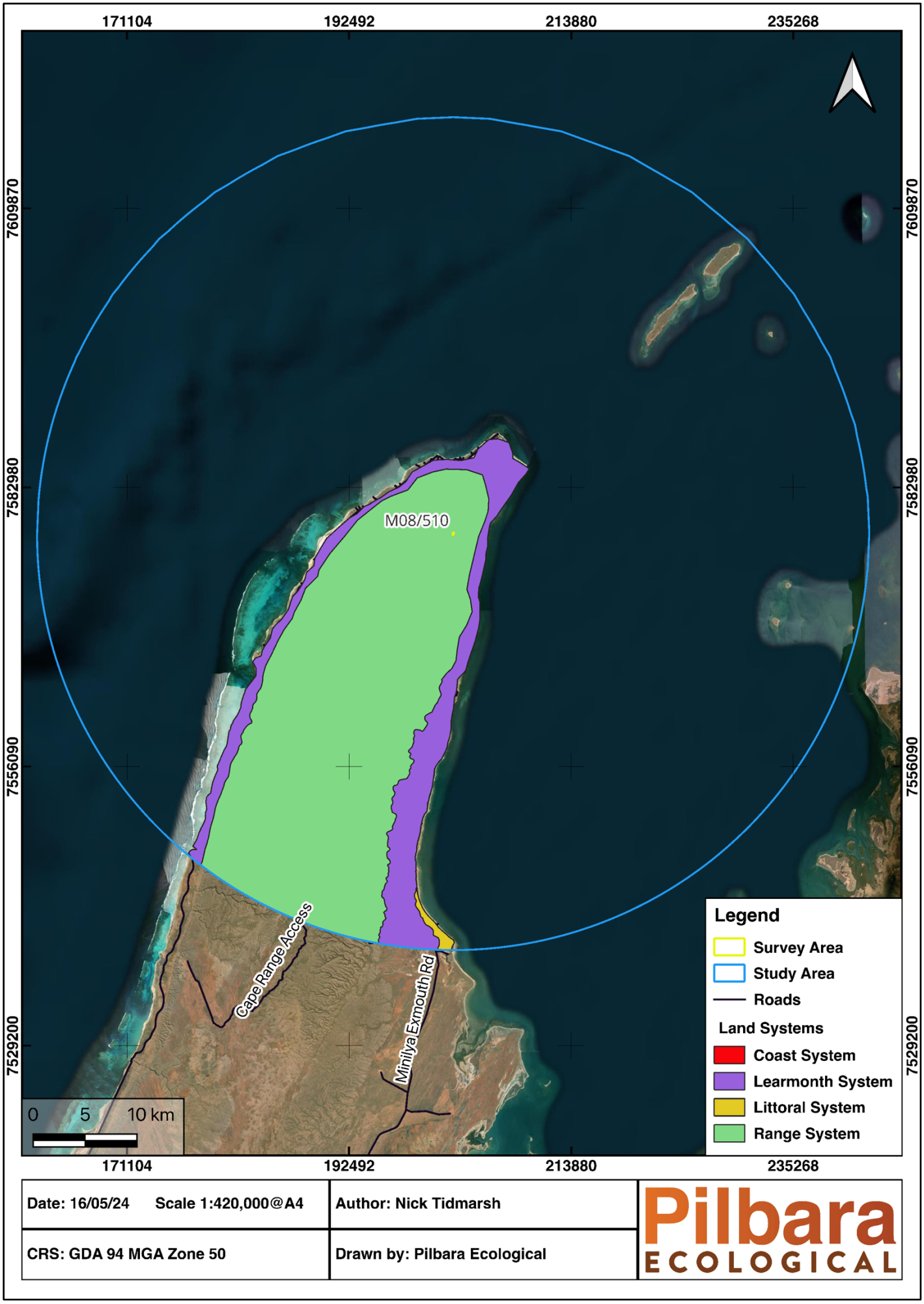


**Figure 5 Land Systems of the Study Area**

## 3.2 Biological Environment

### 3.2.1 Interim Biogeographic Regionalisation of Australia (IBRA)

The latest version of IBRA (IBRA7) classifies Australia's landscapes into 89 large geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information. They were created to present the broad geophysical patterns across the Australian land mass (Thackway & Cresswell 1995). The 89 bioregions are further refined to form 419 subregions which are more localised and homogenous geomorphological units within each bioregion. The Survey Area is located within the Carnarvon bioregion and intersects with the Cape Range subregion (DAWE 2012).

The Cape Range subregion is 2,547,911ha in size and is comprised of the Cape Range and Giralia dunefields. Described as containing rugged tertiary limestone ranges and extensive areas of red aeolian dunefield, Quaternary coastal beach dunes and mud flats, the vegetation of the Cape Range subregion can be broadly categorised as:

- *Acacia* shrublands over *Triodia* on limestone (*Acacia stuartii* or *A. bivenosa*) and red dunefields;
- *Triodia* hummock grasslands with sparse *Eucalyptus* trees and shrubs on the Cape Range;
- extensive hummock grasslands (*Triodia*) on the Cape Range and eastern dune-fields;
- tidal mudflats of sheltered embayments of Exmouth Gulf supporting extensive mangrove;
- beach dunes with Spinifex communities; and
- extensive mosaic of saline alluvial plains with samphire and saltbush low shrublands along the eastern hinterland of Exmouth Gulf.

The Cape Range subregion contains several offshore islands. Islands of the Muiron, Barrow, Lowendal and Montebello groups are limestone-based. The climate is arid, semi-desert to subtropical, with variable summer and winter rainfall. Cyclonic activity can be significant, and cyclonic systems may affect the coast and hinterland annually. Dominant land use includes grazing, conservation, mining leases and urban (Kendrick 2003).

### 3.2.2 Beard Pre-European Vegetation

The pre-European vegetation mapping of Western Australia dataset maps original natural vegetation presumed to have existed prior to European settlement in Western Australia. The major sources of data in this database are the published and unpublished mapping of J.S. Beard at 1:250,000 scale (DPIRD, 2019). The Survey Area intersects with the Cape Range 662.10 vegetation association, as summarised in Table 8.

**Table 8 Beard Pre-European Vegetation Associations within the Survey Area (DPIRD 2019)**

| Pre-European Vegetation Association | Description | Extent in Survey Area | |
|---|---|---|---|
| | | Area (ha) | Proportion (%) |
| **CAPE RANGE_662.10** | Hummock grassland with scattered low trees over dwarf shrubs or mixed short grass and spinifex mixed species, *Triodia* spp. | 7.45 | 100 |
| **TOTAL** | | **7.45** | **100%** |

### 3.2.3 Threatened and Priority Ecological Communities

No Commonwealth listed (EPBC Act) TECs occur within the Study Area (DCCEEW 2024a). A review of DBCA's TEC/PEC database identified one PEC and one TEC as occurring within 40km of the Survey Area;

- Camerons Cave Troglobitic Community TEC (Critically Endangered); and
- Coastal dune tussock grassland dominated by *Whiteochloa airoides* PEC (Priority 3).

The 'Camerons Cave Troglobitic Community' TEC is located approximately 8.5 km south of the Survey Area. The nearest known record of 'Coastal dune tussock grassland dominated by *Whiteochloa airoides'* PEC is situated on South Muiron Island, approximately 29 km north-east of the Survey Area (Figure 6). A summary of these communities is presented in Table 9.

### 3.2.4 Significant Wetlands

There are no surface wetlands or waterways within or near the Survey Area. The Survey Area intersects the 'Cape Range Subterranean Waterways' which is listed under the Directory of Important Wetlands of Australia (DIWA) (DBCA 2024d). Included in this wetland are the subterranean waterways, sinkholes, general groundwater and artificial wells of the coastal plain and foothills of Cape Range north of a line between Norwegian Bay (at the foot of the peninsula on the west coast) and the Bay of Rest in Exmouth. It hosts a rich, entirely endemic stygofauna and is a good example of a subterranean karst wetland system, of which there are only two in northwestern Australia (Barrow Island hosting the other) (DCCEEW 2024b). The 'Exmouth Gulf East' wetland is approximately 37 km east of the Survey Area. Also DIWA listed, this site comprises wetlands in the eastern part of Exmouth Gulf from Giralia Bay to Urala Creek Locker Point (DCCEEW 2024c).

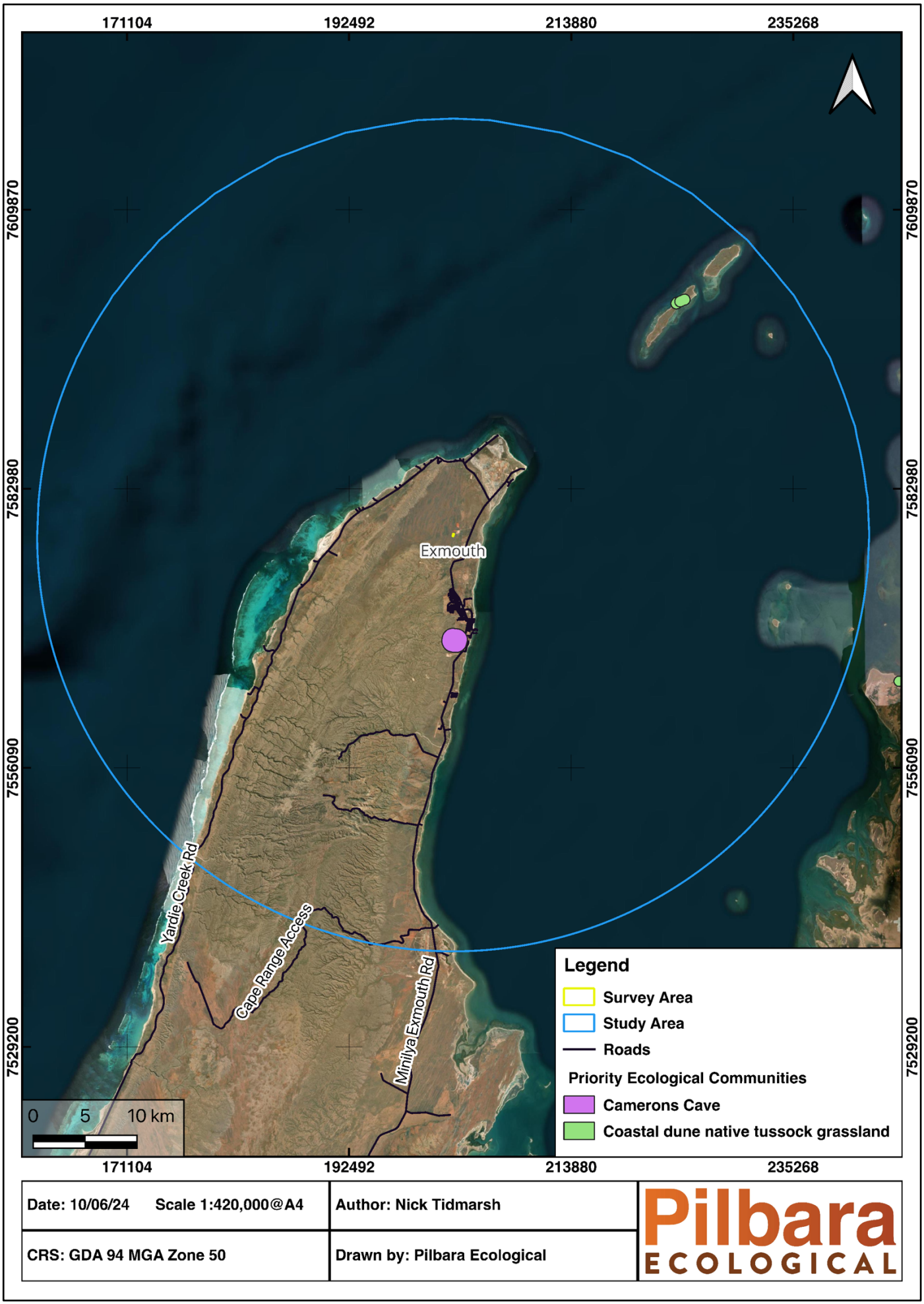


**Figure 6 Priority Ecological Communities within the Study Area**

**Table 9 Significant Ecological Communities within the Study Area**

| Community Type | EPBC Act | DBCA | Description (DBCA, 2022b) | Comments |
|---|---|---|---|---|
| Coastal dune tussock grassland dominated by Whiteochloa airoides | N/A | Priority 3 | Tussock grassland of *Whiteochloa airoides* occurs on the landward side of foredunes, hind dunes or remnant dunes with white or pinkish white medium sands with marine fragments. There may be occasional *Spinifex longifolius* tussock or *Triodia epactia* hummock grasses and scattered low shrubs of *Olearia dampieri* subsp. *dampieri* (now *Olearia* sp. Kennedy Range (G. Byrne 66)), *Scaevola spinescens*, *S. cunninghamii, Trianthema turgidifolium* and *Corchorus* species (*C. walcottii, C. laniflorus*). | Occurs on Barrow Island, Tent Island and possibly some unaffected littoral areas in west Pilbara.<br><br>**Threats**: weed invasion (**Cenchrus ciliaris, *Aerva javanica*), altered fire regimes, grazing, basic raw material extraction |
| Camerons Cave Troglobitic Community | N/A | Critically endangered (BC Act) | The community is known from Camerons Cave on the Cape Range peninsula (North West Cape). It comprises a unique assemblage of species, at least eight of which are known only from this location. The threatened *species Stygiochiropus peculiaris* (Camerons Cave millipede; critically endangered) and *Indohya damocles* (Camerons Cave pseudoscorpion; critically endangered) (previously *Hyella* sp. BES 1154.2525, 1546, 2554) are endemic to Camerons Cave. *Milyeringa veritas* (blind gudgeon; vulnerable) and *Draculoides bramstokeri* (Barrow Island *draculoides*; vulnerable) also occur in the cave. | Occurs in Camerons Cave on the Cape Range peninsula.<br><br>**Threats**: uncontrolled access to the cave and its surrounds, altered water levels or quality, pollution, and waste dumping in the cave. |

### 3.2.5 Significant Flora

A total of 21 flora taxa of conservation significance were identified from database searches as having been recorded within the Study Area (DBCA 2024c; DCCEEW 2024a) (Figure 7). This included:

- Ten Priority 2 species
- Nine Priority 3 species
- Two Priority 4 species.

The pre-survey likelihood of occurrence assessment indicated five Priority flora species have the potential to occur within the Survey Area (Appendix 2a):

- Likely to occur:
  - *Daviesia pleurophylla* (P2)

- Possible to occur:
  - *Acanthocarpus rupestris* (P2)
  - *Verticordia serotina* (P2)
  - *Corchorus congener* (P3)
  - *Corynotheca flexuosissima* (P3)

These five species were subject to a targeted survey during the field assessment of the Survey Area.

### 3.2.6 Significant Fauna

A total of 80 fauna species of significance were identified from the database searches as being present/potentially present within the Study Area (DBCA 2024a, DCCEEW 2024a) (Figures 8-10). Species that are exclusively marine, inshore or aquatic have not been included in this report as these habitats are not present within the Study Area. The number of species within each conservation category (note some species are listed as migratory in addition to conservation ranking) is presented below:

- 25 Threatened species (T), ten of which are also migratory (MI)
- 57 migratory species (MI)
- Three Priority 2 species (P2)
- Two Priority 3 species (P3)
- Five Priority 4 species (P4)

The pre-survey likelihood of occurrence assessment indicated three significant fauna species have the potential to occur within the Survey Area (Appendix 2b):

- Likely to occur:
  - *Aprasia rostrata,* Ningaloo worm lizard (P3).
- Possible to occur:
  - *Falco peregrinus,* Peregrine Falcon (OS)
  - *Pandion haliaetus,* Osprey (MI)

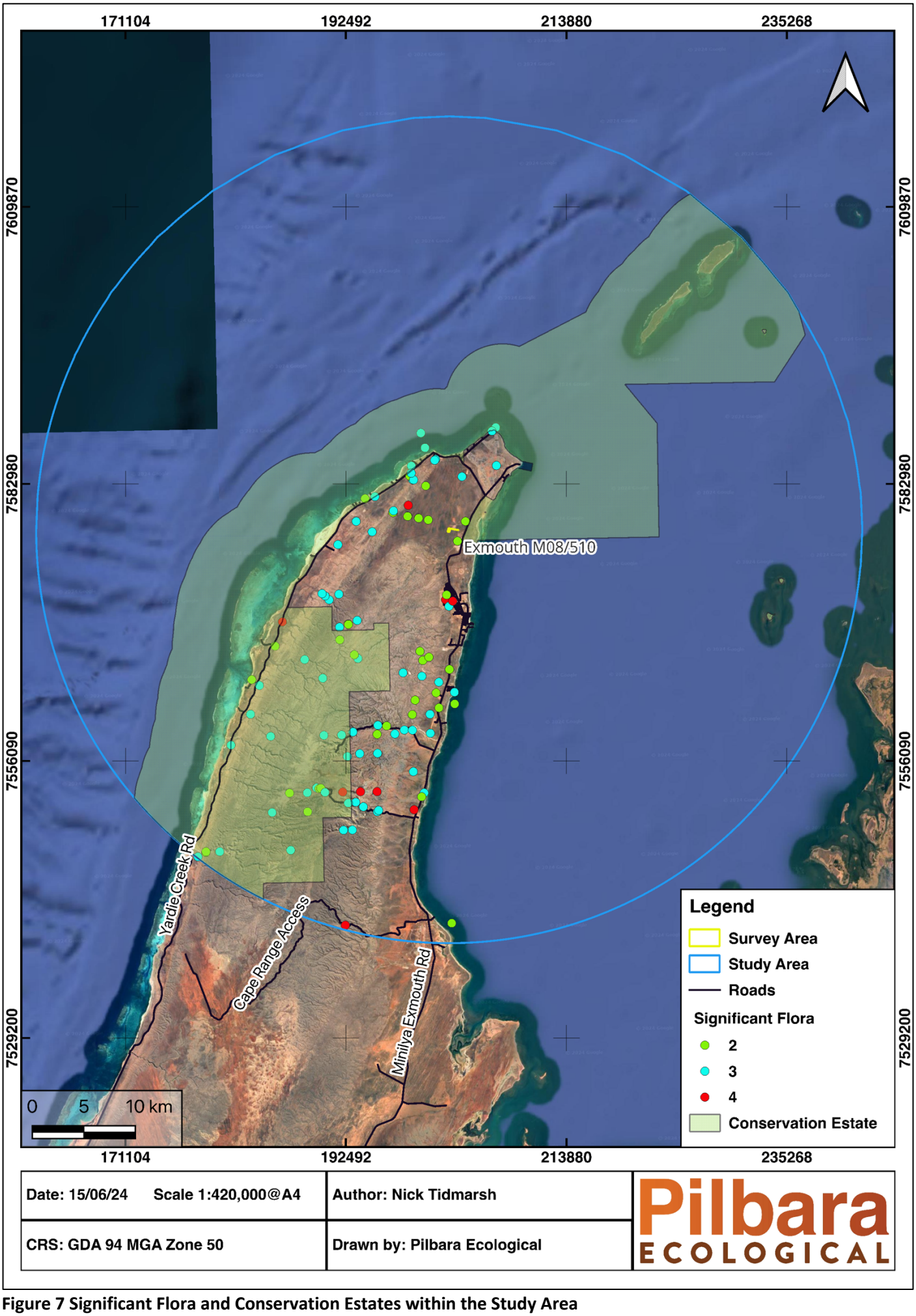


**Figure 7 Significant Flora and Conservation Estates within the Study Area**

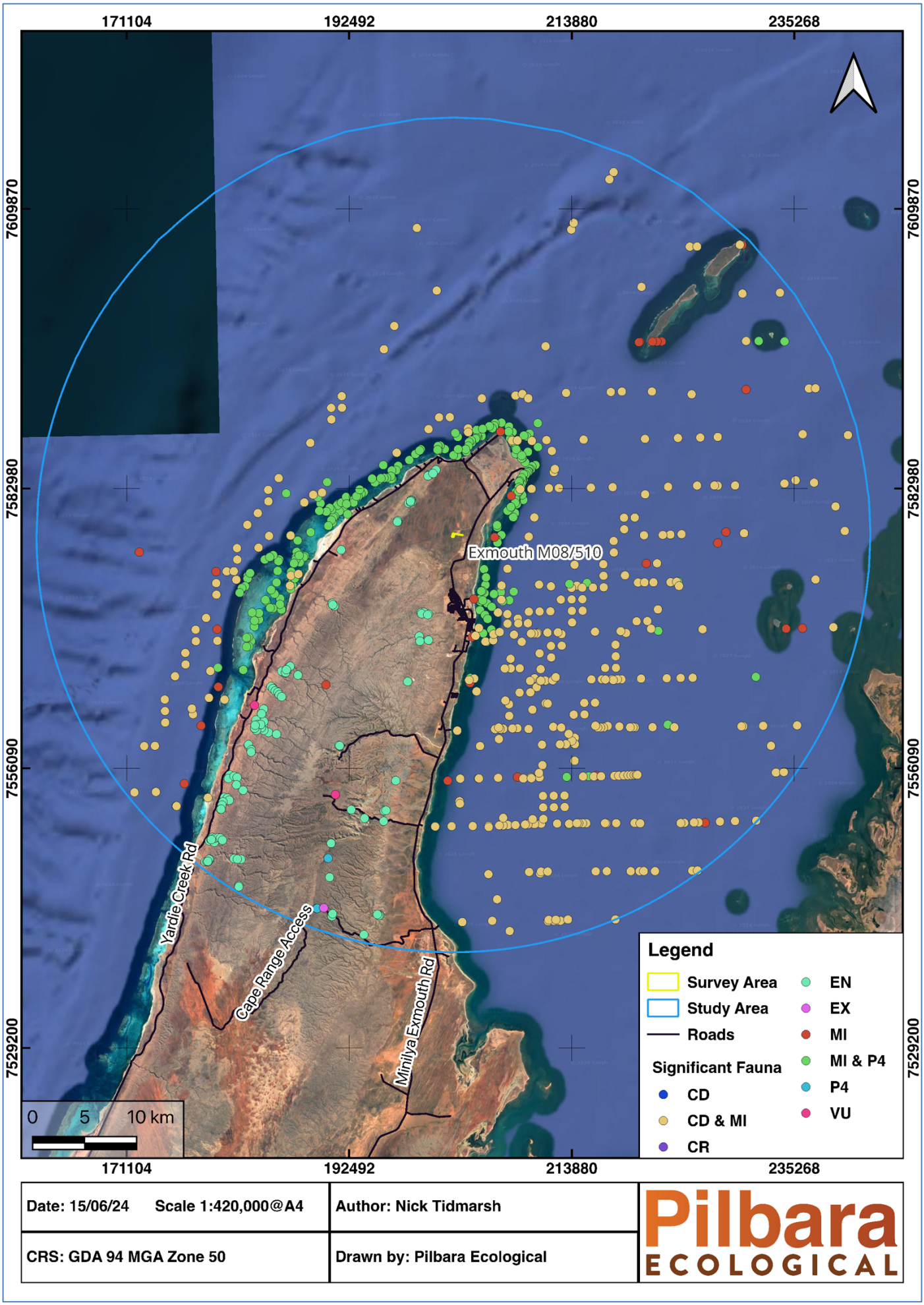


**Figure 8 Significant Mammal Fauna within the Study Area**

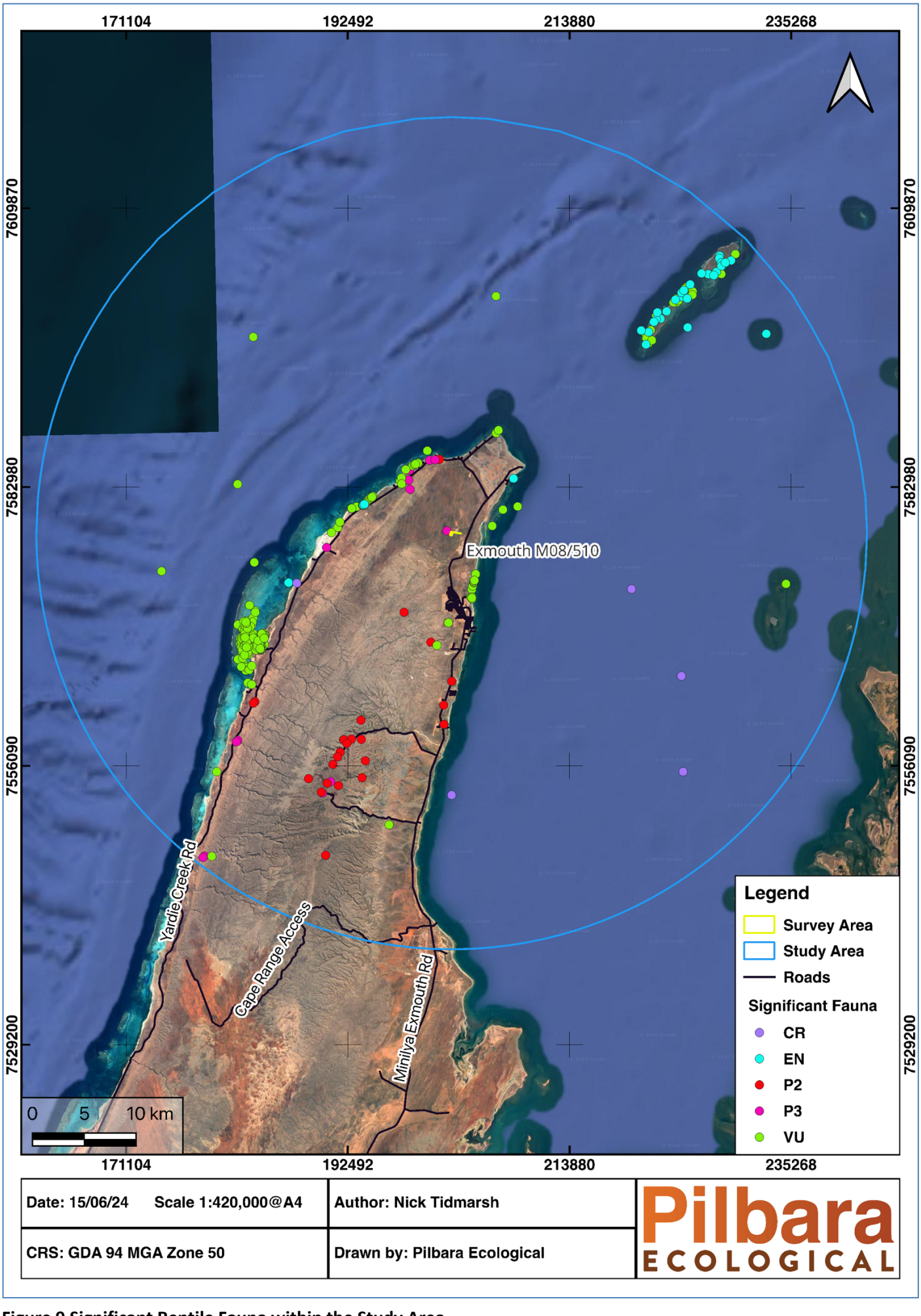


**Figure 9 Significant Reptile Fauna within the Study Area**

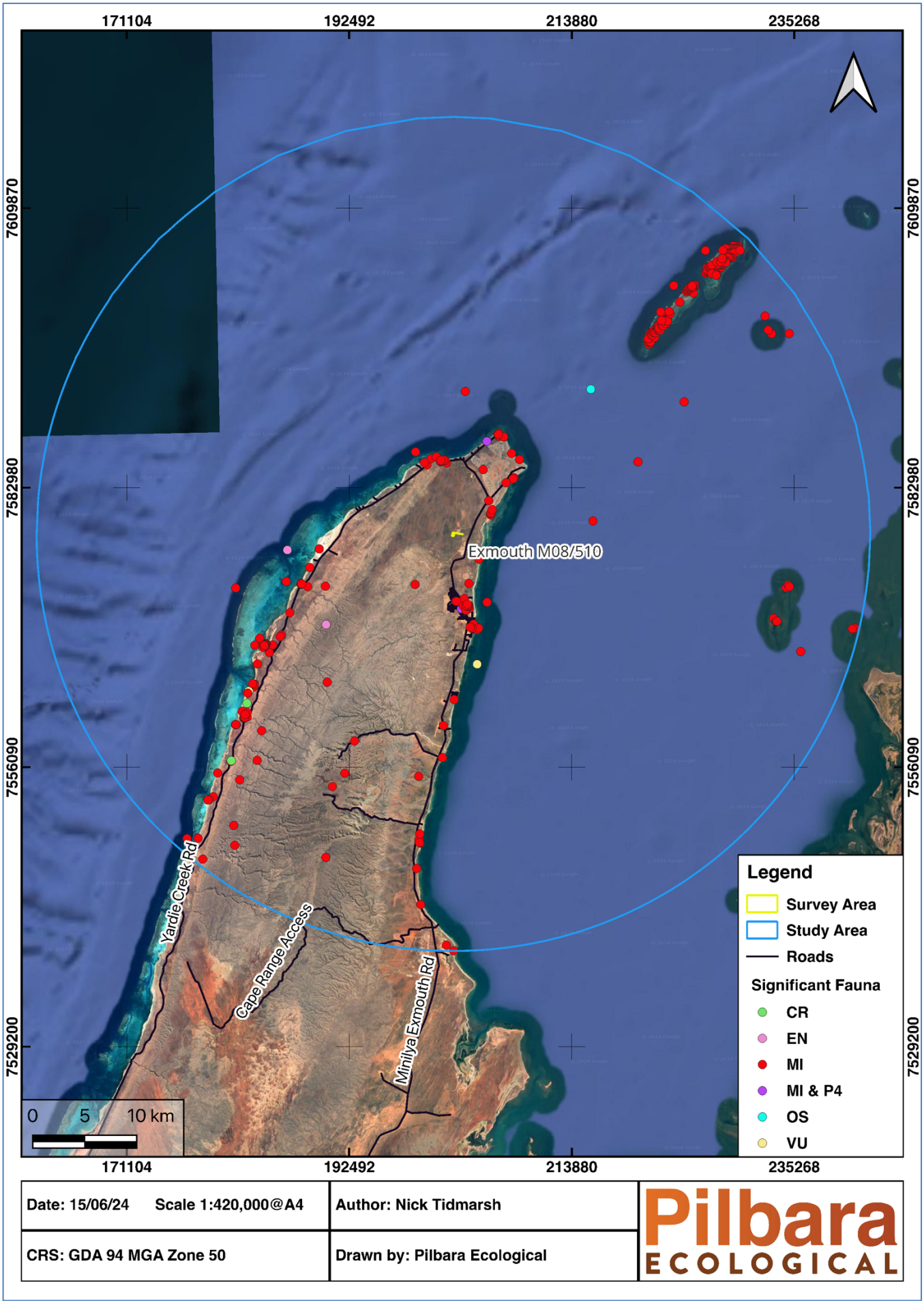


**Figure 10 Significant Bird Fauna within the Study Area**

### 3.2.7 Conservation Estate in the Region

Three conservation estates intersect the Study Area (Figure 7):

- Bundegi Coastal Park
- Cape Range National Park
- Jurabi Coastal Park

No conservation estates intersect the Survey Area. The nearest conservation estate is Bundegi Coastal Park, located 720m to the east. The Cape Range National Park is situated approximately 11 km south-west of the Survey Area. Areas in the conservation estate (and ESAs) located within the Study Area but situated offshore have been disregarded for the purpose of this desktop assessment.

### 3.2.8 Environmentally Sensitive Areas

The Survey Area is situated in an Environmentally Sensitive Area (ESA) as it lies in an area that was listed on the Register of the National Estate due to its geological and palaeontological features, biological attributes and cultural values (DCCEEW 2024d). The majority of the North West Cape lies within an ESA due to being located within the Ningaloo Coast World Heritage Area, being on the Register of the National Estate, or being in proximity to a significant wetland or TEC.

# 4 Field Survey Results

## 4.1 Flora Composition

A total of 63 flora taxa (including species, subspecies, varieties and forms) were recorded from within the Survey Area, representing 24 families and 49 genera, comprising 60 native taxa and 3 introduced taxa. Dominant families recorded in the Survey Area included:

- Poaceae (14 taxa)
- Fabaceae (11 taxa)
- Malvaceae (5 taxa)

The most common genera was *Acacia* (6 taxa) with nine other genera recording two taxa each.

A flora inventory for the Survey Area is provided in Appendix 5. The majority of specimens collected during the field survey were able to be identified to the lowest taxonomic level (90.62%). Other recorded taxa that could not be assigned to the lowest taxonomic level were a result of poor or insufficient material available.

## 4.2 Significant Flora

No Threatened flora (EPBC Act or BC Act) were recorded within the Survey Area. One Priority 2 flora species was located within the Survey Area: *Daviesia pleurophylla* (P2). This species is described as a divaricately branched shrub that typically grows to a height of up to 3m and has many ribbed branchlets (Plate 1). It's phyllodes are scattered, widely spreading, needle-shaped and sharply-pointed. *Daviesia pleurophylla* is endemic to the North West Cape where it is found on sand dunes. There are currently 16 vouchered specimens of this species (AVH 2024), 13 of which are located within the Study Area.

Within the Survey Area, a total of 72 individuals of *Daviesia pleurophylla* (P2) were recorded across vegetation type VT01. Locations of *Daviesia pleurophylla* are presented in Appendix 7.

**Plate 1 *Daviesia pleurophylla* (P2) (ALA 2024)**

Based on the post-survey likelihood of occurrence assessment, a further three Priority species are considered to 'possibly' occur within the Survey Area as suitable habitat is present:

- *Verticordia serotina* (P2)
- *Corchorus congener* (P3)
- *Corynotheca flexuosissima* (P3)

These species were not recorded during the extensive targeted survey of the area. However, since the site was recently burnt, there remains potential for them to occur during the re-establishment of vegetation.

## 4.3 Range Extensions

The interrogation of specimen data available through the Australian Virtual Herbarium (AVH) indicated seven species present within the Survey Area are range extensions (none are flora of conservation significance) (Table 10). While the range extensions are generally limited to < 150km, the most significant include that of *Polymeria lanata, Panicum australiense* var. *australiense* and *Urochloa holosericea* subsp. *velutina* as specimens recorded within the Survey Area mark the western range extent for these common northern Australian species.

**Table 10 Range Extensions for Species Recorded within Survey Area (AVH 2024).**

| Species | Range Extension | Current Recorded Distribution |
|---|---|---|
| *Alyogyne pinoniana* var. *pinoniana* | ~127km NW | 184 records in Australia, 68 records for WA, 16 records for Carnarvon bioregion. Distribution extends from coastal WA across into central NT and SA. The nearest recorded specimen to the Survey Area is from Cane River Conservation Park. Not previously vouchered from the North West Cape. This record (from the Survey Area) marks the north-western range extent for the species. |
| *Panicum australiense* var. *australiense* | ~93km WSW | 40 records for WA. Two records for Carnarvon bioregion. Distribution extends across northern WA from Gascoyne to Kimberley bioregions. The nearest recorded specimen to the Survey Area is from ~18 km SSW of Onslow. Not previously vouchered from the North West Cape, this record marks the western range extent for the species. |
| *Paractaenum refractum* | ~88km NW | 524 records for Australia. 97 records for WA. 11 records for Carnarvon bioregion. The nearest recorded specimen to the Survey Area is from Giralia Station. Not previously vouchered from the North West Cape. |
| *Olax aurantia* | ~33km N | 39 records for WA. Four records for Carnarvon bioregion. Distribution extends from south of Jurien Bay to the North West Cape with specimens predominantly from the Geraldton Sandplains bioregion. The nearest recorded specimen to the Survey Area is from ~33 km south near the Learmonth Aerodrome. While not a significant range extension, the specimen from the Survey Area marks the northern range extent for the species. |
| *Polymeria lanata* | ~162km W | 90 records in Australia. 45 records for WA. Not recorded in Carnarvon bioregion. Distribution extends across northern Australia from WA to Queensland. The nearest recorded specimen to the Survey Area is from Cane River Conservation Park. Not previously vouchered from the North West Cape. This record (from the Survey Area) marks the western range extent for the species. |
| *Setaria surgens* | ~135km N | Common and widespread species across northern half of Australia, particularly eastern Queensland. 1,183 records for |

| Species | Range Extension | Current Recorded Distribution |
|---|---|---|
| | | Australia. 82 records for WA. Three records for Carnarvon bioregion. The nearest recorded specimen to the Survey Area is from 135 km south near Winning Pool. While Survey Area specimen is within the north-south range for the species, it has not previously been vouchered from the North West Cape. |
| *Urochloa holosericea* subsp. *velutina* | ~100km | 152 records in Australia. 45 records for WA. Not recorded in Carnarvon bioregion. Distribution extends across northern Australia from WA to Queensland. The nearest recorded specimen to the Survey Area is from ~16 km SSW of Onslow. Not previously vouchered from the North West Cape. This record (from the Survey Area) marks the western range extent for the species. |

## 4.4 Introduced Flora

Three introduced flora species were recorded within the Survey Area:

- **Aerva javanica* (Kapok)
- **Cenchris ciliaris* (Buffel Grass)
- **Cenchrus setiger* (Birdwood Grass)

None are listed as Weeds of National Significance or Declared Plants under the *Biosecurity and Agriculture Management Act 2007*.

## 4.5 Vegetation Types

The total area of vegetation mapped within the Survey Area was 6.89 ha. A portion of the Survey Area (7.5%, 0.56 ha) had been previously cleared of vegetation. Two vegetation types across two landforms were identified within the Survey Area (Table 12; Appendix 6):

- **VT01**: *Banksia ashbyi* subsp. *boreoscaia*, *Duboisia hopwoodii, Grevillea stenobotrya* tall sparse shrubland over *Triodia ?angusta* sparse hummock grassland on red sand dunes.

- **VT02**: *Acacia sclerosperma* subsp. *sclerosperma*, *Acacia coriacea subsp. coriacea, Gyrostemon ramulosus* tall sparse shrubland over *Acacia gregorii* low sparse shrubland over *Triodia ?angusta* sparse hummock grassland on coastal sandplain.

The dominant vegetation type was VT01, which comprised approximately 78% (5.82 ha) of the Survey Area.

## 4.6 Vegetation of Significance

The vegetation types within the Survey Area are not representative of any known TEC (EPBC Act or BC Act) or PEC. While vegetation type VT01 does not hold any formal conservation significance, it could be considered locally significant due to it being confined to a restricted landform (red sand dunes) and providing habitat for the Priority 2 species *Daviesia pleurophylla.*

## 4.7 Vegetation Condition

The vegetation condition ranged from 'Poor' to 'Very Good' with the majority of the Survey Area classified as being in 'Very Good' condition (73.29%). Disturbances impacting the Survey Area include weeds (dominated by **Cenchris ciliaris*), established tracks and previous clearing. Areas of the Survey Area completely devoid of vegetation, including tracks or other cleared areas, were categorised as 'Cleared' and not assessed for vegetation condition. A significant portion of the Survey Area had been recently burnt (less than 12 months). Vegetation condition rating and extent are listed in Table 11 and presented in Appendix 8.

**Table 11 Vegetation Condition Extents Within the Survey Area**

| Vegetation Condition | Extent (Ha) | Percentage of Survey Area (%) |
|---|---|---|
| **Excellent** | 0 | 0 |
| **Very Good** | 5.46 | 73.29 |
| **Good** | 0.26 | 3.49 |
| **Poor** | 1.17 | 15.70 |
| **Degraded** | 0 | 0.00 |
| **Completely Degraded** | 0 | 0.00 |
| **Cleared** | 0.56 | 7.52 |
| **Total** | **7.45** | **100** |

**Table 12 Vegetation Types Mapped within the Survey Area**

| Vegetation Type Description | Landform and Soils | Sample Sites and Extent in Survey Area | Representative Photograph |
|---|---|---|---|
| (VT01) *Banksia ashbyi* subsp. *boreoscaia*, *Duboisia hopwoodii, Grevillea stenobotrya* tall sparse shrubland over *Triodia ?angusta* sparse hummock grassland<br><br>Associated Species: *Gyrostemon ramulosus, Scaevola sericophylla, Quoya paniculata, Exocarpos sparteus* | Red sand dunes | EQ01, EQ02<br><br>5.82 ha |  |
| (VT02) *Acacia sclerosperma* subsp. *sclerosperma*, *Acacia coriacea subsp. coriacea, Gyrostemon ramulosus* tall sparse shrubland over *Acacia gregorii* low sparse shrubland over *Triodia ?angusta* sparse hummock grassland<br><br>Associated Species: *Euploca glandulifera, Heliotropium crispatum, Stylobasium spathulatum, Senna artemisoides* subsp. *oligophylla* | Coastal sandplain | ER01, ER02, ER03<br><br>1.07 ha |  |

## 4.8 Fauna Habitat

Two broad fauna habitat types were recorded within the Survey Area:

- Tall shrubland on sand dunes (HT01)
- Tall shrubland on coastal plain (HT02)

Table 13 summarises these fauna habitat types, and Appendix 9 (fauna habitat mapping) provides their extent within the Survey Area.

**Table 13 Habitat Types Including Allied Vegetation Types and Extents**

| Habitat Type | Vegetation Type | Notes | Total Area (ha) | Representative Photograph |
|---|---|---|---|---|
| **(HT01) Tall shrubland on sand dunes** | VT01 | This habitat type includes dune crest and swale vegetated with sparse spinifex hummocks and shrubs. The tall shrubs provide habitat for small birds. The red sand dunes may provide habitat for *Aprasia rostrata*, Ningaloo worm lizard (P3) and other reptile species.<br><br>This habitat type is considered of high value for fauna species of significance. | 5.82 ha |  |
| **(HT01) Tall shrubland on coastal plain** | VT02 | This habitat type is charactarised by spinifex hummocks and tall shrubs. The tall shrubs provide habitat for small birds. The red sandy plain may provide habitat for *Aprasia rostrata*, Ningaloo worm lizard (P3) and other reptile species.<br><br>This habitat type is considered of high value for fauna species of significance. | 1.07 ha |  |

## 4.9 Recorded Fauna

A total of four fauna species were opportunistically recorded during the field survey (Table 14).

**Table 14 Vertebrate Species Recorded During the Field Survey**

| Common Name | Species | Observation Type |
|---|---|---|
| **Mammal** | | |
| Cow | *Bos taurus* | Scats |
| Emu | *Dromaius novaehollandiae* | Tracks |
| **Birds** | | |
| Nankeen Kestrel | *Falco cenchroides* | Sighting |
| Rainbow Bee-eater (MA) | *Merops ornatus* | Sighting |

## 4.10 Significant Fauna

No significant fauna species were sighted during the field survey nor was any evidence (burrows, diggings, tracks and scats) of such fauna noted.

*Merops ornatus* (Rainbow Bee-eater), which is listed as a Marine Species (EPBC Act), was recorded in the Survey Area.

A post-survey likelihood of occurrence assessment conducted for all significant fauna species identified during the desktop study (Appendix 2b) indicated three fauna species had the potential to occur within the Survey Area:

- Likely to occur
  - *Aprasia rostrata,* Ningaloo worm lizard (P3)
- Possible to occur
  - *Falco peregrinus,* Peregrine Falcon (OS)
  - *Pandion haliaetus,* Osprey (MI)

A summary of these three fauna species and the associated habitat types present within the Survey Area is provided in Table 15.

**Table 15 Listed Significant Fauna Likely to or Possibly Occurring Within the Survey Area**

| Species and Status | Likelihood of Occurrence (Post Survey) | Comments | Potential Habitat Type in Survey Area |
|---|---|---|---|
| **Birds** | | | |
| ***Falco peregrinus*** **(Peregrine Falcon)** **OS** | Possible – foraging only | The Peregrine Falcon is a widespread species across Australia. This species can forage over a wide range of habitats and maintain a large home range. Suitable nesting habitat includes cliff ledges, granite outcrops, quarries and large trees with old raven or Wedge-tailed Eagle nests (Johnstone and Storr 1998). While there is no suitable nesting habitat within the Survey Area, it is possible this species forages over the Survey Area. | HT01, HT02 |
| ***Pandion haliaetus*** **(Osprey)** **MI** | Possible – foraging only | Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. Nests are constructed in a variety of natural and artificial sites including in dead or partly dead trees or bushes; on cliffs, rocks, rock stacks or islets; on the ground on rocky headlands, coral cays, deserted beaches, sandhills or saltmarshes; and on artificial nest platforms, pylons, jetties, lighthouses, navigation towers, cranes, exposed shipwrecks and offshore drilling rigs. There is no suitable nesting habitat within the Survey Area. It is possible this species forages over the Survey Area. | HT01, HT02 |
| **Reptiles** | | | |
| ***Aprasia rostrata*** **(Ningaloo worm lizard)** **P3** | Likely | This species occupies a variety of sandy habitats including red and white sand dunes. Suitable habitat exists within the Survey Area and the nearest record is 400m from the Survey Area (2008). | HT01, HT02 |

# 5 Conclusion

## 5.1 Significant Flora

No Threatened flora (EPBC Act or BC Act) were recorded within the Survey Area. One Priority 2 flora species was located: *Daviesia pleurophylla* (P2). A total of 72 individuals of this species were recorded within the Survey Area across vegetation type VT01. This species is endemic to the North West Cape and has been previously recorded within the vicinity of the Survey Area.

Based on the post survey likelihood of occurrence assessment, a further three species are considered to 'possibly' occur within the Survey Area: *Verticordia serotina* (P2), *Corchorus congener* (P3) and *Corynotheca flexuosissima* (P3). While these species were not located during the targeted survey, there remains potential for them to occur during the post-fire re-establishment of vegetation across the Survey Area.

## 5.2 Significant Vegetation

The two vegetation types mapped within the Survey Area were not synonymous with any known TEC (EPBC Act or BC Act) or PEC. Vegetation type VT01 was located on red sand dunes and comprised approximately 78% of the Survey Area. This vegetation type does not hold any formal conservation significance; however, it could be considered locally significant due to it being confined to a restricted landform and providing habitat for the Priority 2 species *Daviesia pleurophylla.*

The Survey Area is situated in an Environmentally Sensitive Area (ESA; listed on the Register of the National Estate) and intersects the 'Cape Range Subterranean Waterways, a significant (subterranean) wetland listed on the Directory of Important Wetlands in Australia. There are no surface wetlands or waterways within or near the Survey Area.

## 5.3 Significant Fauna

No significant fauna species (or evidence of) were recorded during the field survey. Three fauna species of significance were identified as having the potential to occur in the Survey Area: *Aprasia rostrata,* Ningaloo worm lizard (P3) (likely to occur); *Falco peregrinus,* Peregrine Falcon (OS) – Foraging only (possible to occur); *Pandion haliaetus,* Osprey (MI) – Foraging only (possible to occur).

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# Appendix 1. Database search Results

# Appendix 2a. Likelihood of Occurrence Assessment (Significant Flora)

| Taxon | Description (DBCA 2023x) | Habitat | Databases | | | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|
| | | | NatureMap | DBCA TPFL | WA Herbarium | | |
| **Priority 2** | | | | | | | |
| *Acacia ryaniana* | Low spreading shrub of 2 m diameter and 0.5 m high. | White or red sand. Coastal sand dunes | ✓ | | | Unlikely: No contemporary records within 40km of Survey Area. | Unlikely |
| *Acanthocarpus rupestris* | Prickly shrub. Rhizomatous, tufted perennial, herb, to 0.5 m high. Fl. white, May to Jun. | Red sand, limestone. | ✓ | ✓ | ✓ | Possible. NR 13km from Survey Area. Some suitable habitat exists in the Survey Area. | Unlikely |
| *Calandrinia sp. Cape Range* (F. Obbens FO 10/18) | Scrambling perennial herb. Single stemmed annual 0.2 m high. Flowers pink. | Rocky habitats, gullies, skeletal soils. | ✓ | | ✓ | Unlikely: Suitable habitat does not exist in the Survey Area. | Unlikely |
| *Cucumis sp. Barrow Island* (D.W. Goodall 1264) | Herbaceous perennial vine. 5 flower fascicles per leaf axil, growing up to 2m tall. | Red sandy loams on sandplain swales, footslopes of basalt, limestone plateau and calcrete slopes. | ✓ | | ✓ | Unlikely: Suitable habitat does not exist in the Survey Area. | Unlikely |
| *Daviesia pleurophylla* | Divaricately branched, broom like shrub to 3m. Petals yellow, flower centres orange. | Sand dunes. | ✓ | ✓ | ✓ | Likely: Suitable habitat is abundant and nearest record is 1km from Survey Area | Recorded |

| Taxon | Description (DBCA 2023x) | Habitat | Databases | | | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|
| | | | NatureMap | DBCA TPFL | WA Herbarium | | |
| *Eremophila occidens* | Shrub, to 1.5 m high. Fl. purple-violet, Aug to Sep. | Orange/brown sand. Limestone ranges, dunes. | ✓ | ✓ | ✓ | Unlikely: Mostly confined to the ranges. | Unlikely |
| *Harnieria kempeana* subsp. *rhadinophylla* | Sprawling perennial shrub 60 cm tall and 1 x 0.5 m across (other individuals more erect). Three lower corolla lobes magenta, the centre one with raised, white, herringbone markings at its base. The upper two lobes fused except for small tips, also magent. | Calcareous loam. Amongst limestone rocks, creek banks. | ✓ | ✓ | ✓ | Unlikely: Suitable habitat does not exist in the Survey Area. | Unlikely |
| *Tephrosia* sp. North West Cape (G. Marsh 81) | Smakk herb. shrub, 0.2 m high x 0.7 m wide. Flowers yellow, orange or white. | Orange sands and red-brown clay loam on limestone outcrops and rocks. | ✓ | | ✓ | Unlikely: Suitable habitat does not exist in the Survey Area. | Unlikely |
| *Tinospora esiangkara* | Annual climbing compact twining climber 2.5 m high x 2 m wide. Flowers yellow. | Pebbly orange-brown calcareous loam. Limestone outcrops or ridges, near creek bank. | ✓ | ✓ | ✓ | Unlikely: Suitable habitat does not exist in the Survey Area. | Unlikely |
| *Verticordia serotina* | Low spreading shrub to 50 cm, flowers pink. | Red sand. Sand dunes. | ✓ | | ✓ | Possible: NR is 15km from the Survey Area. Suitable habitat exists in the Survey Area. | Possible |
| **Priority 3** | | | | | | | |

| Taxon | Description (DBCA 2023x) | Habitat | Databases | | | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|
| | | | NatureMap | DBCA TPFL | WA Herbarium | | |
| *Acacia alexandri* | Open or moderately dense, sometimes wispy shrub, 1.5-3 m high. Fl. cream, Jun or Aug to Sep. | Limestone. Stony creeks, steep rocky slopes. | ✓ | ✓ | ✓ | Unlikely: Suitable habitat does not exist in the Survey Area. | Unlikely |
| *Acacia startii* | Dense, rounded, much-branched shrub, 1-2 m high, to 3 m wide. Fl. green-yellow, Jul to Aug. | Calcareous loam with limestone pebbles. Stony hills and watercourses. | ✓ | | ✓ | Unlikely: Suitable habitat does not exist in the Survey Area. | Unlikely |
| *Corchorus congener* | Spreading shrub, to 0.6 m high. Fl. yellow, Apr to Jun or Aug to Nov. | Sand, red sandy loam with limestone. Sand dunes, plains. | ✓ | ✓ | ✓ | Possible: Suitable habitat is present in the Survey Area. NR is 5km from the survey area. | Possible |
| *Corynotheca flexuosissima* | Rhizomatous, much-branched perennial, herb or shrub, to 0.6 m high. Fl. white, Jan or May or Sep. | Red or white sand, limestone. Costal sand dunes. | ✓ | | ✓ | Possible: Suitable habitat is present in the Survey Area. NR is 8km from the survey area. | Possible |
| *Eremophila forrestii* subsp. *capensis* | Sparsely to much-branched shrub, to 1.4 m high. | Brown rocky soils, limestone. Ridges. | ✓ | | ✓ | Unlikely: Suitable habitat does not exist in the Survey Area. | Unlikely |
| *Grevillea calcicola* | Small straggly tree or shrub (several-stemmed), to 4 m high. Fl. cream-white, May or Jul to Aug. | Limestone hilltops. | ✓ | ✓ | ✓ | Unlikely: Suitable habitat does not exist in the Survey Area. | Unlikely |

| Taxon | Description (DBCA 2023x) | Habitat | Databases | | | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|
| | | | NatureMap | DBCA TPFL | WA Herbarium | | |
| *Gymnanthera cunninghamii* | Erect woody shrub with somewhat leathery, lanceolate to elliptic leaves. Milky exudate when injured. | Sandy soils surrounding permanent or semi-permanent water courses. | ✓ | | ✓ | Unlikely: Suitable habitat does not exist in the Survey Area. | Unlikely |
| *Lysiandra fuernrohrii* | Low shrub that flowers in February or May to September | Sand over limestone | ✓ | | ✓ | Unlikely: Suitable habitat does not exist in the Survey Area. | Unlikely |
| *Stackhousia umbellata* | Spreading perennial, herb, to 0.7 m high. Fl. yellow, May to Aug. | Sandy soils on limestone. | ✓ | | ✓ | Unlikely: Suitable habitat does not exist in the Survey Area. | Unlikely |
| **Priority 4** | | | | | | | |
| *Brachychiton obtusilobus* | Tree ca 5 m tall. Bark smooth, pale grey. Leaves glossy green. Pods matte black, in clusters of up to 5. | Skeletal soils. Rocky limestone ranges, gorges, occasionally sandplains. | ✓ | | ✓ | Unlikely: Suitable habitat does not exist in the Survey Area. | Unlikely |
| *Eremophila youngii* subsp. *lepidota* | Medium to large narrow leaved shrub to 4m high. | Stony red sandy loam on clay flats and floodplains, sometimes semi-saline. | ✓ | | ✓ | Unlikely: Suitable habitat does not exist in the Survey Area. | Unlikely |

# Appendix 2b Likelihood of Occurrence Assessment (Significant Fauna)

| Species | Conservation Status | | | Databases | | | Notes | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | BC Act | DBCA | EPBC PMST | Nature Map | DBCA TFS | | | |
| **Mammals** | | | | | | | | | |
| *Dasyurus hallucatus*<br><br>(Northern Quoll) | EN | EN | | ✓ | ✓ | ✓ | Suitable den habitat includes rock caves/crevices, tree hollows and log hollows (van Dyck and Strahan 2008). Northern Quolls can also utilise holes in termite mounds for denning (Triggs 2014). Preferred general habitats include dissected rocky escarpments, gorges and boulder piles and will utilise gullies and drainage lines. Drainage habitats are known foraging and dispersal pathways for the Northern Quoll. Large rocky outcrops (with large patch area to edge ratio) surrounded by intact, unburnt spinifex is considered primary habitat for the Northern Quoll in the Pilbara (Moore et al. 2021). Proximity to permanent water is another important microhabitat feature (Woinarski et al. 2008). | Unlikely: NR is 34km south of the Survey Area. No suitable den habitat within Survey Area. | Unlikely |
| *Isoodon auratus auratus*<br><br>(Golden Bandicoot (mainland), Wintarru) | VU | VU | | | ✓ | ✓ | This species is a small golden-brown marsupial. It previously occurred throughout central Australia, but is now restricted to Barrow Island (*Isoodon auratus barrowensis*) and the Kimberley (offshore islands and the mainland) and Marchinbar Island (offshore Arnhem Land) (*Isoodon auratus auratus*). During the day it rests in dense vegetation or other shelter. During the night it forages by digging for succulents, invertebrates and plant roots. | Unlikely: No recent records within the Study Area | Unlikely |
| *Leporillus apicalis*<br><br>(Lesser Stick-nest Rat) | EX | EX | | | ✓ | ✓ | The Lesser Stick-nest Rat was a moderately sized native rodent (body mass 60 g) that differed from its larger relative, the Greater Stick-nest Rat, by the narrow brush of white hairs near the tip of its tail. | Unlikely: Presumed extinct | Unlikely |

| Species | Conservation Status | | | Databases | | | Notes | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | BC Act | DBCA | EPBC PMST | Nature Map | DBCA TFS | | | |
| *Macroderma gigas*<br>(Ghost Bat) | VU | VU | | ✓ | | | This species can occur in a variety of habitats and requires deep caves or disused mines for maternal roosting sites (TSSC 2016a). Short-term transient roosts can include rock crevices, shallow caves and even the roots of fig trees (observed in Dales Gorge in Karijini National Park) (Armstrong and Anstee 2000). Preferred foraging habitat includes plains or riparian lines adjacent to gully or gorge systems less than 5km from the roost site (TSSC 2016a). | Unlikely: No records within the Study Area | Unlikely |
| *Mesembriomys macrurus*<br>(Golden-backed Tree-rat) | | | P4 | | ✓ | ✓ | The Golden-backed Tree-rat is a large rodent weighing 207−330 g, with a head and body length of 188−245 mm and a tail length of 291−360 mm. It is midway in size between two other large semi-arboreal species in northern Australia, the smaller *Conilurus penicillatus* (Brush-tailed Rabbit-rat) and the larger *Mesembriomys gouldii* (Black-footed Tree-rat). | Unlikely: No contemporary records within the Study Area | Unlikely |
| *Petrogale lateralis lateralis*<br>(Moororong) | EN | EN | | ✓ | ✓ | ✓ | Suitable habitat includes permanent water or shelter (deep shade in rocky areas such as caves, cliffs, screes and rockpiles). Formerly widespread, this species is now restricted to offshore Pilbara Islands and Cape Range in the north west (Pentland 2014); (TSSC 2016b). | Unlikely: Nearest record is 5km form the Survey Area (2018). Preferred habitat does not occur within the Survey Area. | Unlikely |
| *Rhinonicteris aurantia* (Pilbara)<br>(Pilbara leaf-nosed bat) | VU | VU | P4 | ✓ | ✓ | ✓ | This species utilises deep caves and complex mines for roosting sites. Preferred foraging habitat for the species includes gorges with pools, gullies, rocky outcrops and major water courses. While this species may forage over open grassland and woodland, this is considered the lowest quality of foraging habitat (TSSC 2016c). | Unlikely: NR is 25km from the Survey Area (2006). Preferred habitat does not exist within the Survey Area. | Unlikely |

| Species | Conservation Status | | | Databases | | | Notes | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | BC Act | DBCA | EPBC PMST | Nature Map | DBCA TFS | | | |
| *Sminthopsis longicaudata*<br>(Long-tailed Dunnart) | | | P4 | | ✓ | ✓ | This species is a small carnivorous marsupial, about the size of a mouse with an extremely long tail terminating in a tuft. Its habitat includes Exposed rock and stony soils with hummock grasses and shrubs. Flat-topped hills, lateritic plateaus, sandstone ranges and breakaways. Sparse mulga over spinifex (WAM 2024). | Unlikely: No contemporary records within the Study Area. | Unlikely |
| *Zyzomys pedunculatus*<br>(Central Rock-rat, Antina) | CR | CR | | | ✓ | ✓ | Rediscovered in 1996, the central rock-rat is restricted to the West MacDonnell Ranges of central Australia. The species has irruptive demography and is recorded in high densities following rainfall events. It occurs in a variety of rocky habitat. It mostly eats seeds and lesser amounts of leaves, stems and insects. | Unlikely: No contemporary records within the Study Area. | Unlikely |
| **Birds** | | | | | | | | | |
| *Actitis hypoleucos*<br>(Common Sandpiper) | MI | MI | | ✓ | ✓ | ✓ | This species utilises coastal wetlands and some inland wetlands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Anous stolidus*<br>(Common Noddy) | MI | MI | | ✓ | ✓ | ✓ | Restricted to inshore habitats and coastal islands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Apus pacificus*<br>(Fork-tailed swift) | MI | MI | | ✓ | | | This species is a non-breeding migrant to Australia. Prescence in Australia is predominantly aerial. | Unlikely | Unlikely |

| Species | Conservation Status | | | Databases | | | Notes | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | BC Act | DBCA | EPBC PMST | Nature Map | DBCA TFS | | | |
| *Ardenna carneipes*<br>(Flesh-footed Shearwater) | MI | | | ✓ | | | Restricted to marine or inshore habitats and islands. | Unlikely: No preferred habitat in the survey area. No records in the Study Area. | Unlikely |
| *Ardenna pacifica*<br>(Wedge-Tailed Shearwater) | MI | MI | | ✓ | ✓ | ✓ | Generally restricted to marine or inshore habitats and islands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Arenaria interpres*<br>(Ruddy Turnstone) | MI/VU | MI | | | ✓ | ✓ | Generally restricted to marine or inshore habitats and islands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Calidris acuminata*<br>(Sharp-tailed sandpiper) | MI | MI | | ✓ | ✓ | ✓ | This species utilises lagoons, swamps, lakes, pools near the coast, dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline salt lakes inland. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Calidris alba*<br>(Sanderling) | MI | MI | | | ✓ | ✓ | Restricted to marine or inshore habitats or coastal estuaries. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Calidris canutus*<br>(Red knot) | EN/MI | EN | | ✓ | ✓ | ✓ | Mainly inhabits intertidal mudflats, sandflats, sandy beaches of sheltered coasts, estuaries, bays, inlets, lagoons and harbours. | Unlikely: No preferred habitat in the survey area. | Unlikely |

| Species | Conservation Status | | | Databases | | | Notes | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | BC Act | DBCA | EPBC PMST | Nature Map | DBCA TFS | | | |
| *Calidris ferruginea*<br>(Curlew Sandpiper) | CR/MI | CR | | ✓ | ✓ | ✓ | This species occurs on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Calidris melanotos*<br>(Pectoral sandpiper) | MI | MI | | ✓ | | | This species prefers shallow to fresh saline wetlands. | Unlikely: No preferred habitat in the survey area. No records in the Study Area. | Unlikely |
| *Calidris ruficollis*<br>(Red-necked stint) | MI | MI | | | ✓ | ✓ | Restricted to marine or inshore habitats or coastal estuaries. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Calidris subminuta*<br>(Long-toed Stint) | MI | MI | | | ✓ | ✓ | Restricted to marine or inshore habitats or coastal wetlands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Calonectris leucomelas*<br>(Streaked Shearwater) | MI | MI | | ✓ | | | Restricted to marine or inshore habitats or coastal wetlands. | Unlikely: No preferred habitat in the survey area. No records in the Study Area. | Unlikely |
| *Charadrius leschenaultii*<br>(Greater sand plover) | VU/MI | VU | | ✓ | ✓ | ✓ | Restricted to marine or inshore habitats or coastal wetlands. | Unlikely: No preferred habitat in the survey area. | Unlikely |

| Species | Conservation Status | | | Databases | | | Notes | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | BC Act | DBCA | EPBC PMST | Nature Map | DBCA TFS | | | |
| *Charadrius mongolus*<br><br>(Lesser Sand Plover) | EN/MI | EN | | | ✓ | ✓ | Restricted to marine or inshore habitats or coastal wetlands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Charadrius mongolus mongolus*<br><br>(Lesser Sand Plover (subsp. mongolus)) | EN/MI | EN | | | ✓ | ✓ | In non-breeding grounds in Australia, this species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sandflats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wave-cut rock platforms and rocky outcrops. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Charadrius veredus*<br><br>(Oriental Plover) | MI | MI | | ✓ | ✓ | ✓ | Non-breeding migrant to Australia. This species usually forages among short grass or on hard stony bare ground. Roosting habitat includes soft wet mud, shallow water of beaches and tidal mudflats or salt marshes. | Unlikely: No preferred habitat in the survey area. Non breeding migrant. | Unlikely |
| *Chlidonias leucopteris*<br><br>(White-winged black tern) | MI | MI | | | ✓ | ✓ | Restricted to marine or inshore habitats or coastal wetlands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Erythrotriorchis radiatus*<br><br>(Red Goshawk) | EN | | | ✓ | | | The Red Goshawk occurs in coastal and sub-coastal areas in wooded and forested lands of tropical and warm-temperate Australia. Goshawk nests in large trees. | Unlikely: No preferred habitat in the survey area. No records within the study area. | Unlikely |
| *Falco hypoleucos*<br><br>(Grey Falcon) | VU | VU | | ✓ | | | The Grey Falcon is a widespread but rare species. This species requires larger trees such as River Red Gum (*Eucalyptus camaldulensis*) or Coolibah (*Eucalyptus victrix*) for nesting but can have a large foraging range extending from timbered plains into open grasslands (Sutton 2011). Tall trees along medium and major drainage habitats are likely to provide suitable nesting habitat for the species. | Unlikely: No suitable nesting habitat in the Survey Area. No records within the Study Area. | Unlikely |

| Species | Conservation Status | | | Databases | | | Notes | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | BC Act | DBCA | EPBC PMST | Nature Map | DBCA TFS | | | |
| *Falco peregrinus*<br>(Peregrine Falcon) | | OS | | | ✓ | ✓ | The Peregrine Falcon is a widespread species across Australia. This species can forage over a wide range of habitats and can maintain a large home range. Suitable nesting habitat includes cliff ledges, granite outcrops, quarries and large trees with old raven or Wedge-tailed Eagle nests (Johnstone and Storr 1998). | Possible: NR is 7km from the Survey Area (2013). | Possible: No nesting habitat is present in the Survey Area but species may forage at times in the Survey Area. |
| *Fregata ariel*<br>(Lesser frigatebird) | MI | MI | | ✓ | | | Restricted to marine or inshore habitats or coastal wetlands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Gallinago stenura*<br>(Pin-tailed snipe) | MI | MI | | | ✓ | ✓ | Non-breeding migrant from Siberia. This species occurs on the edges of shallow freshwater swamps, ponds and lakes with emergent, sparse to dense cover of grass/sedge or other vegetation. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Gelochelidon nilotica*<br>(Gull-billed tern) | MI | MI | | | ✓ | ✓ | Restricted to marine or inshore habitats or coastal wetlands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Glareola maldivarum*<br>Oriental pratincole | MI | MI | | ✓ | ✓ | ✓ | Non-breeding migrant to Australia. In Australia this species usually inhabits open plains, floodplains, short grassland often with extensive bare areas. Often found near water and also occurs on the coast. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Hirundo rustica*<br>(Barn Swallow) | MI | MI | | ✓ | | | This species is an occasional non-breeding migrant to Australia. In Australia this species is recorded in open country in coastal lowlands, often near water and towns (Pizzey and Knight 2001). It is often seen perching on overhead wires. It has also been recorded in freshwater wetlands, paperbark *Melaleuca* woodland, mesophyll shrub thickets and tussock grassland (Schodde and Mason 1999). | Unlikely: No records within the Study Area. | Unlikely |

| Species | Conservation Status | | | Databases | | | Notes | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | BC Act | DBCA | EPBC PMST | Nature Map | DBCA TFS | | | |
| *Hydroprogne caspia*<br>(Caspian Tern) | MI | MI | | | ✓ | ✓ | This species is mostly found in sheltered coastal embayments such as harbours, lagoons, inlets, bays, estuaries and river deltas. Sometimes found around terrestrial water holes. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Limicola falcinellus*<br>(Broad-billed sandpiper) | MI | MI | | | ✓ | ✓ | Restricted to marine or inshore habitats and coastal estuaries. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Limnodromus semipalmatus*<br>(Asian Dowitcher) | MI | MI | | ✓ | | | Non-breeding migrant to Australia. In Australia this species is restricted to marine or inshore habitats or coastal estuaries. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Limosa lapponica*<br>(Bar-tailed godwit) | MI | MI | | ✓ | ✓ | ✓ | Non-breeding migrant to Australia. This species is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Limosa limosa*<br>(Black-tailed godwit) | MI | MI | | | ✓ | ✓ | Predominantly inhabits marine or inshore habitats and coastal estuaries/wetlands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Macronectes giganteus*<br>(Southern Giant-Petrel) | EN/MI | EN/MI | | ✓ | | | Predominantly inhabits marine or inshore habitats and coastal estuaries/wetlands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Motacilla cinerea*<br>(Grey Wagtail) | MI | MI | | ✓ | | | This species is an uncommon non-breeding summer visitor to northern Australia. It is predominantly recorded in habitats with water present (Pizzey and Knight 2001). | Unlikely: No records within the Study Area. | Unlikely |

| Species | Conservation Status | | | Databases | | | Notes | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | BC Act | DBCA | EPBC PMST | Nature Map | DBCA TFS | | | |
| *Motacilla flava*<br>(Yellow Wagtail) | MI | MI | | ✓ | | | Uncommon, non-breeding summer visitor from northeast Asia. | Unlikely: No records from the Study Area. | Unlikely |
| *Numenius madagascariensis*<br>(Eastern curlew) | CR/MI | CR | | ✓ | ✓ | ✓ | Non-breeding migrant to Australia. This species is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Numenius minutus*<br>(Little curlew, little whimbrel) | MI | MI | | | ✓ | ✓ | Non-breeding migrant to Australia. In Australia it is often found feeding in short, dry grassland and sedgeland near water. Foraging sites are usually within 5 km of daytime roosting sites, as birds move between grassland and wetland. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Numenius phaeopus*<br>(Whimbrel) | MI | MI | | | ✓ | ✓ | Non-breeding migrant to Australia. In Australia this species is usually found on the intertidal mudflats of sheltered coasts. It is also found in harbours, lagoons, estuaries and river deltas, often those with mangroves, | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Oceanites oceanicus*<br>(Wilson's storm-petrel) | MI | MI | | | ✓ | ✓ | Restricted to marine habitats. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Onychoprion anaethetus*<br>(Bridled tern) | MI | MI | | | ✓ | ✓ | Restricted to marine or inshore habitats or coastal estuaries. | Unlikely: No preferred habitat in the survey area. | Unlikely |

| Species | Conservation Status | | | Databases | | | Notes | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | BC Act | DBCA | EPBC PMST | Nature Map | DBCA TFS | | | |
| *Pandion haliaetus*<br>Osprey | MI | MI | | ✓ | ✓ | ✓ | Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. Nest are constructed in a variety of natural and artificial sites including in dead or partly dead trees or bushes; on cliffs, rocks, rock stacks or islets; on the ground on rocky headlands, coral cays, deserted beaches, sandhills or saltmarshes; and on artificial nest platforms, pylons, jetties, lighthouses, navigation towers, cranes, exposed shipwrecks and offshore drilling rigs | Possible: NR less than 4km form Survey Area (2018). | Possible: No suitable nesting habitat. It Is possible this species forages in the Survey Area at times. |
| *Pezoporus occidentalis*<br>(Night Parrot) | EN | CR | | ✓ | | | Most previous records have been within Spinifex (*Triodia*) grassland and/or chenopod shrubland. It was previously recorded near the Fortescue Marshes in 2005 (Davis and Metcalf 2008). While the habitat preferences of this species are still not well known it is extremely uncommon and considered unlikely to occur. | Unlikely: This species is uncommon and has not been recorded within the Study Area. | Unlikely |
| *Phaethon lepturus*<br>(White-tailed Tropicbird) | MI | MI | | ✓ | ✓ | ✓ | This species occupies marine habitats in tropical waters with sea-surface temperatures of more than 22°C. The tropicbird breeds on islands and atolls, where it nests in a variety of habitats including on bare sandy ground, in closed-canopy rainforest, on rocky cliffs and in quarries. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Phaethon rubricauda*<br>(Red-tailed Tropicbird) | MI | MI | P4 | | ✓ | ✓ | This species prefers marine or inshore habitats, coastal estuaries and offshore islands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Plegadis falcinellus*<br>(Glossy ibis) | MI | MI | | | ✓ | ✓ | This species preferred habitat for foraging and breeding are fresh water marshes at the edges of lakes and rivers, lagoons, floodplains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. | Unlikely: No preferred habitat in the survey area. No contemporary records within the Study Area. | Unlikely |

| Species | Conservation Status | | | Databases | | | Notes | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | BC Act | DBCA | EPBC PMST | Nature Map | DBCA TFS | | | |
| *Pluvialis fulva*<br>(Pacific golden plover) | MI | MI | | | ✓ | ✓ | This species usually inhabits coastal habitats, though it occasionally occurs around inland wetlands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Pluvialis squatarola*<br>(Grey plover) | MI | MI | | | ✓ | ✓ | This species occurs almost entirely in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons. They also occur around terrestrial wetlands such as near-coastal lakes and swamps, or salt-lakes. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Pterodroma mollis*<br>(Soft-plumaged Petrel) | VU | | | ✓ | | | The species is mainly coastal but occasionally occurs inland. | Unlikely: No preferred habitat in the survey area. No records within the study aera. | Unlikely |
| *Puffinus huttoni*<br>(Hutton's shearwater) | | EN | | | ✓ | ✓ | Restricted to marine or inshore habitats, coastal estuaries and offshore islands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Rostratula australis*<br>(Australian Painted Snipe) | EN | EN | | ✓ | | | This species inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Sternula albifrons*<br>(Little Tern) | MI | MI | | ✓ | | | In Australia, Little Terns inhabit sheltered coastal environments, including lagoons, estuaries, river mouths and deltas, lakes, bays, harbours and inlets, especially those with exposed sandbanks or sand-spits, and also on exposed ocean beaches | Unlikely: No preferred habitat in the survey area. No records within the Study Area. | Unlikely |

| Species | Conservation Status | | | Databases | | | Notes | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | BC Act | DBCA | EPBC PMST | Nature Map | DBCA TFS | | | |
| *Sterna dougallii*<br>(Roseate tern) | MI | MI | | | ✓ | ✓ | Restricted to marine or inshore habitats, coastal estuaries and offshore islands. Listed Marine | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Sterna dougallii gracilis*<br>(Roseate Tern (subsp. gracilis)) | MI | MI | | | ✓ | ✓ | The species inhabits rocky and sandy beaches, coral reefs, sand cays and offshore islands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Sterna Hirundo*<br>(Common tern) | MI | MI | | | ✓ | ✓ | Restricted to marine or inshore habitats, coastal estuaries and offshore islands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Sternula albifrons*<br>(Little tern) | MI | MI | | | ✓ | ✓ | Restricted to marine or inshore habitats, coastal estuaries and offshore islands. Listed Marine. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Sternula nereis nereis*<br>(Fairy tern) | VU | VU | | ✓ | ✓ | ✓ | Restricted to marine or inshore habitats and offshore islands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Thalassarche carteri*<br>(Indian Yellow-nosed Albatross) | MI/VU | | | ✓ | | | Restricted to marine or inshore habitats and offshore islands. | Unlikely: No preferred habitat in the survey area. | Unlikely |

| Species | Conservation Status | | | Databases | | | Notes | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | BC Act | DBCA | EPBC PMST | Nature Map | DBCA TFS | | | |
| *Thalassarche chlororhynchos*<br>(Atlantic yellow-nosed albatross) | MI | VU | | | ✓ | ✓ | Restricted to marine or inshore habitats and offshore islands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Thalassarche impavida*<br>(Campbell Albatross, Campbell Black-browed Albatross) | MI/VU | | | ✓ | | | Restricted to marine or inshore habitats and offshore islands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Thalasseus bergii*<br>(Crested tern) | MI | MI | | | ✓ | ✓ | Restricted to marine or inshore habitats and offshore islands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Tringa brevipes*<br>(Grey-tailed tattler) | MI | MI | P4 | | ✓ | ✓ | Restricted to marine or inshore habitats, coastal estuaries and offshore islands. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Tringa glareola*<br>(Wood sandpiper) | MI | MI | | | ✓ | ✓ | This species uses well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Tringa nebularia*<br>(Common Greenshank, greenshank) | MI | MI | | ✓ | ✓ | ✓ | This species uses a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms. | Unlikely: No preferred habitat in the survey area. | Unlikely |

| Species | Conservation Status | | | Databases | | | Notes | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | BC Act | DBCA | EPBC PMST | Nature Map | DBCA TFS | | | |
| *Tringa stagnatilis*<br>(Marsh sandpiper, little greenshank) | MI | MI | | | ✓ | ✓ | The Marsh Sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and also regularly at sewage farms and saltworks. | Unlikely: No preferred habitat in the survey area. | Unlikely |
| *Xenus cinereus*<br>(Terek sandpiper) | MI | MI | | | ✓ | ✓ | The Terek Sandpiper mostly forages in the open, on soft wet intertidal mudflats or in sheltered estuaries, embayments, harbours or lagoons. The species has also been recorded on islets, mudbanks, sandbanks and spits, and near mangroves and occasionally in samphire (*Halosarcia* spp.) | Unlikely: No preferred habitat in the survey area. | Unlikely |
| **Reptiles** | | | | | | | | | |
| *Aipysurus apraefrontalis*<br>(Short-nosed Seasnake) | CR | CR | | ✓ | ✓ | ✓ | The Short-nosed Seasnake is a fully aquatic, small, rather slender snake with a small head and pointed snout. | Unlikely: This species is aquatic; no aquatic habitat exists in the Survey Area. | Unlikely |
| *Anilios splendidus*<br>(Splendid Blind Snake (North West Cape)) | | | P2 | | ✓ | ✓ | Little known species recorded from shrubland on limestone with a thin veneer of sand. | Unlikely: Only recorded once in the Study Area, 25km from the Survey Area (1995). | Unlikely |
| *Aprasia rostrata*<br>(Ningaloo worm lizard) | | | P3 | | ✓ | ✓ | Occupies a variety of sandy habitats including red and white sand dunes. | Likely: NR is 400m from the Survey Area (2008). Suitable habitat exists in the Survey Area. | Likely |

| Species | Conservation Status | | | Databases | | | Notes | Pre-survey Likelihood of Occurrence | Post-survey Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | BC Act | DBCA | EPBC PMST | Nature Map | DBCA TFS | | | |
| *Crenadactylus tuberculatus*<br><br>(Cape Range clawless gecko) | | | P2 | | ✓ | ✓ | Mainly associated with spinifex on limestone, can occur on coastal dunes. | Unlikely: Closest contemporary record is 8km from Survey Area (2008). Preferred habitat doesn't exist in Survey Area. | Unlikely |
| *Diplodactylus capensis*<br><br>(Cape Range stone gecko) | | | P2 | | ✓ | ✓ | Restricted to the rocky northern end of Cape Range. | Unlikely: NR is 8.5km from Survey Area. Preferred habitat does not exist in Survey Area. | Unlikely |
| *Lerista allochira*<br><br>(Cape Range Slider) | | | P3 | | ✓ | ✓ | Present in dissected limestone gorges and plateaux on North West Cape. | Unlikely: Suitable habitat does not exist in Survey Area. | Unlikely |

# Appendix 3. Relevé and Quadrat Data

# Appendix 4. Survey Effort

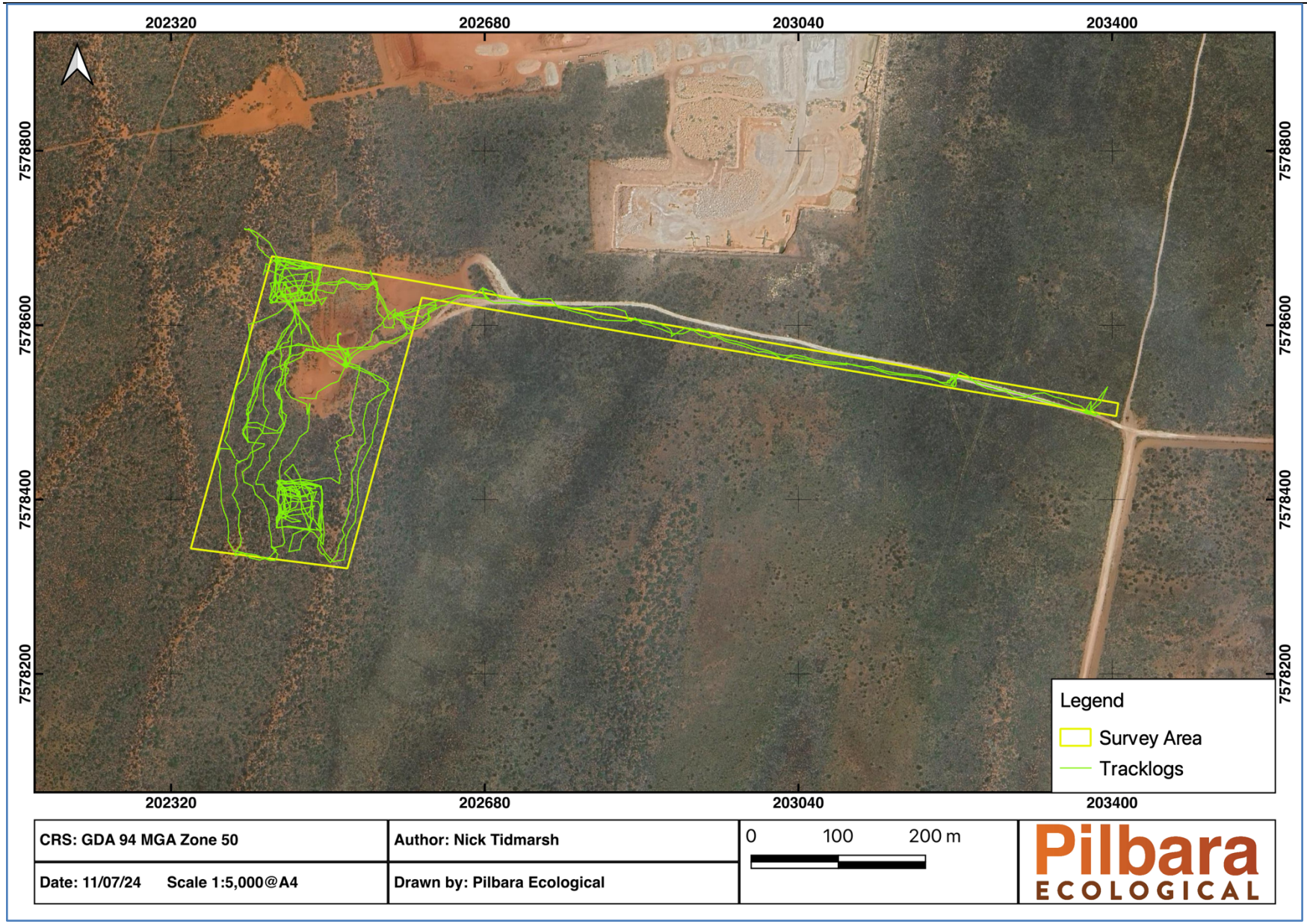


**Figure 11 Survey Effort**

# Appendix 5. List of Flora Species Recorded During the Survey

| Family | Species | Status |
|---|---|---|
| **Aizoaceae** | *Trianthema pilosum* | |
| **Amaranthaceae** | **Aerva javanica* | Weed |
| **Amaranthaceae** | *Ptilotus polystachyus* | |
| **Asparagaceae** | *Thysanotus exfimbriatus* | |
| **Boraginaceae** | *Euploca glandulifera* | |
| **Boraginaceae** | *Heliotropium crispatum* | |
| **Boraginaceae** | *Trichodesma zeylanicum* var. *indet.* | |
| **Chenopodiaceae** | *Enchylaena tomentosa* | |
| **Chenopodiaceae** | *Salsola australis* | |
| **Convolvulaceae** | *Ipomoea polymorpha* | |
| **Convolvulaceae** | *Polymeria lanata* | |
| **Emblingiaceae** | *Emblingia calceoliflora* | |
| **Euphorbiaceae** | *Euphorbia myrtoides* | |
| **Euphorbiaceae** | *Euphorbia tannensis* subsp. *eremophila* | |
| **Fabaceae** | *Acacia ?sericophylla* | |
| **Fabaceae** | *Acacia coriacea* subsp. *coriacea* | |
| **Fabaceae** | *Acacia gregorii* | |
| **Fabaceae** | *Acacia sclerosperma* subsp. *sclerosperma* | |
| **Fabaceae** | *Acacia spathulifolia* | |
| **Fabaceae** | *Acacia tetragonophylla* | |
| **Fabaceae** | *Daviesia pleurophylla* | P2 |
| **Fabaceae** | *Indigofera boviperda* subsp. *boviperda* | |
| **Fabaceae** | *Senna artemisioides* subsp. *oligophylla* | |
| **Fabaceae** | *Senna notabilis* | |
| **Fabaceae** | *Tephrosia rosea* var. *clementii* | |
| **Goodeniaceae** | *Scaevola pulchella* | |
| **Goodeniaceae** | *Scaevola sericophylla* | |
| **Gyrostemonaceae** | *Gyrostemon ramulosus* | |
| **Hemerocallidaceae** | *Corynotheca pungens* | |
| **Lamiaceae** | *Quoya paniculata* | |
| **Malvaceae** | *Alyogyne pinoniana* var. *pinoniana* | |
| **Malvaceae** | *Corchorus ?elachocarpus* | |
| **Malvaceae** | *Seringia hermanniifolia* | |
| **Malvaceae** | *Sida ?arsiniata* | |
| **Malvaceae** | *Sida rohlenae* subsp. *rohlenae* | |
| **Myrtaceae** | *Corymbia zygophylla* | |
| **Myrtaceae** | *Verticordia forrestii* | |
| **Olacaceae** | *Olax aurantia* | |
| **Oleaceae** | *Jasminum didymum* subsp. *lineare* | |
| **Poaceae** | *Eriachne aristidea* | |
| **Poaceae** | *Eriachne helmsii* | |
| **Poaceae** | *Panicum australiense* var. *australiense* | |
| **Poaceae** | **Cenchrus ciliaris* | Weed |

| Family | Species | Status |
|---|---|---|
| **Poaceae** | **Cenchrus setiger* | Weed |
| **Poaceae** | *Aristida contorta* | |
| **Poaceae** | *Chrysopogon fallax* | |
| **Poaceae** | *Dactyloctenium radulans* | |
| **Poaceae** | *Paractaenum refractum* | |
| **Poaceae** | *Paspalidium clementii* | |
| **Poaceae** | *Setaria surgens* | |
| **Poaceae** | *Triodia ?angusta* | |
| **Poaceae** | *Triodia* sp. indet. | |
| **Poaceae** | *Urochloa holosericea* subsp. *velutina* | |
| **Proteaceae** | *Banksia ashbyi* subsp. *boreoscaia* | |
| **Proteaceae** | *Grevillea gordoniana* | |
| **Proteaceae** | *Grevillea stenobotrya* | |
| **Santalaceae** | *Exocarpos sparteus* | |
| **Scrophulariaceae** | *Eremophila ?forrestii* | |
| **Solanaceae** | *Solanum diversiflorum* | |
| **Solanaceae** | *Solanum lasiophyllum* | |
| **Solanaceae** | *Duboisia hopwoodii* | |
| **Surianaceae** | *Stylobasium spathulatum* | |
| **Zygophyllaceae** | *Tribulus macrocarpus* | |

# Appendix 6. Vegetation Type Mapping

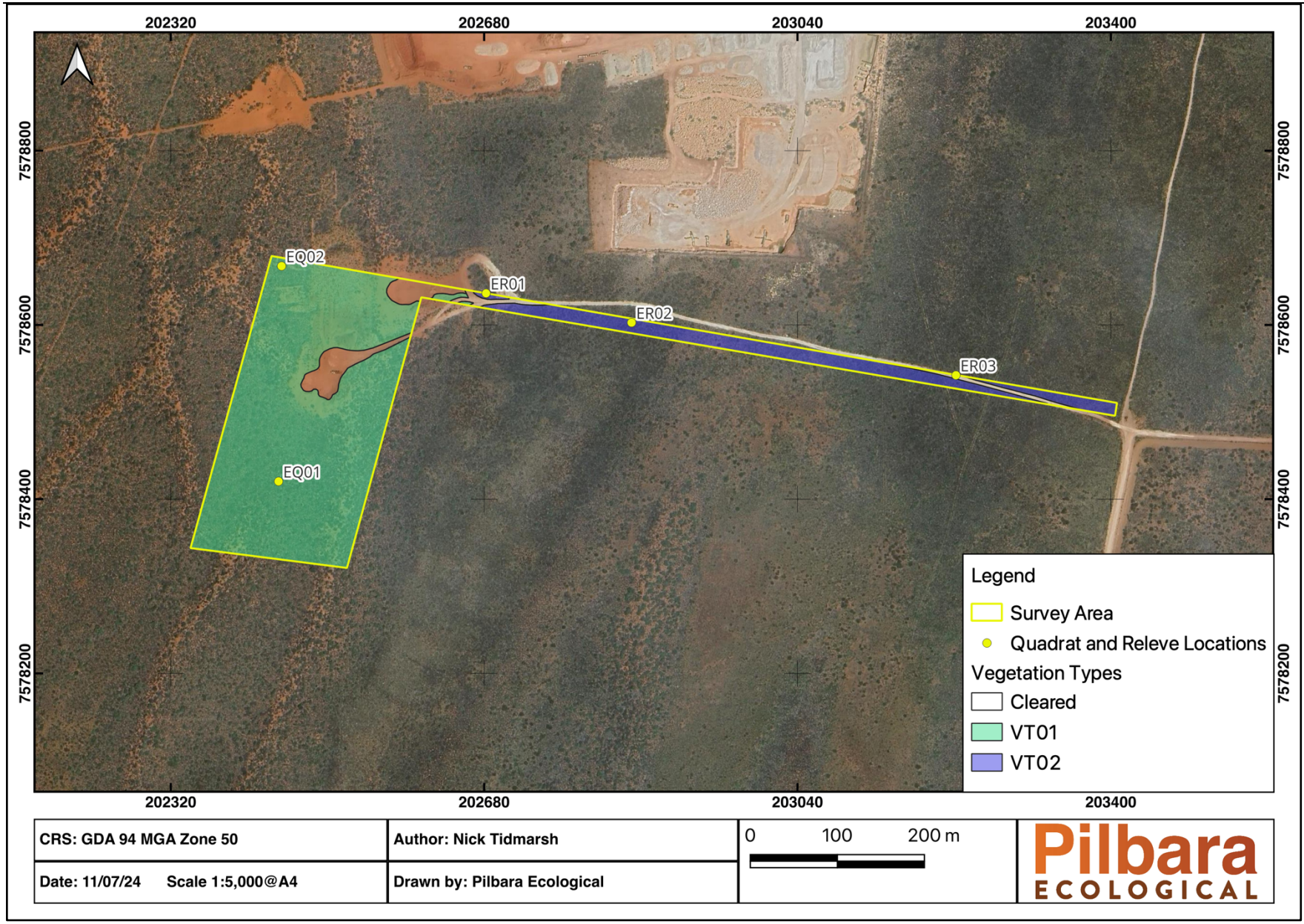


**Figure 12 Vegetation Type Mapping**

# Appendix 7. Maps Showing Location of Significant Flora

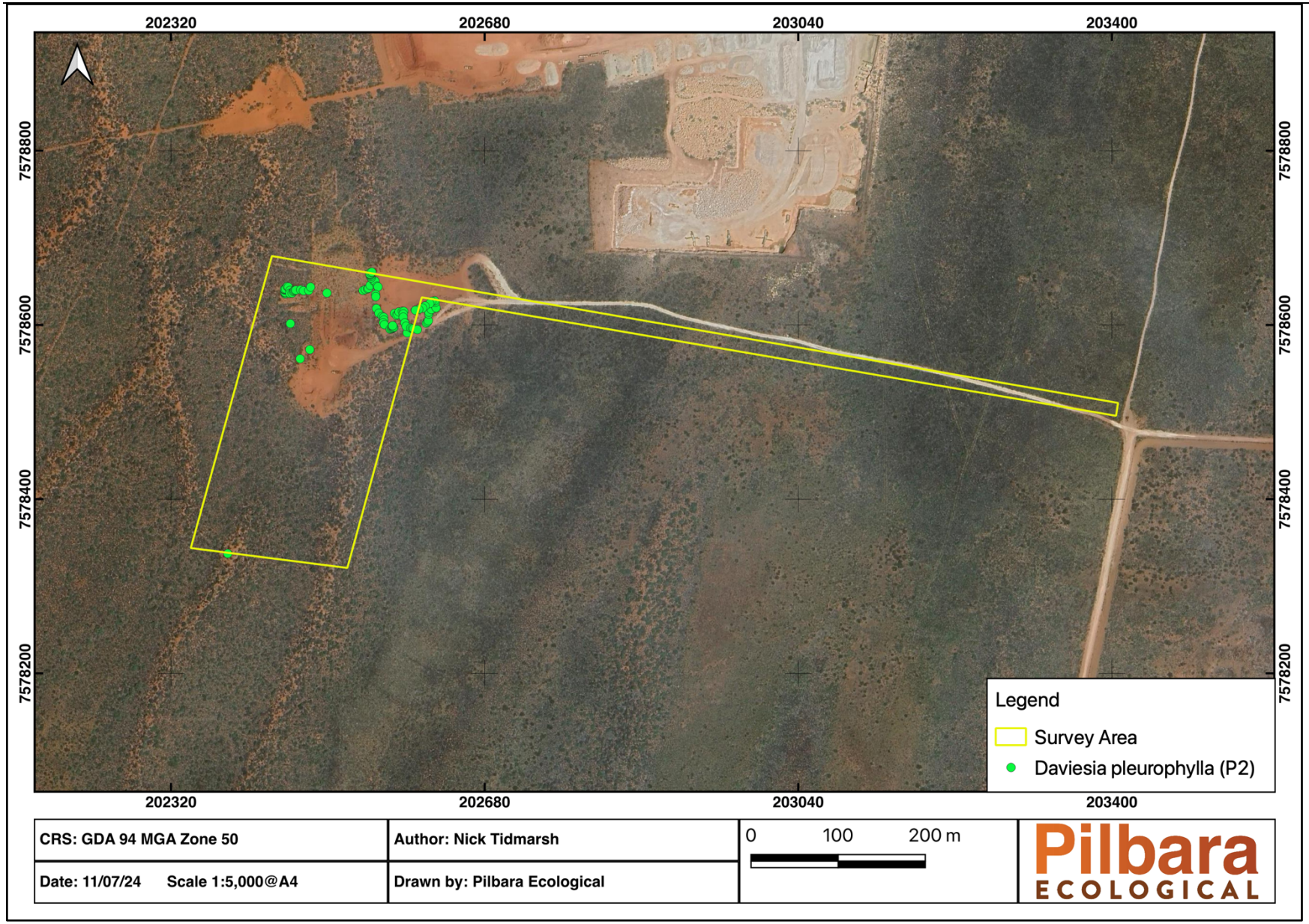


**Figure 13 Location of Significant Flora**

# Appendix 8. Vegetation Condition Mapping

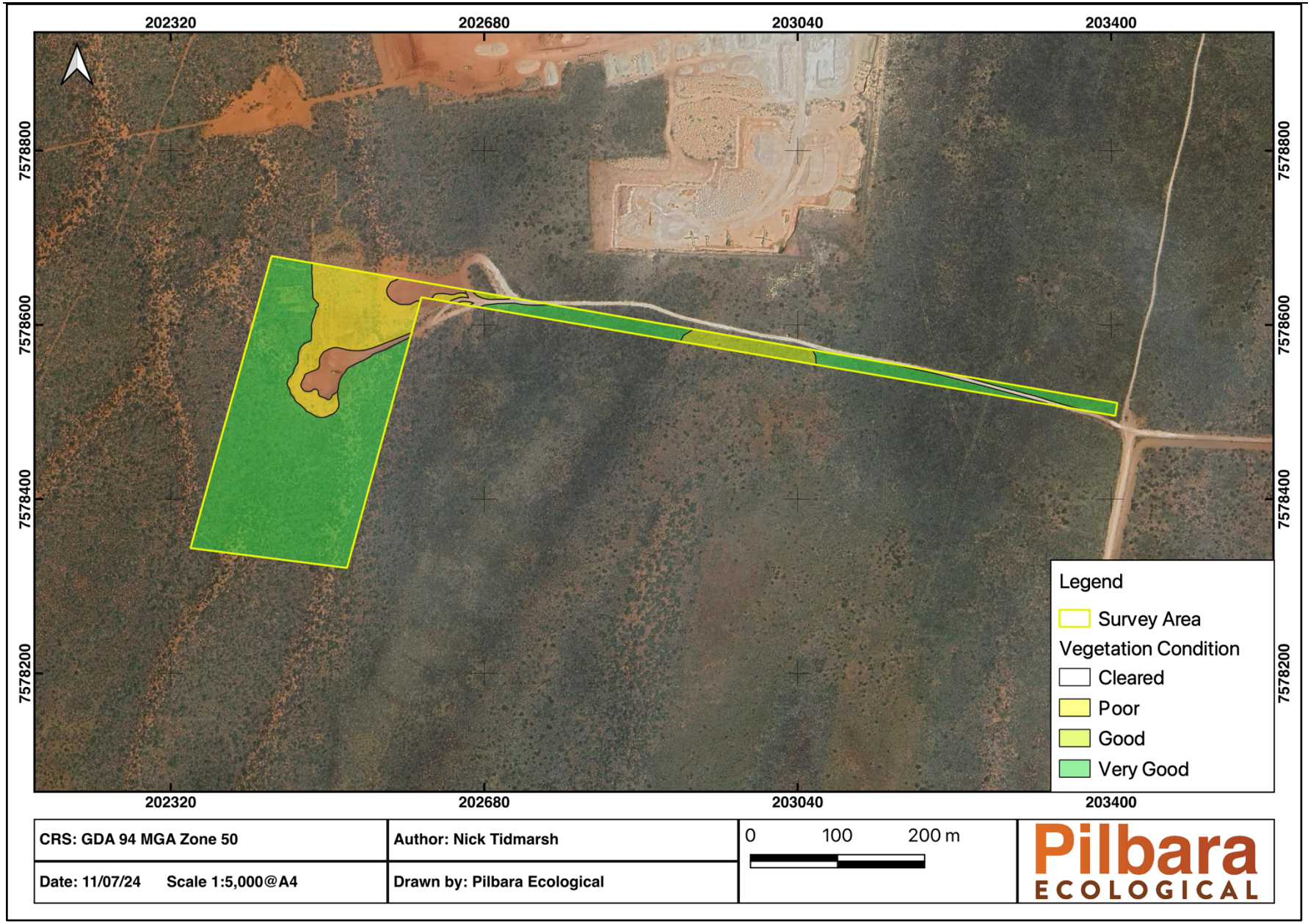


**Figure 14 Vegetation Condition Mapping**

# Appendix 9. Fauna Habitat Mapping

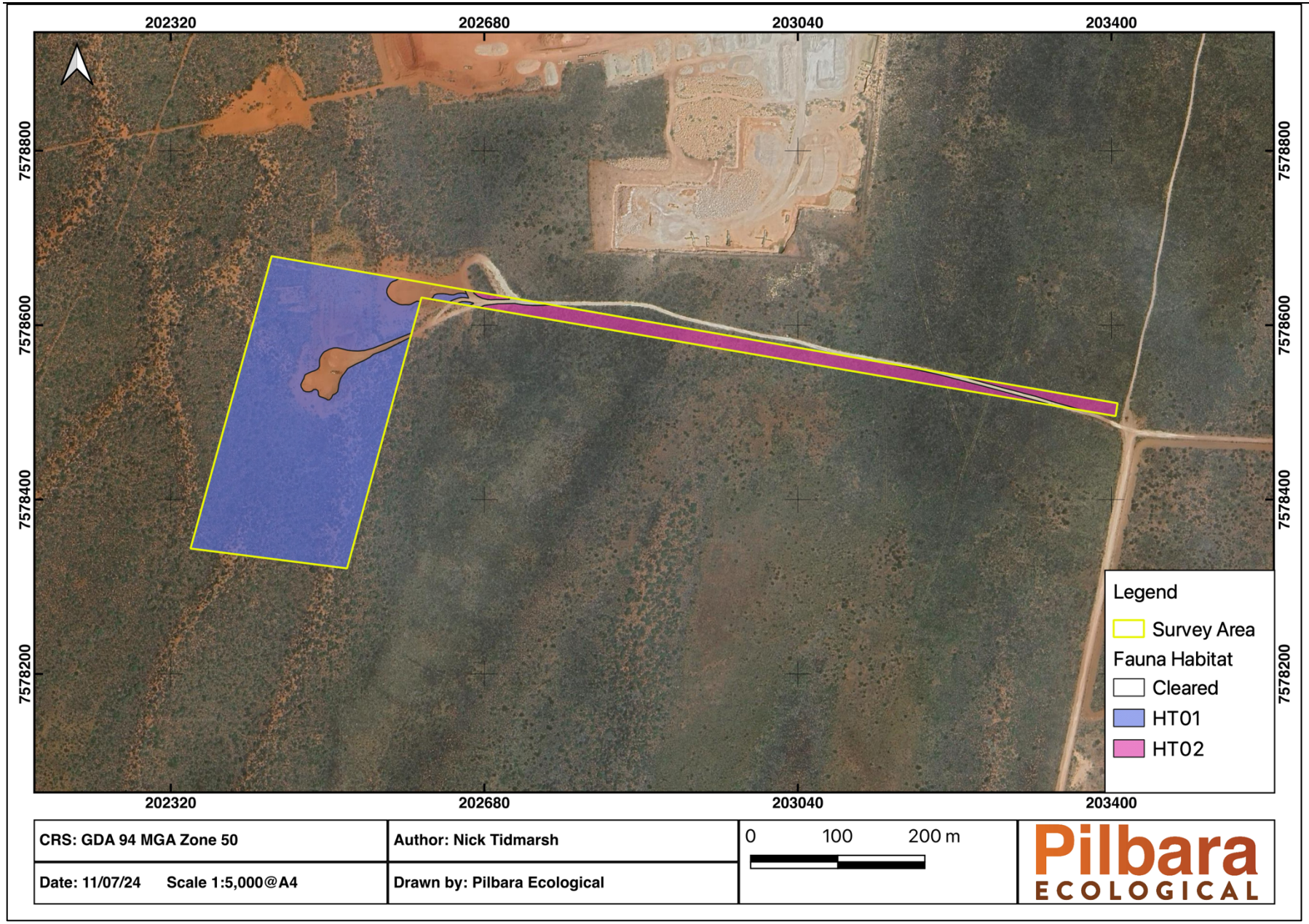


**Figure 15 Fauna Habitat Mapping**

# Appendix C:
## Letter of authorisation – clearing permit application

Exmouth Sand Supplies

PO Box 338
Exmouth WA 6707

John or Andrea Kiesey 0407 493 707 whitebattrucking@bigpond.com
John or Kerrie Ogg 0417 921 650 kcjex@bigpond.net.au

10 June 2024

General Manager Environmental Compliance
Resource and Environmental Compliance Division
Department of Energy, Mines, Industry Regulation and Safety
Mineral House, 100 Plain Street
East Perth WA 6004

CONFIDENTIAL

Dear Sir/Madam

**Letter of authorisation - clearing permit application**

I refer to the clearing permit application made by Hanson Construction Materials Pty Ltd (ACN 009 679 734) (**Hanson**) in relation to the land the subject of Mining Lease 08/510 and L08/157 (**Tenements**) that will be made during 2024.

The Tenements are held in equal shares by John Victor Ernest Kiesey, Andrea Martina Kiesey, John Wilson Ogg and Kerrie Ann Ogg (**Tenement Holders**). The Tenement Holders intend to sell the Tenements to Hanson. The Tenement Holders hereby:

(a) consent to Hanson making the Application in respect of the Tenements in Hanson's own name; and

(b) upon the Application being granted and post completion of the sale of the Tenements to Hanson, consent to Hanson accessing the Tenements to undertake the clearing that is authorised by the clearing permit.

We would be grateful if you would please arrange for the Application to be granted to Hanson as soon as possible.

Yours sincerely,

The Tenement Holders

John Victor Ernest Kiesey

Andrea Martina Kiesey

John Wilson Ogg

Kerrie Ann Ogg