

# Application for a new NVCP for Rivendell / Fanghorn

Native Vegetation Clearing Permit Application  
Supporting Document

February 2024



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## 1 INTRODUCTION

BHP Iron Ore Pty Ltd (BHP) currently operates a number of iron ore mines and associated rail and port infrastructure within the Pilbara region of Western Australia (WA). Current mining operations include the:

- Newman Operations consisting of the:
  - Whaleback hub located approximately two kilometres (km) west of Newman Township and consists of Mount Whaleback, and Orebodies 29, 30 and 35; and
  - Eastern Ridge hub located approximately 5 km east of Newman Township and consists of Orebodies 23, 24, 25 and 32;
- Mining Area C / Southern Flank (MAC) located approximately 90 km north west of Newman Township;
- Jumblebar Operations consisting of Wheelarra Hill (Jumblebar) Mine, Orebody 18 and Orebody 31 are located approximately 35 km east of Newman Township;
- Yandi Mine located approximately 100 km north west of Newman Township.

Ore from the Newman Operations, Mining Area C, Jumblebar Operations and Yandi mining operations is transported to Port Hedland via the BHP Newman to Port Hedland Mainline (and associated spur lines). Ore is then shipped out through Port Hedland at the BHP facilities at Nelson Point and Finucane Island.

BHP has identified an area north of the Jumblebar Operations as a potential area to establish a series of managed aquifer recharge (MAR) schemes (**Figure 1**). To enable the development of the MAR schemes BHP needs to undertake conduct a range of hydrological investigations to identify potentially suitable locations for scheme infrastructure.

BHP is therefore seeking a new Native Vegetation Clearing Permit (NVCP) over the area for the purposes of hydrological / hydrogeological investigations, access tracks and associated activities. The proposed activities will require 200 hectares (ha) of clearing within a 38,850.45 ha Application Area.

In accordance with Part V Division 2 of the *Environmental Protection Act 1986* (EP Act), BHP hereby refers the application for a new NVCP covering the Rivendell / Fanghorn area to the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS).

BHP considers that the proposed amendment application will not result in any significant environmental or social impacts and that the proposed Project complies with the 'Ten Clearing Principles', as defined in Schedule 5 of the EP Act.

### 1.1 LOCATION

The Application Area is located approximately 35 km north east of Newman in the Pilbara region of Western Australia (**Figure 1**).

### 1.2 TENURE

The Application Area is located on Miscellaneous Licence L46/144.

### 1.3 LOCAL GOVERNMENT JURISDICTION

The Application Area is located within the Shire of East Pilbara.

### 1.4 PROJECT DESCRIPTION

BHP has identified an area north of the Jumblebar Operations as a potential area to establish a series of MAR schemes to enable surplus mine dewatering to be returned to the regional aquifers. To enable the development of the MAR schemes BHP needs to undertake conduct a range of hydrological investigations to identify potentially suitable locations for scheme infrastructure. BHP is therefore seeking a new Native Vegetation Clearing Permit (NVCP) over the area for the purposes of hydrological / hydrogeological investigations, access tracks and associated activities.

### 1.5 PROJECT CHARACTERISTICS AND COMMITMENTS

BHP commits to undertake the Project in accordance with the details set out in **Table 1**.

**Table 1: Project Characteristics and Commitments**

Permit Characteristics	
Authorising Agency	DEMIRS
Permit Title	Rivendell / Fanghorn
Area to be cleared	200 hectares.
Application Area	38,850.45 hectares.
Purpose of the permit	Clearing for the purposes of hydrological / hydrogeological investigations, access tracks and associated activities
Tenure	The Application Area is located on Miscellaneous Licence L46/144.
Clearing Duration	Until 30 November 2034
Permit Duration	Until 30 November 2039
Proposed Annual Reporting Date	01 October for the previous Financial Year
Proposed Final Reporting Date	30 November 2039
Application boundary	Map Reference: <ul style="list-style-type: none"> <li>• JIM_006NVCP_001_RevA_0</li> <li>• JIM_006NVCP_002_RevA_0</li> <li>• JIM_006NVCP_003_RevA_0</li> </ul> BHP Shapefile D2 Reference: <a href="https://waio-dctm.bhp.com/D2/?docbase=bhpbio_od_prod&amp;locateld=0b03c41a843791f6&amp;application=ManagedDocuments">https://waio-dctm.bhp.com/D2/?docbase=bhpbio_od_prod&amp;locateld=0b03c41a843791f6&amp;application=ManagedDocuments</a>
Application Commitments	Section
Populations of Priority flora will be avoided by a 10 m buffer where practicable.	3.4.2 6.1
Control of established weed populations will be carried out according to BHP's standard Weed Control and Management Procedures.	3.4.3 6.7.4
Active Mulgara burrows will be avoided with a 10 m buffer, where practicable	3.4.4 6.2
Active Greater Bilby burrows will be avoided with a 10 m buffer	3.4.4 6.2
Active mounds of the Western Pebble-mound Mouse will be avoided using a 10 m buffer, where practicable.	3.4.4 6.2
Where practicable, existing cleared tracks will be used to cross the Fortescue River, Jimblebar Creek and Caramulla Creek and unnamed non-perennial minor drainage lines. If it is necessary for new crossings to be installed, clearing will be kept to a bare minimum and will be constructed flat level to the surface (i.e. a simple clearing with no bunds) to maintain the natural surface flow.	3.6 6.6 6.9

## 2 ASSOCIATED APPROVALS

Any other additional approvals will be sought as required.

### 3 EXISTING ENVIRONMENT

#### 3.1 CLIMATE

Newman Aero meteorological site (007176) is the closest Bureau of Meteorology (BoM) station to the Application Area. Average annual rainfall at Newman Aero is 318.0 mm (BOM, 2024a). This is mainly derived from tropical storms and cyclones during summer, producing sporadic, heavy rains over the area. Mean monthly rainfall varies from 4.6 mm in September to 71.6 mm in February (BoM, 2024a). Daily rainfall is highly variable; the highest maximum daily rainfall ranges from 34.8 mm in October, to 305.6 mm in February (BoM, 2024a). The mean maximum temperature in summer months (October to March) is 35.2°C to 39.4°C, and mean maximum temperature in winter (April to September) is between 23.0°C and 32.1°C (BoM, 2024a).

Wittenoom meteorological site (005026) is the closest station to the Application Area that records daily evaporation. Wittenoom is located approximately 200 km north west of the Application Area. Mean daily evaporation at Wittenoom throughout the year is 8.6 mm/day (BoM, 2023b), which equates to 3.1 metres per year. Evaporation greatly exceeds rainfall in the region throughout the year and on a month-by-month basis (BoM, 2024b).

#### 3.2 BIOREGION, LANDFORMS AND LAND SYSTEMS

The Application Area is situated in the following biogeographic subregion:

- Fortescue subregion (PIL2) of the Pilbara region described as: *“Alluvial plains and river frontage. Extensive salt marsh, mulga-bunch grass, and short grass communities on alluvial plains in the east. Deeply incised gorge systems in the western (lower) part of the drainage. River gum woodlands fringe the drainage lines. Northern limit of Mulga (Acacia aneura). An extensive calcrete aquifer (originating within a palaeo-drainage valley) feeds numerous permanent springs in the central Fortescue, supporting large permanent wetlands with extensive stands of river gum and cadjeput Melaleuca woodlands. Climatic conditions are semi desert tropical, with average rainfall of 300 mm, falling mainly in summer cyclonic events. Drainage occurs to the north-west. Subregional area is 2,041,914ha”* (Kendrick, 2001).

The proposed Application Area is also located in the following land systems, as mapped by van Vreeswyk *et al.* (2004):

- Adrian: Stony plains and low silcrete hills supporting hard spinifex grasslands.
- Divide: Sandplains and occasional dunes supporting shrubby hard spinifex grasslands.
- Fan: Washplains and gilgai plains supporting groved mulga shrublands and minor tussock grasslands.
- Fortescue: Alluvial plains and flood plains supporting patchy grassy woodlands and shrublands and tussock grasslands.
- River: Active flood plains and major rivers supporting grassy eucalypt woodlands, tussock grasslands and soft Spinifex grasslands.
- Washplain: Hardpan plains supporting groved mulga shrublands.

These Land Systems are well represented in the Pilbara.

#### 3.3 GEOLOGY AND SOILS

Soils of the Pilbara region have been defined and mapped at a scale of 1:2,000,000 by Bettenay *et al.* (1967). The following soil units occur in the Application Area, based on mapping by Bettenay *et al.* (1967):

- Be6: Extensive flat and gently sloping plains, which sometimes have a surface cover of gravels and on which red-brown hardpan frequently outcrops: chief soils are shallow earthy loams (Um5.3), with associated (Gn) soils of units My5O and Mz23 of Sheet 6. There are also inclusions of units Oc47 and BB9.
- MM16: Alluvial plains dominated by deep cracking clays (Ug5.38) along with some areas of (Uf6.71) soils, and minor areas of (Dr2.33) soils.
- Mz25: Plains associated with the Fortescue valley; there is a surface cover of stony gravels close to the ranges and hills: chief soils are acid red earths (Gn2.11) with some neutral red earths (Gn2.12); red-brown hardpan is absent. Associated are areas of calcareous earths (Gc) and loams (Um1) on calcrete (kunkar) and some hard red (Dr) soils around creek lines.

**3.4 FLORA, VEGETATION AND FAUNA**

Twelve flora and vegetation surveys and four vertebrate fauna surveys have been undertaken across the Application Area between 2014 and 2022.

Primary surveys for the Application Area are:

- *OB32 Surplus Water & Homestead Creek Wetting Front Detailed Flora & Vegetation Assessment* (Spectrum Ecology & Spatial, 2022) (IBSA-2023-0106) (**Appendix 1**);
- *BHP Poonda MAR reconnaissance flora and level 1 fauna survey* (GHD, 2020a) (**Appendix 2**);
- *BHP WAIO Jimblebar Eremophila capricornica Targeted Flora Survey* (Biologic Environmental Survey, 2021) (IBSA-2022-0317) (**Appendix 3**);
- *Targeted Survey for Acacia sp. East Fortescue (surrounding OB31)* Onshore Environmental Consultants, 2015) (IBSA-2022-0310) (**Appendix 4**);
- *Orebody 32 Surplus Water Targeted MNES Vertebrate Fauna Survey* (Biota Environmental Sciences, 2022) (IBSA-2023-0105) (**Appendix 5**); and
- Jimblebar targeted ghost bat survey (GHD, 2020b) (IBSA-2022-0318) (**Appendix 6**).

**3.4.1 Vegetation Communities**

The Application Area is located within the Interim Biogeographic Regionalisation for Australia (IBRA) Pilbara Bioregion (Department of Environment and Heritage, 2005). According to the Government of Western Australia (2013), the bioregion is 99.9% vegetated (**Table 2**).

The vegetation within the Application Area is classified as the following vegetation associations, as mapped by Beard (1975):

- 29 Sparse low woodland; mulga, discontinuous in scattered groups
- 111 Hummock grasslands, shrub steppe; *Eucalyptus gamophylla* over hard spinifex
- 166 Low woodland; mulga & *Acacia victoriae*

There is more than 99% of the pre-European vegetation remaining of these vegetation associations (**Table 2**).

The Application Area is not part of any significant remnant vegetation in the wider regional area.

**Table 2: Pre-European extent of vegetation associations occurring within the Application Area (Government of Western Australia, 2013)**

Vegetation Sub-Association	Pre-European Extent (ha)	Current Extent (ha)	% Remaining	Pre-European % in IUCN Class I-IV Reserves
Pilbara IBRA Bioregion	17,808,657.06	17,733,583	99.58	6.34
Vegetation Association 29 within Western Australia	7,903,991.47	7,900,200.44	99.95	0.29
Vegetation Association 29 within the Pilbara Bioregion	1,133,219.76	1,132,939.20	99.98	1.91
Vegetation Association 111 within Western Australia	762,963.54	762,326.21	99.92	5.46
Vegetation Association 111 within the Pilbara Bioregion	550,286.98	550,232.44	99.99	1.29
Vegetation Association 166 within the Pilbara Bioregion	387,530.52	387,511.29	100.00	0.00
Vegetation Association 166 within the Pilbara Bioregion	25,541.89	25,541.89	100.00	0.00

A total of nine broad floristic formations (**Figure 2**) with nine vegetation associations have been described and mapped within the Application Area (**Table 3**).

**Table 3: Vegetation associations of the Application Area (Spectrum Ecology & Spatial, 2022; GHD, 2020a)**

Broad Floristic Formation		Vegetation Association Description
* <i>Cenchrus</i> Open Tussock Grassland	SC CceEcy Aap SaoSah	Open Tussock Grassland of * <i>Cenchrus ciliaris</i> and <i>Enneapogon cylindricus</i> with Low Woodland of <i>Acacia aptaneura</i> over High Open Shrubland of <i>Acacia tetragonophylla</i> and <i>Acacia synchronicia</i> with Low Open Shrubland of <i>Senna artemisioides</i> subsp. <i>helmsii</i> and <i>Senna artemisioides</i> subsp. <i>oligophylla</i> on orange sand clay on plains.
* <i>Cenchrus</i> Tussock Grassland	SC CciEpo Aci	Tussock Grassland of * <i>Cenchrus ciliaris</i> and <i>Enneapogon polyphyllus</i> and Low Woodland of <i>Acacia citrinoviridis</i> on orange brown sand and clay on floodplains.
<i>Digitaria</i> Tussock Grassland	CL DctCpuPra	Tussock Grassland of <i>Digitaria ctenantha</i> , <i>Chloris pumilio</i> , and <i>Paspalidium rarum</i> and Low Open Forest of <i>Acacia aptaneura</i> on brown sand and clay on plains.
Eucalyptus Woodland	MA Ecr AciAhe Mgl	Woodland of <i>Eucalyptus camaldulensis</i> with Low Open Woodland of <i>Acacia citrinoviridis</i> with High Open Shrubland of <i>Melaleuca glomerata</i> and Low Scattered Shrubs of <i>Acacia pyrifolia</i> var. <i>morrisonii</i> , and <i>Acacia pyrifolia</i> var. <i>pyrifolia</i> over Scattered Sedges of <i>Cyperus vaginatus</i> on orange sandy clay in major creek lines.
Low woodland of <i>Acacia aptaneura</i> and <i>Acacia paraneura</i> with occasional <i>Corymbia aspera</i> and <i>Corymbia hamersleyana</i> scattered trees	SA ApApCaCh	Low woodland of <i>Acacia aptaneura</i> and <i>Acacia paraneura</i> with occasional <i>Corymbia aspera</i> and <i>Corymbia hamersleyana</i> scattered trees over <i>Eremophila forrestii</i> subsp. <i>forrestii</i> , <i>Senna artemisioides</i> subsp. <i>helmsii</i> and <i>Senna artemisioides</i> subsp. <i>oligophylla</i> shrubland over <i>Triodia epactia</i> very open to scattered hummock grassland with <i>Aristida contorta</i> open tussock grassland on sandy loam Mulga plains.
Low woodland of <i>Acacia paraneura</i> , <i>Acacia pruinocarpa</i> and <i>Acacia citrinoviridis</i>	OT ApApAc	Low woodland of <i>Acacia paraneura</i> , <i>Acacia pruinocarpa</i> and <i>Acacia citrinoviridis</i> with occasional scattered <i>Corymbia hamersleyana</i> over <i>Senna artemisioides</i> subsp. <i>x artemisioides</i> and <i>Senna artemisioides</i> subsp. <i>oligophylla</i> open shrubland over <i>Triodia basedowii</i> hummock grassland on low rocky hill.
Open Forest of <i>Eucalyptus victrix</i> and <i>Eucalyptus camaldulensis</i> subsp. <i>refulgens</i> on silty clay loam on major drainage line	MA EvEc	Open Forest of <i>Eucalyptus victrix</i> and <i>Eucalyptus camaldulensis</i> subsp. <i>refulgens</i> over <i>Acacia citrinoviridis</i> and <i>Acacia coriacea</i> subsp. <i>pendens</i> over <i>Indigofera monophylla</i> and <i>Corchorus crozophorifolius</i> open shrubland over * <i>Cenchrus ciliaris</i> open tussock grassland on silty clay loam on major drainage line.
Scattered low trees of <i>Hakea lorea</i> subsp. <i>lorea</i> and <i>Acacia sericophylla</i> with occasional scattered <i>Corymbia hamersleyana</i>	SA HIAs	Scattered low trees of <i>Hakea lorea</i> subsp. <i>lorea</i> and <i>Acacia sericophylla</i> with occasional scattered <i>Corymbia hamersleyana</i> over <i>Acacia pachyacra</i> and <i>Acacia ancistrocarpa</i> scattered shrubs over <i>Triodia basedowii</i> and <i>Triodia schinzii</i> hummock grassland with <i>Aristida holathera</i> var. <i>holathera</i> , <i>Eriachne aristidea</i> and <i>Eragrostis eriopoda</i> very open tussock grassland on red sand on flat sandplain.
<i>Triodia</i> Open Hummock Grassland	SA Tpu SaoSahAdi EerAhh	Open Hummock Grassland of <i>Triodia pungens</i> with a Shrubland of <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , <i>Senna artemisioides</i> subsp. <i>helmsii</i> , and <i>Acacia dictyophleba</i> over Open Tussock Grassland of <i>Eragrostis eriopoda</i> and <i>Aristida holathera</i> var. <i>holathera</i> on orange sand plains.

No Threatened Ecological Communities (TEC's) or Priority Ecological Communities (PEC's) have been identified within the Application Area. One vegetation association (High open shrubland of *Grevillea berryana* and *Acacia ancistrocarpa* - SD GbAa) has been clipped out of the Application Area with a 100m buffer as this vegetation association is analogous with DBCA Priority 3 PEC *Vegetation of sand dunes of the Hamersley Range/Fortescue Valley* (GHD, 2020a). This PEC is directly linked with the sand dune formations.

The distinct mapped broad floristic communities and vegetation associations identified within the Application Area extend or occur beyond the proposed permit boundary.

Vegetation condition within the Application Area ranges from Excellent to Poor.



### 3.4.2 Significant Flora

No species listed under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) or gazetted as Threatened Flora species under the *Biodiversity Conservation Act, 2016* (BC Act) have been recorded within or adjacent to the Application Area.

Two Priority flora have been identified within the Application Area (**Figure 2**):

- *Crotalaria smithiana* (Priority 3); and
- *Indigofera rivularis* (Priority 3).

Populations of Priority flora will be avoided by a 10 m buffer where practicable.

### 3.4.3 Weeds

Nine introduced flora species (weeds) have been recorded within the Application Area (**Table 4**). None are listed as a Declared Pest under s22 of the *Biosecurity and Agriculture Management Act, 2007* (BAM Act). Control of established weed populations will be carried out according to BHP's standard *Weed Control and Management Procedures*.

**Table 4: Introduced Flora of the Application Area**

Species	Common Name	DPAW Rating (DPAW, 2016)	Declared Pest <sup>1</sup>
* <i>Aerva javanica</i>	Kapok Bush	High and Rapid	No
* <i>Bidens bipinnata</i>	Bipinnate Beggartick	Unknown and Rapid	No
* <i>Cenchrus ciliaris</i>	Buffel Grass	High and Rapid	No
* <i>Cenchrus setiger</i>	Birdwood Grass	High and Rapid	No
* <i>Citrullus amarus</i>	Bitter melon	Unknown and Moderate	No
* <i>Citrullus colocynthis</i>	Wild Watermelon	Unknown and Moderate	No
* <i>Datura leichhardtii</i> subsp. <i>leichhardtii</i>	Native Thornapple	Unknown and Unknown	No
* <i>Malvastrum americanum</i>	Spiked Malvastrum	High and Rapid	No
* <i>Portulaca pilosa</i>	Djanggara	Not listed	No

### 3.4.4 Fauna Habitats and Significant Fauna

GHD (2020a) and Biota Environmental Sciences (2022) identified the following five vertebrate fauna habitats within the Application Area (**Figure 3**):

- **Drainage Area/ Floodplain:** Fortescue land system floodplains that consist of open shrubland with patches of mulga and sandy *Triodia* plains. Scattered *Acacia* over schrub steppe and tussock grassland with patches of mulga woodland (*Acacia aneura*) in scattered groups.
- **Major Drainage Line:** Open Forest of *Eucalyptus victrix* and *Eucalyptus camaldulensis* subsp. *refulgens* over *Acacia citrinoviridis* and *Acacia coriacea* subsp. *pendens* over *Indigofera monophylla* and *Corchorus crozophorifolius* open shrubland over *Cenchrus ciliaris* open tussock grassland.

This section of the Fortescue River is typically dry and only flows after large weather events. Several species of birds including migratory and non-migratory wetland birds and frogs utilise this habitat type. Snakes and mammals may also be attracted to this area.

- **Mulga Woodland:** Low woodland of *Acacia aptaneura* and *Acacia paraneura* over *Eremophila forrestii* subsp. *forrestii*, *Senna artemisioides* subsp. *helmsii* and *Senna artemisioides* subsp. *oligophylla* shrubland over *Triodia epactia* very open to scattered hummock grassland.

There are several large patches of Mulga Woodland habitat across the Application Area, with long sections that correspond to associated drainage lines, particularly the major drainage line (Fortescue River) that stretches northeast to southwest of the Application Area. This habitat provides large tree-lined water courses (*Corymbia hamersleyana* and *Corymbia aspera*) suitable for several birds. The understory provides litter and debris as microhabitats suitable for burrowing reptiles and potentially frogs. Some areas of mulga woodland had a sand plain understory that provided foraging plant species and suitable burrowing substrate for the greater bilby.

<sup>1</sup> *Biosecurity and Agriculture Management Act, 2007* (BAM Act) s22

- **Sand Plain:** Scattered low trees of *Hakea lorea* subsp. *lorea* and *Acacia sericophylla* with occasional scattered *Corymbia hamersleyana* over *Acacia pachyacra* and *Acacia ancistrocarpa* scattered shrubs over *Triodia basedowii* and *Triodia schinzii* hummock grassland.

The sand plain habitat makes up a majority of the Application Area. Several species of reptiles, including snakes and lizards will utilise this habitat for foraging, burrowing and dispersal. Evidence of goanna diggings was prevalent over the entirety of the Application Area. Small rodents and mammals will also utilise this habitat as a foraging and dispersal area. Evidence of the Echidna (tracks and scats), small mammal (Spinifex Hopping Mouse etc) and introduced mammals including dog, cat and horse were located over the Application Area. The sandy substrate and protection of the spinifex hummocks provides suitable burrowing habitat for the greater bilby and the brush-tailed mulgara.

- **Hillcrest/ Hillslope:** Low woodland of *Acacia paraneura*, *Acacia pruinocarpa* and *Acacia citrinoviridis* open shrubland over *Triodia basedowii* hummock grassland on low rocky hill.

Certain species of reptiles adapted to rocky substrates will utilise this habitat-type, including *Ctenophorus* spp. and *Ctenotus* spp. such as *Ctenophorus caudicinctus* and *Ctenotus pantherinus*. Small rodents and mammals will also utilise this habitat as a foraging and dispersal area. The Western Pebble-mound Mouse utilises this habitat type for building mounds and burrow systems.

These fauna habitats extend beyond the Application Area and are common in the surrounding region. Areas of Sand Dune habitat has been excluded from the Application Area with a 100m buffer.

The surveys undertaken across the Application Area (GHD, 2020a and 2020b; Biota Environmental Sciences, 2022) have resulted in four fauna species of significance being recorded from within the Application Area (**Figure 3**):

- Brush-tailed Mulgara (*Dasyurus blythi*) (DBCA Priority 4)
- Fork-tailed Swift (*Apus pacificus*) (Migratory EPBC Act and BC Act);
- Grey Falcon (*Falco hypoleucos*) (Vulnerable EPBC Act and BC Act); and
- Western Pebble-mound Mouse (*Pseudomys chapmani*) (Priority 4 DBCA).

Based on the occurrence of the habitat types and significant fauna species previously recorded in the vicinity, an additional five species are considered to potentially occur within the Application Area (i.e. those considered 'likely' or 'possible' to occur within the Application Area):

- Greater Bilby (*Macrotis lagotis*) (Vulnerable EPBC Act and BC Act);
- Peregrine Falcon (*Falco peregrinus*) (BC Act Other specially protected fauna)
- Pilbara Leaf-nosed Bat (*Rhinonictis aurantia*) (Vulnerable EPBC Act and BC Act)
- Pilbara Olive Python (*Liasis olivaceus barroni*) (Vulnerable EPBC Act and BC Act); and
- Spectacled Hare-wallaby (*Lagorchestes conspicillatus leichardti*) (Priority 4 DBCA).

An assessment of the potential impact of the proposed clearing on the species of significant fauna that may occur in the application amendment area is provided in **Table 5**.

**Table 5: Significant Fauna Recorded or Potentially Occurring within the Application Area**

Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood	Potential Impact on Species
<b>Birds</b>					
Fork-tailed Swift ( <i>Apus pacificus</i> )	Migratory EPBC Act Migratory BC Act	The Fork-tailed Swift breeds in north-east and east Asia, wintering in Australia and southern New Guinea (Johnstone and Storr, 1998). Fork-tailed Swifts are entirely aerial within the Pilbara and may forage sporadically over the Application Area in the summer months, associated with thunderstorms and cyclonic systems (Johnstone and Storr, 1998).	The Fork-tailed Swift is largely an aerial species and has a broad distribution across much of Western Australia. It is viewed as a nomadic species and may fly over the Application Area.	Recorded	<b>Negligible</b> As this species is entirely aerial and not reliant on terrestrial habitats, the impact to this species is considered to be negligible.
Grey Falcon ( <i>Falco hypoleucos</i> )	Vulnerable EPBC Act Vulnerable BC Act	The Grey Falcon occurs at low densities across inland Australia. This species frequents timbered lowlands, particularly Acacia shrublands that are crossed by tree-lined drainage systems (Threatened Species Scientific Committee, 2020). The species also frequents spinifex and tussock grassland.	The Drainage Area/Floodplain and Major Drainage Line habitat provide suitable foraging habitat for this species. The species may be an infrequent foraging visitor to the Application Area.	Recorded	<b>Low</b> Proposed activities under the Application Area are unlikely to have an impact given the species' high mobility and wide distribution, and its preferred habitat is present in the surrounding region.
Peregrine Falcon ( <i>Falco peregrinus</i> )	Other Specially Protected Fauna BC Act	The Peregrine Falcon is uncommon but wide ranging across Australia. They occur mainly along coastal cliffs, rivers and ranges as well as wooded watercourses and lakes. The Peregrine Falcon nests primarily on cliffs, granite outcrops and quarries, and feed mostly on birds (Johnstone and Storr 1998).	The Peregrine Falcon may forage opportunistically within the Application Area. No suitable breeding habitat is known from the Application Area.	Possible	<b>Low</b> Given the availability of suitable foraging habitat in the local area and surrounding region and the wide ranging and highly mobile nature of the Peregrine Falcon, the potential impact to this species is considered to be low.
<b>Mammals</b>					
Brush-tailed Mulgara ( <i>Dasyercus blythi</i> )	Priority 4 DBCA	Brush-tailed mulgaras occur in a range of vegetation types, however, the principal habitat is mature hummock grasslands of spinifex, especially <i>Triodia basedowii</i> and <i>T. pungens</i> (Masters <i>et al.</i> , 2003). Note: Woolley, <i>et. al.</i> (2013) noted that the Crest-tailed Mulgara ( <i>Dasyercus cristicauda</i> ) is unlikely to occur within the Pilbara.	The sand plain habitat is ideal burrowing and foraging habitat for the Brush-tailed Mulgara. Secondary evidence (scats and burrows) of the Mulgara was located in this habitat type (GHD, 2020a). The sandy substrate and protection of the spinifex hummocks provides the burrowing habitat. There are multiple records of the Brush-tailed Mulgara between Port Hedland and Newman both within and adjacent to the Application Area.	Recorded	<b>Low</b> There is likely to be a low impact on this species given that: <ul style="list-style-type: none"> <li>the Sand Plain habitat within the Application Area is widespread throughout the Pilbara;</li> <li>Active Mulgara burrows will be avoided with a 10 m buffer, where practicable; and</li> <li>the application is to clear a relatively small amount (200 ha out of 38,850.45 ha or less than 0.52%) of the Application Area, therefore large undisturbed areas of the Sand Plain habitat will remain.</li> </ul>

Application for a new NVCP for Rivendell / Fanghorn

Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood	Potential Impact on Species
Greater Bilby ( <i>Macrotis lagotis</i> )	Vulnerable EPBC Act Vulnerable BC Act	Three major vegetation types associated with the Greater Bilby are listed by Southgate (1990) including: open tussock grassland on uplands and hills, Mulga woodland/shrubland on ridges and rises, and hummock grassland in plains and alluvial areas. Other habitats used by the species include stony downs, cracking clays, desert sandplains and dune fields, spinifex grassland and <i>Acacia</i> species shrublands on red earths (Johnson, 2008).	The sand plain habitat is ideal burrowing and foraging habitat for the Greater Bilby.  The sandy substrate and protection of the spinifex hummocks provides the burrowing habitat.	Possible	<b>Low</b> There is likely to be a low impact on this species given that: <ul style="list-style-type: none"> <li>the Sand Plain habitat within the Application Area is widespread throughout the Pilbara;</li> <li>Active Greater Bilby burrows will be avoided with a 10 m buffer; and</li> <li>the application is to clear a relatively small amount (200 ha out of 38,850.45 ha or less than 0.52%) of the Application Area, therefore large undisturbed areas of the Sand Plain habitat will remain.</li> </ul>
Pilbara Leaf-nosed Bat ( <i>Rhinonicteris aurantia</i> )	Vulnerable EPBC Act Vulnerable BC Act	The Pilbara leaf-nosed bat is a sub-population of the orange leaf-nosed bat and is endemic to the Pilbara and Ashburton regions of Western Australia. This species has specific roosting requirements, requiring roost sites in caves or mine adits with stable, very hot and humid microclimates (Churchill 2008). Observed foraging habitat includes <i>Triodia</i> hummock grassland, sparse tree and shrub savannah and riparian vegetation along drainage lines, over pools and low shrubs in ironstone gorges.	The Major Drainage Line habitat within the Application Area is considered to be supporting habitat for the Pilbara Leaf-nosed Bat. This species was recorded by Biota Environmental Sciences (2022) 800 m to the north and 2 km to the south of the Application Area in Major Drainage Line habitat.	Likely	<b>Low</b> There is likely to be a low impact on this species given that: <ul style="list-style-type: none"> <li>There are no known roosts within the Application Area.</li> <li>Major drainage line habitat occurs to the south and north of the Application Area</li> <li>the application is to clear a relatively small amount (200 ha out of 38,850.45 ha or less than 0.52%) of the Application Area, therefore large undisturbed areas of the Major Drainage Line habitat will remain.</li> </ul>
Spectacled Hare-wallaby ( <i>Lagorchestes conspicillatus leichardti</i> )	Priority 4 DBCA	The Spectacled Hare-wallaby was once widely distributed across the lower latitudes of northern Australia from eastern Queensland, through Northern Territory to the Pilbara and Kimberley in Western Australia, with a subspecies on Barrow Island. In the Pilbara region this species has declined drastically, possibly due to fox predation and because frequent burning of spinifex grasslands has prevented the development of the large hummocks required for shelter (Van Dyck and Strahan 2008). They live in open woodlands, shrublands and hummock grasslands, sheltering under vegetation or in burrows during the day and searching for herbs, grass and fruits at night.	The Sand Plain and Mulga Woodlands within the Application Area provide suitable foraging habitat for this species.	Possible	<b>Low</b> There is likely to be a low impact on this species given that: <ul style="list-style-type: none"> <li>the Sand Plain and Mulga habitat within the Application Area is widespread throughout the Pilbara; and</li> <li>the application is to clear a relatively small amount (200 ha out of 38,850.45 ha or less than 0.52%) of the Application Area, therefore large undisturbed areas of the Sand Plain habitat will remain.</li> </ul>

Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood	Potential Impact on Species
Western Pebble-mound Mouse ( <i>Pseudomys chapmani</i> )	Priority 4 DBCA	The Western Pebble-mound Mouse is restricted to the Pilbara region, where it is recognized as an endemic species. Abandoned mounds to the east of its current range indicate a decline in distribution (Menkhorst and Knight, 2004). Abandoned mounds in disturbed areas suggest that the species is under threat by grazing and mining activities. The construction of extensive pebble mounds, built from small stones, which typically cover areas from 0.5-9.0 square metres, is characteristic of this species. Mounds are restricted to suitable class stones, and are usually found on gentle slopes and spurs (van Dyck and Strahan, 2008).	The Hillcrest / Hillslope habitat of the Application Area is suitable for this species. This species has been recorded within the Application Area and is widespread commonly in the broader region.	Recorded	<b>Low</b> There are large areas of suitable habitat adjacent to the Application Area. This species has been recorded in the vicinity of the Application Area and is relatively widespread in the Pilbara. The habitat within the Application Area where this species is found is considered to be low habitat value, and is considered not necessary for the continuance of this species. Active mounds of the Western Pebble-mound Mouse will be avoided using a 10 m buffer, where practicable.
<b>Reptiles</b>					
Pilbara Olive Python ( <i>Liasis olivaceus barroni</i> )	Vulnerable EPBC Act Vulnerable BC Act	Pilbara Olive Python are widespread across the Pilbara, with many significant populations remaining (Pearson, 2003). The Pilbara Olive Python is found in a range of habitats, including drier areas of woodland, escarpments, rocky gorges, gullies and around watercourses (Wilson and Swan, 2010). This species is known to den/ shelter in rocky crevices or tree hollows and are often associated with areas containing watercourses. The Pilbara Olive Python uses drainage line habitat to forage and disperse throughout the landscape.	The Pilbara Olive Python may forage within the Major Drainage Line and Drainage Area/ Floodplain habitats of the Application Area, however its preferred habitat (Gorge and Gully) is absent from the application area and its surrounds	Possible	<b>Low</b> The Pilbara Olive Python's preferred habitat (large Gorge/Gullies) does not occur within or adjacent to the Application Area. This species may forage in the area but given the low level nature of the clearing activities and the lack of key habitat it is unlikely there would be any impact this species.

### **3.5 GROUNDWATER**

The Application Area is located in the Pilbara Groundwater Area, proclaimed under the *Rights in Water and Irrigation Act 1914* (RIWI Act) (DWER, 2020).

There are two main aquifer within the Application Area:

Hamersley – Fractured Rock Aquifer which is described as: “The Precambrian rocks of the Hamersley Basin are principally volcanics, shales and iron formations. Groundwater is contained within fractures within these rocks. The groundwater level may be deep below the surface, and is generally fresh. The main use of this aquifer is for mining and mine dewatering from iron ore mines. Bores have also been drilled for road and railway construction. There will be increasing dewatering from the fractured rocks around iron ore mines as the pits become deeper” (DoW, 2015a); and

Combined Fractured Rock West – “Alluvial and surficial sediments lie along the main river valleys of the Yilgarn Craton and adjacent Proterozoic basins. The alluvium overlies calcrete, palaeochannels, and fractured rock. The thickness is probably up to about 30 metres. The alluvium probably consists of silts, sands and clays but mostly fine-grained material. It is not known to be a major aquifer. The groundwater level may be as much as 15 to 20 metres below the surface. The groundwater salinity is variable, being generally fresh in the valley sides with salinity increasing into the centre of the valleys. Usage is mainly for pastoral purposes through bores and wells in the Murchison and Gascoyne. Further south in the wheatbelt groundwater salinity is generally high and often too high even for stock purposes. Alluvial and surficial aquifers are utilised for town supply at Meekatharra, Yerecoin, New Norcia, Yenart (Calingiri), Bolgart and Happy Valley (Brookton). Potential localised low salinity groundwater resources exist in the Darling Range, and to the south of Kojonup.” (DoW, 2015b).

### **3.6 SURFACE WATER**

The Application Area is located in the Pilbara Surface Water Area, proclaimed under the RIWI Act (DoW, 2009ba). There are no permanent watercourse or wetlands within or associated with the Application Area. Three named watercourse from to the north across the Application Area: Fortescue River, Jimblebar Creek and Caramulla Creek along with a number of other unnamed minor drainage lines. Watercourses are dry for most of the year, only flowing intermittently during rainfall event. There are no significant water features that will be impacted by this proposal.

Where practicable, existing cleared tracks will be used to cross the Fortescue River, Jimblebar Creek and Caramulla Creek and unnamed non-perennial minor drainage lines. If it is necessary for new crossings to be installed, clearing will be kept to a bare minimum and will be constructed flat level to the surface (i.e. a simple clearing with no bunds) to maintain the natural surface flow.

## **4 ENVIRONMENTAL MANAGEMENT**

The management of the environmental aspects of BHP’s Iron Ore operations are managed under the company’s AS/NZS ISO 14001:2016 certified Environmental Management System (EMS). The EMS describes the organisational structure, responsibilities, practices, processes and resources for implementing and maintaining environmental objectives at all BHP sites.

Additionally, operational controls for environmental management for the Project are guided by BHP’s Charter values. The Charter Values outline a commitment to develop, implement and maintain management systems for sustainable development that drive continual improvement and set and achieve targets that promote efficient use of resources. In order to give effect to the Charter Values, a series of “Our Requirements” documents have been developed.

BHP has also developed a Sustainable Development Policy for its Iron Ore operations. The Sustainable Development Policy outlines a commitment to setting objective and targets to achieve sustainable outcomes and to continually improve our performance.

To support these documents BHP has an internal Project Environmental and Aboriginal Heritage Review (PEAHR) system. The purpose of the system is to manage implementation of environmental, Aboriginal heritage, land tenure and legal commitments prior to and during land disturbance. All ground disturbance activities will meet the requirements of the PEAHR system.

All personnel carrying out works associated with the Project are required to comply with the Sustainable Development Policy, the PEAHR system and any other relevant legislative and licensing requirements.

**5 PROJECT COMPLIANCE WITH THE TEN CLEARING PRINCIPLES**

BHP considers that native vegetation clearing within the Application Area will not result in any significant environmental or social impacts, and complies with the Ten Clearing Principles, as defined in Schedule 5 of the EP Act. **Section 6** provides an assessment of project compliance with the Ten Clearing Principles.

## **6 ASSESSMENT AGAINST THE TEN CLEARING PRINCIPLES**

The information used to assess the application against the Ten Clearing Principles has been based on the findings of multiple baseline surveys (**Section 3**).

### **6.1 PRINCIPLE A**

***Native vegetation should not be cleared if it comprises a high level of biological diversity***

This proposal is not likely to be at variance to this Principle.

Similar habitat to the Application Area is located outside the Application Area. These other areas of similar vegetation type are therefore expected to have a similar biological diversity and conservation value than that of the Application Area.

The proposed clearing is therefore unlikely to have any significant impact on the biodiversity of the region.

**Table 6** provides an assessment of the proposed clearing activities within the Application Area against the components of clearing Principle A.



**Table 6: Assessment against Principle A components**

Principle	Criteria	Assessment	Outcome
a) Native vegetation should not be cleared if it comprises a high level of biological diversity.	a1) Native vegetation should not be cleared if it is representative of an area of outstanding biodiversity in the Bioregion.	The native vegetation within the Application Area is represented in the same condition within the broader region and is not considered to be of outstanding biodiversity in the Bioregion.	Not at variance with clearing principle.
	a2) Native vegetation should not be cleared if it has higher diversity of indigenous aquatic or terrestrial plant or fauna species than native vegetation of that ecological community in good or better condition in the Bioregion.	The native vegetation within the Application Area is in the same condition as other areas of similar vegetation type within the broader region.	Not at variance with clearing principle.
	a3) Native vegetation should not be cleared if it has higher diversity of indigenous aquatic or terrestrial plant or fauna species than the remaining vegetation of that ecological community in the local area.	The native vegetation within the Application Area is not considered to have higher biodiversity and conservation value than that of the surrounding vegetation within the local area.	Not at variance with clearing principle.
	a4) Native vegetation should not be cleared if it has higher ecosystem diversity than other native vegetation of that local area.	The native vegetation within the Application Area is not considered to have a higher ecosystem diversity than other native vegetation of that local area.	Not at variance with clearing principle.
	a5) Native vegetation should not be cleared if it has higher genetic diversity than the remaining native vegetation of that ecological community.	The native vegetation within the Application Area is not considered to have a higher genetic diversity than the remaining native vegetation of that ecological community as the vegetation is contiguous with adjacent native vegetation and has no special features.	Not at variance with clearing principle.
	A6) Native vegetation should not be cleared if it is necessary for the continued in situ existence of significant habitat for priority flora species published by the Department of Environment and Conservation.	Two Priority flora species were recorded in the Application Area. Populations of Priority flora will be avoided by a 10 m buffer where practicable.	Not at variance with clearing principle.

**6.2 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*

This proposal is not likely to be at variance to this Principle.

There are five broad fauna habitat types within the Application Area (**Figure 3**).

The vegetation and habitat found within the Application Area are considered to be well represented in the Pilbara bioregions.

Four fauna species of significance have been recorded from within the Application Area with an additional four species considered to potentially occur within the Application Area (**Table 5**). As described in **Section 3.4.4** and **Table 5** clearing of the Application Area is expected to have a low impact on these species.

**Table 7** provides an assessment of the proposed clearing activities within the Application Area against the components of clearing Principle B.

**Table 7: Assessment against Principle B components**

Principle	Criteria	Assessment	Outcome
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.	b1) Native vegetation should not be cleared if it is or is likely to be habitat for fauna that is declared Specially Protected under the BC Act.	Two BC Act protected species have been recorded from the Application Area with a further four BC Act protected species considered 'possible' or 'likely' to occur within the Application Area ( <b>Table 5</b> ). The proposed activities are unlikely to have a significant impact on these species as: <ul style="list-style-type: none"> <li>All species are wide-ranging and found throughout the broader region;</li> <li>All species are only likely to forage within the Application Area;</li> <li>These species do not exclusively depend on any habitat type or feature within the Application Area; and</li> <li>Similar habitat is well represented outside the Application Area.</li> </ul>	Not at variance with clearing principle.
	b2) Native vegetation should not be cleared if it is or is likely to be habitat for Priority Listed Fauna.	Two priority fauna species have been recorded within the Application Area, with another one species potentially occurring. As detailed in <b>Table 5</b> these species is unlikely to be impacted for the following reasons: <ul style="list-style-type: none"> <li>The preferred habitat for these species is well represented outside the Application Area;</li> <li>Similar habitat within close vicinity to the Application Area was found to be the same or better condition than that of the Application Area;</li> <li>Active Mulgara burrows will be avoided with a 10 m buffer, where practicable;</li> <li>Active Greater Bilby burrows will be avoided with a 10 m buffer; and</li> <li>Active mounds of the Western Pebble-mound Mouse will be avoided using a 10 m buffer, where practicable.</li> </ul>	Not at variance with clearing principle.
	b3) Native vegetation should not be cleared if it is or is likely to be habitat for fauna that is otherwise significant.	Habitat found within the Application Area may be suitable for use by conservation significant fauna, however similar habitat in the same or better condition is widespread in the Application Area surrounds	Not at variance with clearing principle.
	b4) Native vegetation should not be cleared if it provides significant habitat for fauna species in the local area.	Habitat within the Application Area is not considered significant habitat for fauna species within the local area. Similar habitat to that proposed to be cleared is located to the area surrounding of the Application Area.	Not at variance with clearing principle.
	b5) Native vegetation should not be cleared if it maintains ecological functions and processes that protect significant habitat for fauna.	The clearing of native vegetation is not considered to alter ecological functions and processes that protect significant habitat for fauna.	Not at variance with clearing principle.
	b6) Native vegetation should not be cleared if it forms, or is part of, an ecological linkage that is necessary for the maintenance of fauna.	No ecological linkages run through the Application Area that are necessary for the maintenance of fauna.	Not at variance with clearing principle.
	b7) Native vegetation should not be cleared if it provides significant habitat for fauna communities (assemblages) and meta-populations.	The Application Area is not considered to contain significant habitat for faunal assemblages that are not also present in other areas within the vicinity. The Application Area is not considered likely to contain geographically isolated fauna populations.	Not at variance with clearing principle.

**6.3 PRINCIPLE C**

*Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora*

This proposal is not likely to be at variance to this Principle.

No species listed under the EPBC Act or gazetted as Threatened under the BC Act were recorded in the Application Area.

**Table 8** provides an assessment of the proposed clearing activities within the Application Area against the components of clearing Principle C.

**Table 8: Assessment against Principle C components**

Principle	Criteria	Assessment	Outcome
c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	c1) Native vegetation should not be cleared if it is necessary for the continued <i>in situ</i> existence of populations of Declared Rare Flora under the <i>BC Act 2016</i>	No Threatened flora species were recorded in the Application Area.	Not at variance with clearing principle.
	c2) Native vegetation should not be cleared if it is necessary for the continued <i>in situ</i> existence of other significant flora.	No species listed under the EPBC Act or other significant flora species were recorded in the Application Area.	Not at variance with clearing principle.

**6.4 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***

This proposal is not likely to be at variance to this Principle.

None of the vegetation associations or landforms of the Application Area are associated with a TEC or PEC (Spectrum Ecology & Spatial, 2022; GHD, 2020a).

One vegetation association (High open shrubland of *Grevillea berryana* and *Acacia ancistrocarpa* - SD GbAa) has been clipped out of the Application Area with a 100m buffer as this vegetation association is analogous with DBCA Priority 3 PEC *Vegetation of sand dunes of the Hamersley Range/Fortescue Valley* (GHD, 2020a). This PEC is directly linked with the sand dune formations (**Section 3.4.1**).

**Table 9** provides an assessment of the proposed clearing activities within the Application Area against the components of clearing Principle D.

**Table 9: Assessment against Principle D components**

Principle	Criteria	Assessment	Outcome
<p>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.</p>	<p>d1) Native vegetation should not be cleared if threatened ecological communities listed under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> are present.</p>	<p>No EPBC Act TECs are present in the Application Area.</p>	<p>Not at variance with clearing principle.</p>
	<p>d2) Native vegetation should not be cleared if it is necessary for the maintenance of Threatened Ecological Communities listed under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>.</p>	<p>No EPBC Act TECs or associated native vegetation will be impacted by the proposed works.</p>	<p>Not at variance with clearing principle.</p>
	<p>d3) Native vegetation should not be cleared if other significant ecological communities are present.</p>	<p>No other significant ecological communities are known to occur or are likely to occur within the Application Area.</p> <p>All sand dunes and the associated vegetation association that are analogous with DBCA Priority 3 PEC Vegetation of sand dunes of the Hamersley Range/Fortescue Valley have been clipped from the Application Area with a 100m buffer.</p>	<p>Not at variance with clearing principle.</p>
	<p>d4) Native vegetation should not be cleared if it is necessary for the maintenance of other significant ecological communities.</p>	<p>No DBCA listed TECs or associated native vegetation will be impacted by the proposed works.</p>	<p>Not at variance with clearing principle.</p>
	<p>d5) Native vegetation should not be cleared if it is necessary for the continued <i>in situ</i> existence of significant examples of priority threatened ecological communities published by the Department of Environment and Conservation.</p>	<p>No DBCA listed PECs or associated native vegetation will be impacted by the proposed works.</p> <p>All sand dunes and the associated vegetation association that are analogous with DBCA Priority 3 PEC Vegetation of sand dunes of the Hamersley Range/Fortescue Valley have been clipped from the Application Area with a 100m buffer.</p>	<p>Not at variance with clearing principle.</p>

**6.5 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***

This proposal is not likely to be at variance to this Principle.

The habitat and vegetation within the Application Area is well represented in the Land Systems of the region (**Section 3.2**), and therefore it is unlikely individual species would be restricted to a particular habitat and vegetation occurring in the Application Area.

**Table 10** provides an assessment of the proposed clearing activities within the Application Area against the components of clearing Principle E.



**Table 10: Assessment against Principle E components**

Principle	Criteria	Assessment	Outcome
<p>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.</p>	<p>e1) Native vegetation should not be cleared if the remaining native vegetation represents less than 30%, or the clearing would reduce the representation of remaining native vegetation to less than 30% in the Bioregion (or subregion where applicable).</p>	<p>Clearing native vegetation within the Application Area will not reduce the extent of native vegetation below 30% in the bioregion or subregion.</p>	<p>Not at variance with clearing principle.</p>
	<p>e2) Native vegetation should not be cleared if an ecological community represents less than 30% of its original extent or clearing would reduce the representation of any ecological community to less than 30% of its original extent in the Bioregion (or subregion where applicable).</p>	<p>Clearing native vegetation within the Application Area will not significantly reduce the known extent of the ecological community from pre-European extents.  Current remaining extents of the vegetation communities in the bioregion are almost 100% of pre-European extents.</p>	<p>Not at variance with clearing principle.</p>
	<p>e3) Native vegetation should not be cleared if clearing would reduce an ecological community to less than 1% of the Bioregion (or subregion where applicable)</p>	<p>Clearing native vegetation within the Application Area will not significantly reduce the known extent of the vegetation community in the bioregion.</p>	<p>Not at variance with clearing principle.</p>
	<p>e4) Native vegetation should not be cleared if the remaining native vegetation represents less than 30% or the clearing would reduce the representation of remaining native vegetation to less than 30% in the Local Area.</p>	<p>Clearing native vegetation within the Application Area will not reduce the representation of remaining native vegetation to less than 30% in the local area.</p>	<p>Not at variance with clearing principle.</p>
	<p>e5) Native vegetation should not be cleared if an ecological community represents less than 30% of its original extent or clearing will reduce the representation of any ecological community to less than 30% of its original extent in the Local Area.</p>	<p>Clearing native vegetation within the Application Area will not reduce the representation of any ecological community to less than 30% of its original extent in the local area.</p>	<p>Not at variance with clearing principle.</p>
	<p>e6) Native vegetation should not be cleared if clearing would reduce any ecological community to less than 1% of the Local Area.</p>	<p>Clearing native vegetation within the Application Area will not significantly reduce the known extent of the vegetation community in the local area.</p>	<p>Not at variance with clearing principle.</p>

**6.6 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***

This proposal is not likely to be at variance to this Principle.

There are no permanent watercourse or wetlands within or associated with the Application Area. Three named watercourse from to the north across the Application Area: Fortescue River, Jimblebar Creek and Caramulla Creek along with a number of other unnamed minor drainage lines. Watercourses are dry for most of the year, only flowing intermittently during rainfall event. There are no significant water features that will be impacted by this proposal.

Where practicable, existing cleared tracks will be used to cross the Fortescue River, Jimblebar Creek and Caramulla Creek and unnamed non-perennial minor drainage lines. If it is necessary for new crossings to be installed, clearing will be kept to a bare minimum and will be constructed flat level to the surface (i.e. a simple clearing with no bunds) to maintain the natural surface flow.

**Table 11** provides an assessment of the proposed clearing activities within the Application Area against the components of clearing Principle F.

**Table 11: Assessment against Principle F components**

Principle	Criteria	Assessment	Outcome
<p>f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.</p>	<p>f1) Native vegetation should not be cleared if it is growing in a watercourse or wetland that has been identified as having significant environmental values.</p>	<p>No watercourse or wetland with significant environmental values occurs within the Application Area or immediate surrounds.</p>	<p>Not at variance with clearing principle.</p>
	<p>f2) Native vegetation should not be cleared if it provides a buffer area for watercourses and wetlands identified in criteria (f1) and (f2).</p>	<p>Three named watercourse from to the north across the Application Area: Fortescue River, Jimblebar Creek and Caramulla Creek along with a number of other unnamed minor drainage lines. Where practicable, existing cleared tracks will be used to cross the Fortescue River, Jimblebar Creek and Caramulla Creek and unnamed non-perennial minor drainage lines. If it is necessary for new crossings to be installed, clearing will be kept to a bare minimum and will be constructed flat level to the surface (i.e. a simple clearing with no bunds) to maintain the natural surface flow.</p>	<p>Not at variance with clearing principle.</p>
	<p>f3) Native vegetation should not be cleared if water tables are likely to change and adversely affect ecological communities that are wetland or groundwater dependent.</p>	<p>Clearing is not considered likely to adversely alter water tables, and as such will not impact on any ecological communities that are wetland or groundwater dependent.</p>	<p>Not at variance with clearing principle.</p>
	<p>f4) Native vegetation should not be cleared if it is growing in other watercourses or wetlands.</p>	<p>There are no permanent watercourses or wetlands within the Application Area. The Application Area contains the a section of the Fortescue River, Jimblebar Creek and Caramulla Creek along with a number of other unnamed minor drainage lines. Where practicable, existing cleared tracks will be used to cross the Fortescue River, Jimblebar Creek and Caramulla Creek and unnamed non-perennial minor drainage lines. If it is necessary for new crossings to be installed, clearing will be kept to a bare minimum and will be constructed flat level to the surface (i.e. a simple clearing with no bunds) to maintain the natural surface flow.</p>	<p>Not at variance with clearing principle.</p>

## **6.7 PRINCIPLE G**

### ***Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation***

This proposal is not likely to be at variance to this Principle.

Land degradation may include impacts such as erosion, changes to pH, water logging, salinisation or spread of weeds. These potential impacts are assessed in the sections below. **Table 12** provides an assessment of the proposed clearing activities within the Application Area against the components of clearing Principle G.

#### **6.7.1 Erosion**

It is not anticipated that the removal of vegetation will contribute to increased amounts of wind or water erosion in the Application Area or adjacent areas.

#### **6.7.2 Changes to pH**

The Application Area is not in an area at risk of acid sulphate soils and there are no recorded acid sulphate soils within the Application Area. It is not expected that the proposed clearing will result in changes to soil pH.

#### **6.7.3 Water logging and salinisation**

It is not expected that there will be a significant reduction in groundwater uptake due to the proposed clearing. No water logging or increased salinisation is expected to occur as a result of the proposed clearing.

#### **6.7.4 Weeds**

Nine introduced flora species have been recorded in the Application Area (**Table 5**). None are listed as a Declared Pest under s22 of the BAM Act.

The remaining weeds are typical introduced species commonly recorded in the Pilbara region.

Control of established weed populations will be carried out according to BHP's standard *Weed Control and Management Procedures*.

**Table 12: Assessment against Principle G components**

Principle	Criteria	Assessment	Outcome
g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	g1) Native vegetation should not be cleared if wind or water erosion of soil is likely to be increased (on or off site).	Soil erosion is not anticipated to occur as any areas cleared will be revegetated where practicable, if not required for infrastructure.	Not considered to be at variance with clearing principle.
	g2) Native vegetation on land with soils with high or low pH should not be cleared.	The Application Area is not considered to contain soils at risk of having acid sulphate soils present.  No vegetation on soils with significantly low (or high) pH will be impacted by the proposed works.	Not at variance with clearing principle.
	g3) Native vegetation should not be cleared if water logging is likely to be increased (on or off site).	It is not expected that water logging would be increased by the clearing of native vegetation within the Application Area.	Not at variance with clearing principle.
	g4) Native vegetation should not be cleared if land salinisation is likely to be increased (on or off site).	Soil salinity is not considered to be increased in the Application Area (on or off site) by the clearing of native vegetation.	Not at variance with clearing principle.

**6.8 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***

This proposal is not likely to be at variance to this Principle.

The Application Area is not within any conservation areas as listed by the DBCA or those protected under the EPBC Act. The closest conservation areas to the Application Area, are Karijini National Park (120 km west), Karlamilyi National Park (145 km east) and Collier Range National Park (150 km south).

The Application Area is not considered to form an ecological linkage to these conservation areas.

An assessment of the proposed clearing activities within the Application Area against the components of clearing Principle H is provided in **Table 13** below.

**Table 13: Assessment against Principle H components**

Principle	Criteria	Assessment	Outcome
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.	h1) Native vegetation should not be cleared if it contributes significantly to the environmental values of a conservation area.	The vegetation of the Application Area does not contribute to the environmental values of a conservation area.	Not at variance with clearing principle.
	h2) Native vegetation should not be cleared if that vegetation provides a buffer to a conservation area.	There are no conservation areas within the vicinity of the Application Area.	Not at variance with clearing principle.
	h3) Native vegetation should not be cleared if the land contributes to an ecological linkage to a conservation area.	The nearest conservation area is 120 km west of the Application Area.	Not at variance with clearing principle.
	h4) Native vegetation should not be cleared if it provides habitats not well represented on conservation land.	There are no habitats within the Application Area that are not well represented on conservation land.	Not at variance with clearing principle.

**6.9 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***

This proposal is not likely to be at variance to this Principle.

There are no permanent watercourse or wetlands within or associated with the Application Area. Three named watercourse from to the north across the Application Area: Fortescue River, Jimblebar Creek and Caramulla Creek along with a number of other unnamed minor drainage lines. Watercourses are dry for most of the year, only flowing intermittently during rainfall event. There are no significant water features that will be impacted by this proposal. None of these are considered to be significant watercourses.

Appropriate surface water management practices will be implemented to minimise erosion and minimise potential impacts on the quality of surface water. The clearing is unlikely to cause deterioration in the quality of any surface or underground water.

Where practicable, existing cleared tracks will be used to cross the Fortescue River, Jimblebar Creek and Caramulla Creek and unnamed non-perennial minor drainage lines. If it is necessary for new crossings to be installed, clearing will be kept to a bare minimum and will be constructed flat level to the surface (i.e. a simple clearing with no bunds) to maintain the natural surface flow.

**Table 14** provides an assessment of the proposed clearing activities within the Application Area against the components of clearing Principle I.



**Table 14: Assessment against Principle I components**

Principle	Criteria	Assessment	Outcome
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.	i1) Native vegetation should not be cleared if clearing the vegetation will reduce the quality of surface or underground water in proclaimed, gazetted or declared areas or catchments.	The clearing of native vegetation is not considered likely to alter the quality of surface or groundwater within the Application Area due to the small amount of clearing within the Application Area and lack of permanent waterbodies in the vicinity.	Not at variance with clearing principle.
	i2) Native vegetation should not be cleared if sedimentation, erosion, turbidity or eutrophication of water bodies on or off site is likely to be caused or increased.	Localised erosion will not impact any waterbodies as no permanent waterbodies present within the vicinity of the Application Area.	Not at variance with clearing principle.
	i3) Native vegetation should not be cleared if water tables are likely to change significantly altering salinity or pH.	The clearing of native vegetation is not considered likely to alter the quality of surface or ground water within the Application Area.	Not at variance with clearing principle.
	i4) Native vegetation should not be cleared if the clearing is likely to alter the water regimes of groundwater-dependent ecosystems on or off site, causing degradation to the biological communities associated with these systems.	The clearing of native vegetation is not considered likely to alter the regimes of surface or groundwater dependent vegetation within the vicinity of the Application Area.	Not at variance with clearing principle.

**6.10 PRINCIPLE J**

***Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding***

This proposal is not likely to be at variance to this Principle.

Massive surface water runoff and localised flooding occurs following intense rainfall events during December to April. However, the incidence or intensity of flooding is not likely to be significantly influenced by the proposed vegetation clearing. It is highly improbable that surface runoff generated from the cleared area could create sufficient concentrated water volumes to cause even a localised flood event. Drainage infrastructure will be designed to ensure that post-construction flows will not differ significantly from pre-construction flows. Therefore the proposed clearing is unlikely to cause or exacerbate the incidence or intensity of flooding.

**Table 15** provides an assessment of the proposed clearing activities within the Application Area against the components of clearing Principle J.

**Table 15: Assessment against Principle J components**

Principle	Criteria	Assessment	Outcome
j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.	j1) Native vegetation should not be cleared if it is likely to lead to an incremental increase in peak flood height.	The clearing of native vegetation is not considered likely to cause any alteration to peak flood height.	Not at variance with clearing principle.
	j2) Native vegetation should not be cleared if it is likely to lead to an incremental increase in duration of flood peak.	The clearing of native vegetation is not considered likely to cause any impact on duration of flood peak.	Not at variance with clearing principle.

## **7 HERITAGE**

The Land Access Unit is the internal group within BHP that manages Aboriginal heritage matters. The Land Access Unit is responsible for ensuring that BHP complies with the *Aboriginal Cultural Heritage Act 2022*, and all other state and federal heritage legislation. All land disturbance activities are subject to ethnographic and archaeological surveys as part of an internal PEHR. The PEHR process ensures that all heritage sites in the vicinity of the project area are identified and avoided where practicable.

The Application Area is situated within the Nyiyaparli Native Title Determination. No heritage sites were identified within the Application Area. In the event that new heritage sites are identified they will be avoided. If any heritage site cannot practicably be avoided, BHP would consult the relevant traditional owners and seek approval under the *Aboriginal Cultural Heritage Act 2022* before the site is disturbed.

## **8 CONCLUSION**

The proposed clearing of 200 ha within the 38,850.45 ha Application Area for the purposes of hydrological / hydrogeological investigations, access tracks and associated activities is unlikely to be at variance to any of the Ten Clearing Principles.

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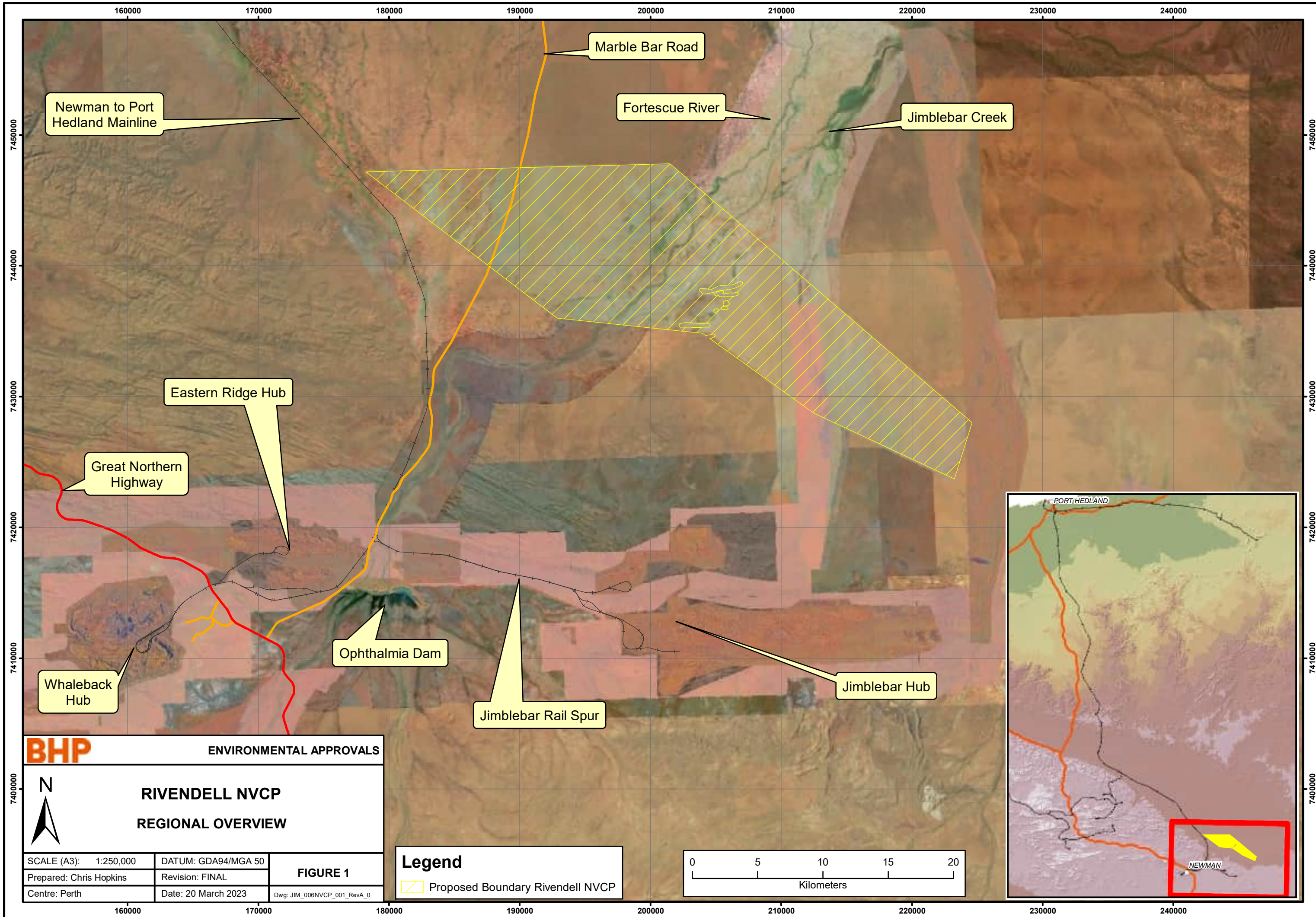
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# Figures



**BHP** ENVIRONMENTAL APPROVALS

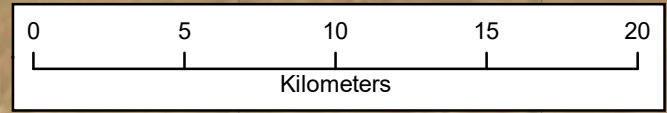


**RIVENDELL NVCP  
REGIONAL OVERVIEW**

SCALE (A3): 1:250,000	DATUM: GDA94/MGA 50	<b>FIGURE 1</b>
Prepared: Chris Hopkins	Revision: FINAL	
Centre: Perth	Date: 20 March 2023	

**Legend**

Proposed Boundary Rivendell NVCP

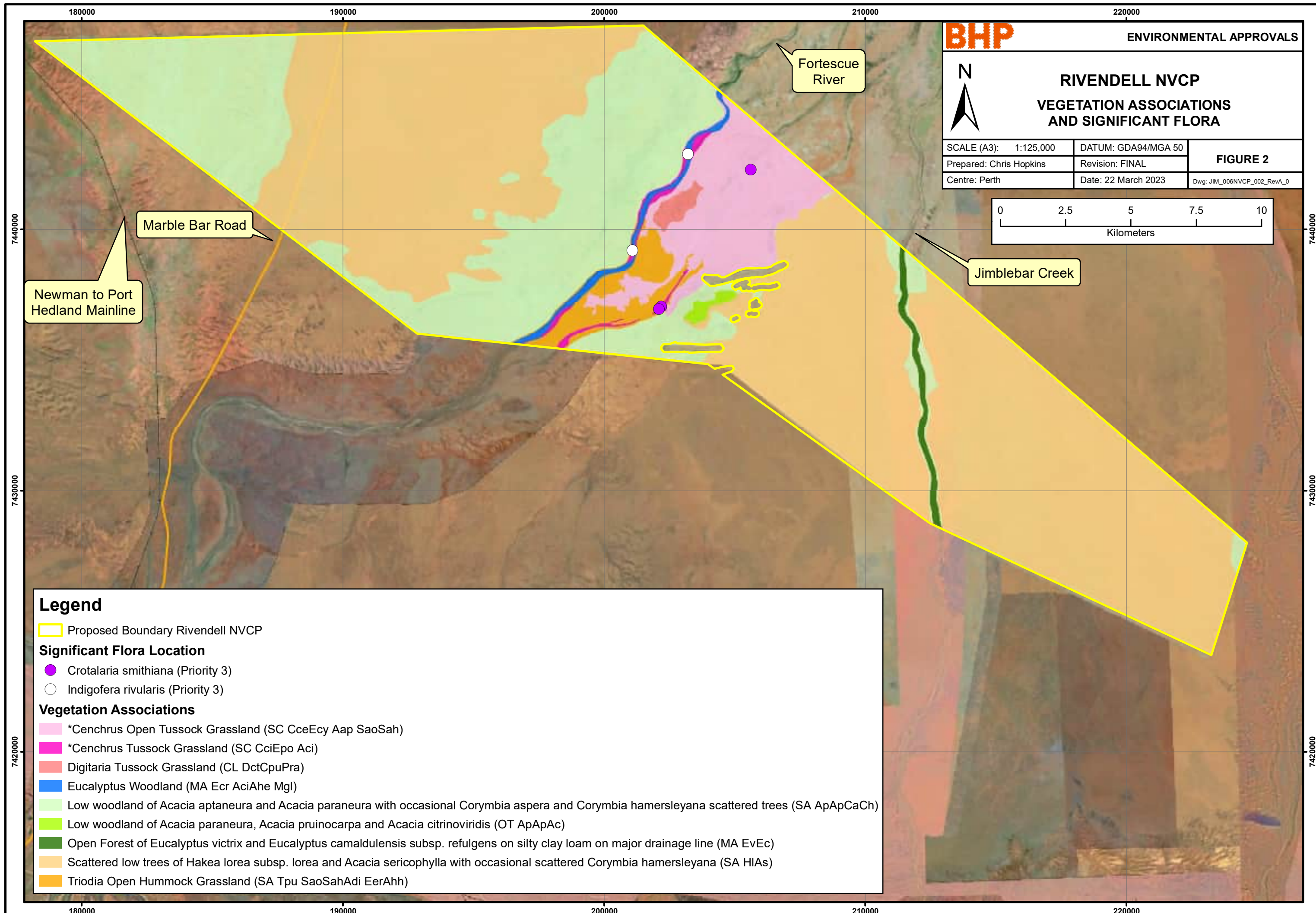
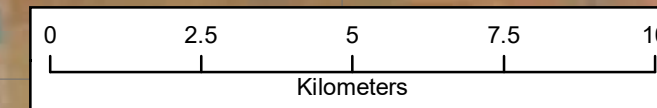






### RIVENDELL NVCP VEGETATION ASSOCIATIONS AND SIGNIFICANT FLORA

SCALE (A3): 1:125,000	DATUM: GDA94/MGA 50	<b>FIGURE 2</b>
Prepared: Chris Hopkins	Revision: FINAL	
Centre: Perth	Date: 22 March 2023	



#### Legend

Proposed Boundary Rivendell NVCP

#### Significant Flora Location

- Crotalaria smithiana* (Priority 3)
- Indigofera rivularis* (Priority 3)

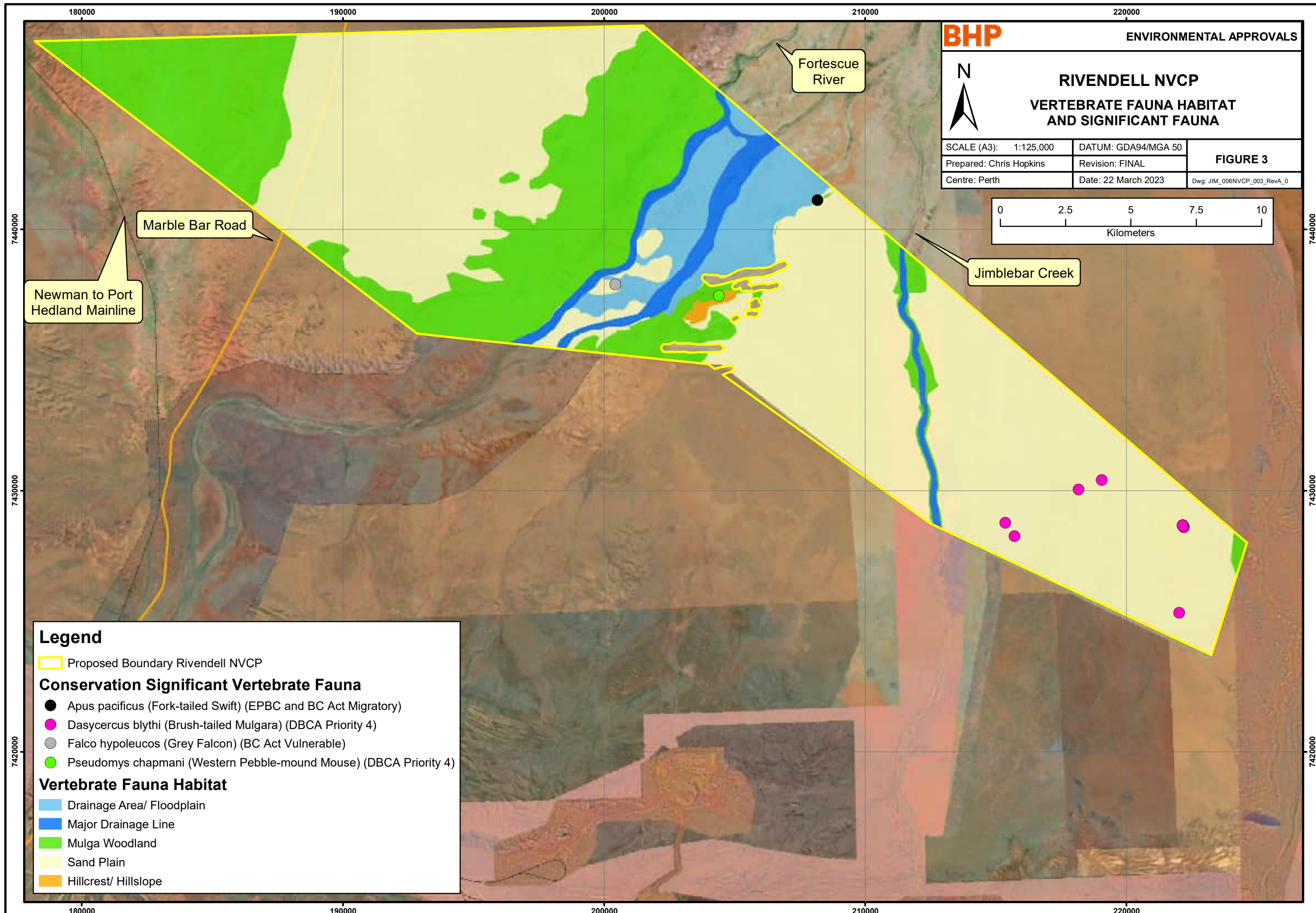
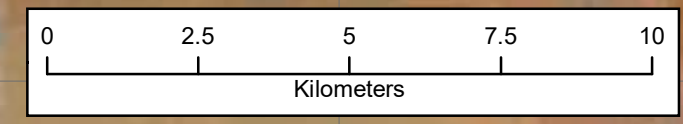
#### Vegetation Associations

- \**Cenchrus* Open Tussock Grassland (SC CceEcy Aap SaoSah)
- \**Cenchrus* Tussock Grassland (SC CciEpo Aci)
- Digitaria* Tussock Grassland (CL DctCpuPra)
- Eucalyptus* Woodland (MA Ecr AciAhe Mgl)
- Low woodland of *Acacia aptaneura* and *Acacia paraneura* with occasional *Corymbia aspera* and *Corymbia hamersleyana* scattered trees (SA ApApCaCh)
- Low woodland of *Acacia paraneura*, *Acacia pruinocarpa* and *Acacia citrinoviridis* (OT ApApAc)
- Open Forest of *Eucalyptus victrix* and *Eucalyptus camaldulensis* subsp. *refulgens* on silty clay loam on major drainage line (MA EvEc)
- Scattered low trees of *Hakea lorea* subsp. *lorea* and *Acacia sericophylla* with occasional scattered *Corymbia hamersleyana* (SA HIAs)
- Triodia* Open Hummock Grassland (SA Tpu SaoSahAdi EerAhh)



**RIVENDELL NVCP  
VERTEBRATE FAUNA HABITAT  
AND SIGNIFICANT FAUNA**

SCALE (A3): 1:125,000	DATUM: GDA94/MGA 50	<b>FIGURE 3</b> Dwg: JIM_006NVCP_003_RevA_0
Prepared: Chris Hopkins	Revision: FINAL	
Centre: Perth	Date: 22 March 2023	



**Legend**

- Proposed Boundary Rivendell NVCP

**Conservation Significant Vertebrate Fauna**

- Apus pacificus* (Fork-tailed Swift) (EPBC and BC Act Migratory)
- Dasyurus blythi* (Brush-tailed Mulgara) (DBCA Priority 4)
- Falco hypoleucos* (Grey Falcon) (BC Act Vulnerable)
- Pseudomys chapmani* (Western Pebble-mound Mouse) (DBCA Priority 4)

**Vertebrate Fauna Habitat**

- Drainage Area/ Floodplain
- Major Drainage Line
- Mulga Woodland
- Sand Plain
- Hillcrest/ Hillslope

# Appendices

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**Appendix 1: OB32 Surplus Water & Homestead Creek Wetting Front Detailed Flora & Vegetation Assessment (Spectrum Ecology & Spatial, 2022)**

**Appendix 2: *BHP Poonda MAR reconnaissance flora and level 1 fauna survey* (GHD, 2020a)**

**Appendix 3: *BHP WAIO Jimblebar Eremophila capricornica Targeted Flora Survey*  
(Biologic Environmental Survey, 2021)**

**Appendix 4: *Targeted Survey for Acacia sp. East Fortescue (surrounding OB31)*  
Onshore Environmental Consultants, 2015)**

**Appendix 5: *Orebody 32 Surplus Water Targeted MNES Vertebrate Fauna Survey*  
(Biota Environmental Sciences, 2022)**



**Appendix 6: *Jimblebar targeted ghost bat survey* (GHD, 2020b)**