

Application to Amend NVCP CPS 5617/5 Whaleback Strategic NVCP

**Native Vegetation Clearing Permit Amendment
Application Supporting Document**

February 2023



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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 currently holds Native Vegetation Clearing Permit (NVCP) CPS 5617/5 for the purposes of mineral production, mineral exploration, construction and maintenance of infrastructure and associated activities (**Figure 1**). The clearing period of this permit expires on 30 November 2023.

The full extent of these works is yet to be undertaken and therefore BHP is seeking to:

- Extend the permit duration to 30 November 2040;
- Extend the clearing period to 30 November 2035; and
- Extend the final reporting date to 30 November 2040.

BHP is also seeking to:

- Update the Permit Holder to BHP Iron Ore Pty Ltd.; and
- Amend the permit boundary to exclude a Ghost Bat cave located east of Orebody 35.

No other changes to the permit are required.

In accordance with Part V Division 2 of the *Environmental Protection Act 1986* (EP Act), BHP hereby refers the application to amend NVCP CPS 5617/5 to the Department of Mines, Industry Regulation and Safety (DMIRS).

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 Amendment Application Area is located approximately 2 km west of Newman in the Pilbara region of Western Australia (**Figure 1**).

1.2 TENURE

The Amendment Application Area is located on:

- Mineral Lease AML244SA;
- Mining Lease 266SA;
- Miscellaneous Licences: L47/92, L52/99 and L52/185;
- General Purpose Lease: G52/19 to 274, G52/276, G52/277 and G52/279;
- I154279 (Newman Rail Lease);
- K529955 (Newman Light Industrial Lease); and
- K858923 (Newman Town Common Lease).

No new tenure is required for the Amendment Application.

1.3 LOCAL GOVERNMENT JURISDICTION

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

1.4 PROJECT DESCRIPTION

BHP has been operating at the Whaleback Hub for over 50 years. In 2013 BHP undertook a consolidation of the 13 existing NVCP's at Whaleback Hub into the single overarching permit CPS 5617. This permit was designed to allow clearing of any mining associated activity with the Whaleback Hub. The overarching purpose of CPS 5617 is: "Clearing for the purposes of mineral production, mineral exploration, construction and maintenance of infrastructure and associated activities."

The original application noted that this high level purpose includes all activities relating to the mining, processing and transportation of iron ore are undertaken within the permit boundary including, but not limited to:

- mineral production and all associated activities;
- mineral exploration and all associated activities;
- construction and maintenance of infrastructure and all associated activities;
- construction and maintenance of access roads;
- ore transportation infrastructure, including conveyors;
- ore processing infrastructure;
- beneficiation and associated activities;
- over burden storage areas, ore stockpiles and topsoil stockpiles;
- expansion and maintenance of infrastructure and services corridors (rail, power, water, gas) and associated infrastructure;
- railway construction and maintenance and associated activities;
- installation and maintenance of fibre optic cable and associated activities;
- ongoing maintenance;
- geotechnical investigations and associated activities;
- rehabilitation activities;
- borrow areas;
- construction and maintenance of laydown areas, assembly areas, water bores, turkey nests and culverts;
- construction and maintenance of creek diversions;
- construction and maintenance of tailings storage facilities; and
- construction and maintenance of ancillary infrastructure 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**.

1.6 NVCP RECORDS

BHP reports on each NVCP in accordance with the permit reporting conditions. For a majority of NVCPs this is incorporated into BHP Iron Ore's Annual Environmental Report (AER) which is submitted to government prior to the 01 October each year.

Clearing commenced on 23 November 2013 with a total of 982.40 ha cleared, with 316.96 ha of land rehabilitated to 30 June 2022 (BHP, 2022). The remaining locations cleared are still required for the purpose for which they were cleared.

Clearing has been minimised by restricting activities to the minimal required for the safe operation of the Whaleback Hub. Populations of significant flora have been avoided, where practicable, using the BHP Project Environmental and Heritage Review (PEAHR) procedure. This internal BHP procedure authorises ground disturbing activities. Where populations of Priority Flora can be practicably avoided their locations are been clipped from the PEAHR boundary to prevent disturbance within 10 m of these populations.

No environmental offsets are required for this NVCP.

Table 1: Project Characteristics and Commitments

Permit Characteristics		
Authorising Agency	DMIRS	
Permit Title	Mount Whaleback Project CPS 5617/5 Amendment Application	
Area to be cleared	2,010.3 hectares.	
Amendment Application Area	8,884.5 hectares.	
Purpose of the permit	Clearing for the purposes of mineral production, mineral exploration, construction and maintenance of infrastructure and associated activities.	
Tenure	The Amendment Application Area is located on: <ul style="list-style-type: none"> • Mineral Lease AML244SA; • Mining Lease 266SA; • Miscellaneous Licences: L47/92, L52/99 and L52/185; • General Purpose Lease: G52/19 to 274, G52/276, G52/277 and G52/279; • I154279 (Newman Rail Lease); • K529955 (Newman Light Industrial Lease); and • K858923 (Newman Town Common Lease). 	
Clearing Duration	Until 30 November 2035	
Permit Duration	Until 30 November 2040	
Proposed Annual Reporting Date	01 October for the previous Financial Year	
Proposed Final Reporting Date	30 November 2040	
Application boundary	Map Reference: <ul style="list-style-type: none"> • MWB_004NVCP_001_RevA_0 • MWB_004NVCP_002_RevA_0 • MWB_004NVCP_003_RevA_0 • MWB_004NVCP_004_RevA_0 • MWB_004NVCP_004_RevA_0 BHP Shapefile 1 Doc Reference: https://waio-dctm.bhp.com/D2/?docbase=bhpbio_od_prod&locateld=0b03c41a842da564&application=ManagedDocuments	
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 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 Whaleback 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 Amendment Application Area. Average annual rainfall at Newman Aero is 323.8 mm (BOM, 2023a). This is mainly derived from tropical storms and cyclones during summer, producing sporadic, heavy rains over the area. Mean monthly rainfall varies from 4.7 mm in September to 72.3 mm in February (BoM, 2023a). Daily rainfall is highly variable; the highest maximum daily rainfall ranges from 34.8 mm in October, to 305.6 mm in February (BoM, 2023a). The mean maximum temperature in summer months (October to March) is 35.1°C to 39.3°C, and mean maximum temperature in winter (April to September) is between 23.1°C and 32.2°C (BoM, 2023a).

Wittenoom meteorological site (005026) is the closest station to the Amendment Application Area that records daily evaporation. Wittenoom is located approximately 200 km north west of the Amendment 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, 2023b).

3.2 BIOREGION, LANDFORMS AND LAND SYSTEMS

The Amendment Application Area is situated in the following biogeographic subregion:

- Hamersley subregion (PIL3) of the Pilbara region described as: *“Mountainous area of Proterozoic sedimentary ranges and plateaux, dissected by gorges (basalt, shale and dolerite). Mulga low woodland over bunch grasses on fine textured soils in valley floors, and Eucalyptus leucophloia over Triodia brizoides on skeletal soils of the ranges. The climate is semi-desert tropical, average 300 mm rainfall, usually in summer cyclonic or thunderstorm events. Winter rain is not uncommon. Drainage into either the Fortescue (to the north), the Ashburton to the south, or the Robe to the west. Subregional area is 6,215,092ha”* (Kendrick, 2001).

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

- Boolgeeda: Stony lower slopes and plains below hill slopes; supporting hard and soft Spinifex grasslands and Mulga scrublands.
- Elimunna Stony: plains on basalt supporting sparse acacia and cassia shrublands and patchy tussock grasslands.
- McKay: Hills, ridges, plateaux remnants and breakaways of meta sedimentary and sedimentary rocks supporting hard Spinifex grasslands.
- Newman: Rugged jaspilite plateaux, ridges and mountains; supporting hard Spinifex grasslands.
- River: Active flood plains and major rivers supporting grassy eucalypt woodlands, tussock grasslands and soft Spinifex grasslands.
- Rocklea: Basalt hills, plateaux, lower slopes and minor stony plains supporting hard Spinifex (and occasional soft Spinifex) grasslands.

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 Amendment Application Area, based on mapping by Bettenay *et al.* (1967):

- Fa13: Ranges of banded jaspilite and chert along with shales, dolomites, and iron ore formations; some areas of ferruginous duricrust as well as occasional narrow winding valley plains and steeply dissected pediments. This unit is largely associated with the Hamersley and Ophthalmia Ranges. The soils are frequently stony and shallow and there are extensive areas without soil cover: chief soils are shallow stony earthy loams (Um5.51) along with some (Uc5.11) soils on the steeper slopes. Associated are (Dr2.33, Dr2.32) soils on the limited areas of dissected pediments, while (Um5.52) and (Uf6.71) soils occur on the valley plains.

- Fa14: Steep hills and steeply dissected pediments on areas of banded jaspilite and chert along with shales, dolomite, and iron ore formations; some narrow winding valley plains: chief soils are shallow stony earthy loams (Um5.51) along with some (Uc5.11) soils on the steeper slopes. (Dr2.33, Dr2.32) soils which occur on the pediments are more extensive in this unit than in unit Fa13. (Um5.52) and (Uf6.71) soils occur on the valley plains.
- 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.
- Oc64: Low stony hills and dissected pediments on granite with occasional basic dykes: the chief soils are hard alkaline red soils (Dr2.33) having shallow stony A horizons. Associated are shallow stony (Uc5.11) soils on steep slopes, (Uc1.22) soils along creek lines, and (Um5.11) soils on patches of calcrete (kunkar).

3.4 FLORA, VEGETATION AND FAUNA

Forty seven flora and vegetation surveys and thirty vertebrate fauna surveys have been undertaken across the Amendment Application Area between 1999 and 2022.

Primary surveys for the Application Area:

- *Consolidation of Regional Vegetation Mapping BHP Billiton Iron Ore Pilbara Tenure* (Onshore Environmental, 2014) (**Appendix 1**);
- *Western Ridge Pipeline Reconnaissance Flora and Vegetation Survey* (Biologic, 2021a) (**Appendix 2**);
- *Western Ridge Single Season Detailed Flora and Vegetation Survey* (Biologic, 2021b) (**Appendix 3**);
- *Western Ridge Paddy Bore Area Reconnaissance Flora and Vegetation Survey* (Biologic, 2022a) (**Appendix 4**);
- *Consolidated Fauna Habitat Mapping 2017* (Biologic, 2017) (**Appendix 5**);
- *Western Ridge Targeted Vertebrate Fauna Survey* (Biologic, 2020) (**Appendix 6**);
- *Western Ridge Pipelines Targeted Vertebrate Survey Fauna* (Biologic, 2022b) (**Appendix 7**); and
- *Western Ridge Paddy Bore Area Vertebrate Fauna Assessment* (Biologic, 2022c) (**Appendix 8**).

Other studies¹:

- *Mt Whaleback AML 7/244 Flora & Vegetation and Fauna Review* (Onshore Environmental, 2013);
- *Orebody 35 and Surrounds Flora and Vegetation Survey* (GHD, 2011);
- *Orebody 35 and Western Ridge Vertebrate Fauna Survey* (Biologic, 2011);
- *Mt Whaleback East Flora, Vegetation and Fauna Assessment Summary Letter and Recommendations* (ENV, 2011);
- *Mount Whaleback TSF Flora, Vegetation and Fauna Assessment* (Astron, 2010);
- *Orebody 35 Vegetation Clearing Permit Area Flora and Fauna Assessment* (ENV, 2010);
- *Homestead Creek Culvert Flora and Vegetation Assessment* (ENV, 2009);
- *Homestead Creek Culvert Fauna Assessment* (ENV, 2009);
- *Mt Whaleback Mine Site Flora and Vegetation Survey and Fauna Assessment* completed by (Onshore Environmental and Biologic, 2009);
- *Mount Whaleback Power Station Flora and Vegetation Assessment* (ENV, 2009);
- *Myopic Exploration Leases Biological Survey* (Onshore Environmental, 2009);
- *Newman to Yandi Transmission Line Terrestrial Vertebrate Fauna Assessment* (ENV, 2009);
- *Newman to Jimblebar Transmission Line and Newman Town Substation Terrestrial Fauna Assessment* (ENV, 2009);

¹ Note: A copy of the reports for these other studies can be provided on request.

- *Newman to Jimblebar Transmission Line and Newman Town Substation Flora and Vegetation Assessment* (ENV, 2009);
- *Newman Power Network, Level 2 Flora and Level 1 Fauna Survey* (Biologic, 2009);
- *Orebody 25 to Newman Flora and Vegetation Assessment* (ENV, 2009);
- *Orebody 25 to Newman Fauna Assessment* (ENV, 2009);
- *Jimblebar Linear Development Terrestrial Vertebrate Fauna Assessment* (Outback Ecology, 2009);
- *Newman Water Pipeline Enhancement Project: Vegetation and Flora Survey* (Ecologia, 2008);
- *Rapid Growth Project 5: Repeater 9 Access Road Flora and Vegetation Assessment* (ENV, 2008);
- *Rapid Growth Project 5: Repeater 9 Access Road Fauna Assessment* (ENV, 2008);
- *Rapid Growth Project 5: Jimblebar Junction to Yandi Junction Railway Reserve and Repeaters 6, 7 and 8* (ENV, 2008);
- *Summary of Important Findings from Rapid Growth Project 5 Railway Project - Biological Assessments* (ENV, 2008);
- *Rapid Growth Project 5: Jimblebar Junction to Yandi Junction Railway Reserve Flora and Vegetation Assessment* (ENV, 2008);
- *Report for Myopic Project Area, Newman, Flora and Fauna Assessment* (GHD, 2008);
- *Peregrine Falcon Habitat Assessment at Myopic* (Biologic, 2008);
- *RGP4 Orebody 25 Rail Spur Siding Declared Rare and Priority Flora Survey* (ENV, 2007);
- *BHPBIO Western Ridge Exploration Project Biological Survey* (Ecologia, 2006);
- *Mount Whaleback Flora and Vegetation Assessment Phase III Summary Report* (ENV, 2006);
- *Proposed Kurra Village Extension Area Flora and Vegetation Assessment* (ENV, 2006);
- *Newman Ammonium Nitrate Storage Facility Conservation Significant Flora Survey* (Ecologia, 2006);
- *Newman Ammonium Nitrate Storage Facility – Phase 2 Conservation Significant Flora Survey* (Ecologia, 2006);
- *Newman Hub Rail Corridor Declared Rare and Priority Flora Survey* (ENV, 2006);
- *RGP4 Newman Hub Infrastructure Area Flora and Vegetation Assessment* (ENV, 2006);
- *RGP4 Newman Hub Topsoil Stockpile and Borrow Area for Construction Flora and Vegetation Assessment* (ENV, 2006);
- *OB 24 Flora and Fauna Assessment Phase II* (ENV, 2006);
- *Western Ridge Exploration Project Biological Survey* (Ecologia, 2006);
- *Western Ridge Exploration Project Biological Survey* (Ecologia, 2005);
- *Orebody 25 Biological Review and Environmental Impact Assessment* (Ecologia, 2005);
- *Newman BHP Billiton Ongoing Works – Newman Hub* (Ecologia, 2004);
- *Newman Village Declared Rare, Priority Flora and Weed Survey* (Ecologia, 2004);
- *Satellite Orebodies: Orebody 18 Flora and Fauna Review* (Ecologia, 2004);
- *Orebody 24 Expansion Biological Survey* (Ecologia, 2004);
- *BHP Billiton Long Term Expansion Pre-feasibility Study* (Ecologia, 2003);
- *Baseline Biological and Soil Surveys Mapping for ML244SA West of the Fortescue River* (Biota, 2001);
- *Mt Whaleback Priority Flora Species Survey* (BHPIO, 2000);
- *Orebody 25 Priority Flora Species Survey* (BHPIO, 2000);
- *Field Search and Observations of *Lepidium catapycnon* Population Near Mt Whaleback, Newman* (BHPIO, 1999);
- *Follow-Up Survey of Mt Whaleback *Lepidium catapycnon* Population* (HGM, 1999);
- *Mt Whaleback/ OB29 Soil and Vegetation Mapping* (HGM, 1999);
- *Regional Search for *Lepidium catapycnon* in the greater Newman Area (Pilbara), Western Australia* (BHPIO, 1999);

- *Mt Whaleback Fauna Monitoring Programme: Baseline Sampling 1997-1998* (Ecologia, 1998);
- *Orebody 23 Extension – Biological Survey Assessment* (Ecologia, 1998);
- *Orebody 25 Biological Assessment Survey* (Ecologia, 1995); and
- *Newman Lease Environmental Appraisal* (Maunsell and Partners, 1984).

3.4.1 Vegetation Communities

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

- 18 Low woodland; mulga (*Acacia aneura*)
- 82 Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*

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

The Amendment 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 Amendment Application Area (Government of Western Australia, 2019)

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 18 within Western Australia	19,890,664.93	19,843,409.70	99.76	2.13
Vegetation Association 18 within the Pilbara Bioregion	676,556.73	672,424.33	99.39	16.78
Vegetation Association 82 within Western Australia	2,565,901	2,553,217	99.51	10.25
Vegetation Association 82 within the Pilbara Bioregion	2,563,583	2,550,898	99.51	10.26

A total of 18 broad floristic formations (**Figure 2**) with 45 vegetation associations have been described and mapped within the Amendment Application Area (**Table 3**).

Table 3: Vegetation associations of the Amendment Application Area (Onshore Environmental, 2014, Biologic, 2021a, 2021b and 2022a)

Broad Floristic Formation	Vegetation Association Description	
* <i>Cenchrus</i> mid tussock grassland	FP CcCsChf AaApAte Ex	Mid tussock grassland of * <i>Cenchrus ciliaris</i> , * <i>Cenchrus setiger</i> , and <i>Chrysopogon fallax</i> with tall sparse shrubland to scattered trees of <i>Acacia aptaneura</i> , <i>Acacia paraneura</i> , and <i>Acacia tetragonophylla</i> with low scattered trees of <i>Eucalyptus xerothermica</i> on brown clay loam on drainage areas/ floodplains and minor drainage lines.
	FP CcCsChf AciAaAin ExEgCocd	Mid tussock grassland of * <i>Cenchrus ciliaris</i> , * <i>Cenchrus setiger</i> , and <i>Chrysopogon fallax</i> with tall open shrubland of <i>Acacia citrinoviridis</i> , <i>Acacia aptaneura</i> , and <i>Acacia incurvaneura</i> with low open woodland of <i>Eucalyptus xerothermica</i> , <i>Eucalyptus gamophylla</i> , and <i>Corymbia candida</i> subsp. <i>dipsodes</i> on brown clay loam on drainage areas/ floodplains.
* <i>Cenchrus</i> tussock grassland	MA CcTtEua ChCa AbAtpAss	Tussock Grassland of * <i>Cenchrus ciliaris</i> , <i>Themeda triandra</i> and <i>Eulalia aurea</i> with Low Open Woodland of <i>Corymbia hamersleyana</i> and <i>Corymbia aspera</i> over High Open Shrubland of <i>Acacia bivenosa</i> , <i>Acacia tumida</i> var. <i>pilbarensis</i> and <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> on brown loamy sand on levee banks of major drainage lines.
<i>Acacia</i> low open forest	HS AcaoAaApr ScaErlIAb TbrTw	Low Open Forest of <i>Acacia aptaneura</i> , <i>Acacia aneura</i> x <i>ayersiana</i> and <i>Acacia pruinocarpa</i> over Hummock Grassland of <i>Triodia epactia</i> and <i>Triodia</i> sp. Shovelanna Hill (S. van Leeuwen 3835) with Open Shrubland of <i>Eremophila forrestii</i> subsp. <i>forrestii</i> , <i>Grevillea berryana</i> and <i>Dodonaea petiolaris</i> on red brown loamy sand on stony plains.

Broad Floristic Formation		Vegetation Association Description
Acacia low open woodland	FP AaAinAte(±E xEg) CcEnpoChf BbCivAbl	Low open woodland of <i>Acacia aptaneura</i> , <i>Acacia incurvaneura</i> , and <i>Acacia tetragonophylla</i> (± <i>Eucalyptus xerothermica</i> , <i>Eucalyptus gamophylla</i>) over low open tussock grassland of * <i>Cenchrus ciliaris</i> , <i>Enneapogon polyphyllus</i> , <i>Chrysopogon fallax</i> with low scattered herbs of * <i>Bidens bipinnata</i> , <i>Arivela viscosa</i> , <i>Abutilon lepidum</i> on brown clay loam on drainage areas/ floodplains and minor drainage lines.
	SP Aa Asy ErpdCcTt	Low open woodland of <i>Acacia aptaneura</i> over tall open shrubland <i>Acacia synchronicia</i> over low sparse grassland of <i>Eriachne pulchella</i> subsp. <i>dominii</i> , <i>Cenchrus ciliaris</i> and <i>Themeda triandra</i> on red clay loam on stony plains and floodplains.
	SP AaAayAi ArAadsAte SeahSegl ErffEre TpTw Pacl	Low open woodland of <i>Acacia aptaneura</i> , <i>Acacia ayersiana</i> (hybrid) and <i>Acacia incurvaneura</i> over tall open shrubland of <i>Acacia rhodophloia</i> , <i>Acacia adsurgens</i> and <i>Acacia tetragonophylla</i> over mid isolated shrubs of <i>Senna artemisioides</i> subsp. <i>helmsii</i> and <i>Senna glutinosa</i> subsp. <i>xluerssenii</i> over low isolated shrubs of <i>Eremophila forrestii</i> subsp. <i>forrestii</i> and <i>Eremophila exilifolia</i> over mid scattered hummock grasses of <i>Triodia pungens</i> and <i>Triodia wiseana</i> with low scattered tussock grasses of <i>Paspalidium clementii</i> on red clay loam on stony plains.
Acacia low woodland	FP AaAprAci RheAa CcChfArin	Low Woodland of <i>Acacia aptaneura</i> , <i>Acacia pruinocarpa</i> and <i>Acacia catenulata</i> subsp. <i>occidentalis</i> over Open Shrubland of <i>Eremophila forrestii</i> subsp. <i>forrestii</i> , <i>Dodonaea petiolaris</i> and <i>Sida ecogama</i> over Open Tussock Grassland of <i>Aristida contorta</i> , <i>Digitaria ammophila</i> and <i>Aristida inaequiglumis</i> on red orange clay loam on floodplains.
	FP AcaoAaEx Erff Tp	Low Woodland of <i>Acacia catenulata</i> subsp. <i>occidentalis</i> , <i>Acacia aptaneura</i> and <i>Eucalyptus xerothermica</i> over Open Shrubland of <i>Eremophila forrestii</i> subsp. <i>forrestii</i> over Open Hummock Grassland of <i>Triodia pungens</i> on red sandy loam on floodplains.
	FP AciChAa AancApyPI TtAriCc	Low Woodland of <i>Acacia citrinoviridis</i> , <i>Corymbia hamersleyana</i> and <i>Acacia aptaneura</i> over High Shrubland of <i>Acacia ancistrocarpa</i> , <i>Acacia pyrifolia</i> var. <i>pyrifolia</i> and <i>Petalostylis labicheoides</i> over Very Open Tussock Grassland of <i>Themeda triandra</i> , <i>Aristida inaequiglumis</i> and * <i>Cenchrus ciliaris</i> on brown sandy loam on floodplains and medium drainage lines.
	FP ApAaApr AsyErffPto CcAriArc	Low Woodland of <i>Acacia paraneura</i> , <i>Acacia aptaneura</i> and <i>Acacia pruinocarpa</i> over Open Shrubland of <i>Acacia synchronicia</i> , <i>Eremophila forrestii</i> subsp. <i>forrestii</i> and <i>Ptilotus obovatus</i> over Open Tussock Grassland of * <i>Cenchrus ciliaris</i> , <i>Aristida inaequiglumis</i> and <i>Aristida contorta</i> on red brown loam on floodplains.
	MI AaApr Cc Pacl Ch ClvBbDiaa	Low woodland of <i>Acacia aptaneura</i> and <i>Acacia pruinocarpa</i> over mid open tussock grassland of <i>Cenchrus ciliaris</i> over a low sparse grassland of <i>Paspalidium clementii</i> with low open hermland of <i>Cleome viscosa</i> , <i>Bidens bipinnata</i> and <i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i> with low scattered trees of <i>Corymbia hamersleyana</i> mid to low scattered trees on red silty clay loam on minor drainage lines and drainage areas.
	SP AprAa AiAb Ts	Low Woodland of <i>Acacia pruinocarpa</i> and <i>Acacia aptaneura</i> over Scattered Shrubs of <i>Acacia inaequilatera</i> and <i>Acacia bivenosa</i> over Open Hummock Grassland of <i>Triodia</i> sp. Shovelanna Hill (S. van Leeuwen 3835) on red brown clay loam on stony plains.
Acacia tall open to sparse shrubland	HS Aa SeglErplErt EnpoEmu	Tall open to sparse shrubland of <i>Acacia aptaneura</i> over mid sparse shrubland of <i>Senna glutinosa</i> subsp. <i>xluerssenii</i> , <i>Eremophila ?platycalyx</i> , and <i>Eremophila latrobei</i> over low scattered tussock grasses of <i>Enneapogon polyphyllus</i> , and <i>Eriachne mucronata</i> on brown silty loam on hillslopes and upper hillslopes/hillcrests.
Acacia tall shrubland	FP ApyAancAb Tp Cc Anl Ch	Tall open shrubland of <i>Acacia pyrifolia</i> var. <i>pyrifolia</i> , <i>Acacia ancistrocarpa</i> and <i>Acacia bivenosa</i> over mid open hummock grassland of <i>Triodia pungens</i> with mid sparse tussock grasses of <i>Cenchrus ciliaris</i> with mid isolated shrubs of <i>Androcalva luteiflora</i> with low isolated trees of <i>Corymbia hamersleyana</i> on brown sandy clay loam on floodplains, drainage areas and minor drainage lines.
Acacia tall shrubland to tall open shrubland	FP AaApAte SeglMam EnpoEmuAri Tp	Tall shrubland to tall open shrubland of <i>Acacia aptaneura</i> , <i>Acacia paraneura</i> and <i>Acacia tetragonophylla</i> over mid to low scattered shrubs of <i>Senna glutinosa</i> subsp. <i>xluerssenii</i> , and <i>Maireana melanocoma</i> over low scattered, tussock and hummock grasses of <i>Enneapogon polyphyllus</i> , <i>Eriachne mucronata</i> , <i>Aristida inaequiglumis</i> and <i>Triodia pungens</i> on brown clay loam on stony plains and drainage areas/ floodplains.
Corymbia low open woodland	GO CfCocd AhPI DopErhr ErmuPaclCy a Tp CyvCyh	Low open <i>Corymbia ferritcola</i> woodland, with occasional low trees of <i>Corymbia candida</i> subsp. <i>dipsodes</i> , over low tall sparse shrubland of <i>Acacia hamersleyensis</i> and <i>Petalostylis labicheoides</i> over mid sparse shrubland of <i>Dodonaea pachyneura</i> and <i>Eremophila</i> sp. Hamersley Range (K. Walker KW 136) over mid sparse tussock grassland of <i>Eriachne mucronata</i> , <i>Paspalidium clementii</i> and <i>Cymbopogon ambiguus</i> with mid scattered hummock grasses of <i>Triodia pungens</i> with occasional mid scattered sedges of <i>Cyperus vaginatus</i> and <i>Cyperus hesperius</i> on black/brown clay loam in gorges.

Broad Floristic Formation		Vegetation Association Description
<i>Eucalyptus</i> mid open woodland	ME EvAcp CcTtEua ApypAciMg Cyv Clv	Low open woodland of <i>Eucalyptus victrix</i> and <i>Acacia coriacea</i> subsp. <i>pendens</i> over mid open tussock grassland of <i>Cenchrus ciliaris</i> , <i>Themeda triandra</i> and <i>Eulalia aurea</i> open tussock grassland with <i>Acacia pyrifolia</i> var. <i>pyrifolia</i> , <i>Acacia citrinoviridis</i> and <i>Melaleuca glomerata</i> over tall sparse sedgeland of <i>Cyperus vaginatus</i> over sparse herbland of <i>Cleome viscosa</i> on red/ brown loamy sand on medium drainage lines.
<i>Eucalyptus</i> woodland	MA EcrEv AciApypMg CcEuaTt	Woodland of <i>Eucalyptus camaldulensis</i> subsp. <i>refulgens</i> and <i>Eucalyptus victrix</i> over High Open Shrubland of <i>Acacia citrinoviridis</i> , <i>Acacia pyrifolia</i> var. <i>pyrifolia</i> and <i>Melaleuca glomerata</i> over Tussock Grassland of * <i>Cenchrus ciliaris</i> , <i>Eulalia aurea</i> and <i>Themeda triandra</i> on brown clay loam on banks of major drainage lines.
<i>Senna</i> mid sparse shrubland	SP Segl AsyAteAp Ercu	Mid sparse shrubland of <i>Senna glutinosa</i> subsp. <i>xluerssenii</i> with tall isolated shrubs of <i>Acacia synchronicia</i> , <i>Acacia tetragonophylla</i> and <i>Acacia paraneura</i> over low isolated shrubs of <i>Eremophila cuneifolia</i> over low scattered chenopods and grasses on stony plains.
<i>Senna</i> mid to low sparse shrubland	FP SeaoSesmS egl AaAsyAte ArcEnpoDar	Mid to low sparse shrubland of <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , <i>Senna</i> sp. Meekatharra (E. Bailey 1-36), and <i>Senna glutinosa</i> subsp. <i>xluerssenii</i> with tall scattered shrubs of <i>Acacia aptaneura</i> , <i>Acacia synchronicia</i> , and <i>Acacia tetragonophylla</i> over low scattered tussock grasses of <i>Aristida contorta</i> , <i>Enneapogon polyphyllus</i> , and <i>Dactyloctenium radulans</i> on brown clay loam on drainage areas/ floodplain.
<i>Triodia</i> hummock grassland	CP TwTa Ese AbPIApyp	Hummock Grassland of <i>Triodia wiseana</i> and <i>Triodia angusta</i> with Open Mallee of <i>Eucalyptus socialis</i> subsp. <i>eucentrica</i> and Open Shrubland of <i>Acacia bivenosa</i> , <i>Petalostylis labicheoides</i> and <i>Acacia pyrifolia</i> var. <i>pyrifolia</i> on light brown clay loam on calcrete plains and rises.
	HC TsTp EkkEg	Hummock Grassland of <i>Triodia</i> sp. Shovelanna Hill (S. van Leeuwen 3835) and <i>Triodia pungens</i> with Very Open Mallee of <i>Eucalyptus kingsmillii</i> subsp. <i>kingsmillii</i> and <i>Eucalyptus gamophylla</i> on red sandy loam on hill crests and upper hill slopes.
	HC TwTbrTp EilCh AmaGrwhAb	Hummock Grassland of <i>Triodia wiseana</i> , <i>Triodia brizoides</i> and <i>Triodia pungens</i> with Low Open Woodland of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and <i>Corymbia hamersleyana</i> over High Open Shrubland of <i>Acacia maitlandii</i> , <i>Grevillea wickhamii</i> subsp. <i>hispidula</i> and <i>Acacia bivenosa</i> on red brown sandy loam on hill crests and upper hill slopes.
	HS TbrTw AiAprHc ErfrErpd	Hummock Grassland of <i>Triodia brizoides</i> and <i>Triodia wiseana</i> with High Open Shrubland of <i>Acacia inaequilatera</i> , <i>Acacia pruinocarpa</i> and <i>Hakea chordophylla</i> over Open Shrubland of <i>Eremophila fraseri</i> and <i>Eremophila platycalyx</i> subsp. <i>pardalota</i> on red loamy sand on lower hill slopes and footslopes.
	HS Tw EilChHc AancAbAa	Hummock Grassland of <i>Triodia wiseana</i> with Low Open Woodland of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> , <i>Corymbia hamersleyana</i> and <i>Hakea chordophylla</i> and Open Shrubland of <i>Acacia ancistrocarpa</i> , <i>Acacia bivenosa</i> and <i>Acacia aptaneura</i> on red sandy loam on hill slopes.
	ME TpTlo ExAciCh PIApypGoro	Hummock Grassland of <i>Triodia pungens</i> and <i>Triodia longiceps</i> with Low Woodland of <i>Eucalyptus xerothermica</i> , <i>Acacia citrinoviridis</i> and <i>Corymbia hamersleyana</i> over High Shrubland of <i>Petalostylis labicheoides</i> , <i>Acacia pyrifolia</i> var. <i>pyrifolia</i> and <i>Gossypium robinsonii</i> on red brown clay loam on medium drainage lines and surrounding floodplains.
	SP TpTb Eg PIAbAanc	Hummock Grassland of <i>Triodia pungens</i> and <i>Triodia basedowii</i> with Open Mallee of <i>Eucalyptus gamophylla</i> and Shrubland of <i>Petalostylis labicheoides</i> , <i>Acacia bivenosa</i> and <i>Acacia ancistrocarpa</i> on red brown loamy sand on stony plains and footslopes.
	SP Ts Ai	Hummock Grassland of <i>Triodia</i> sp. Shovelanna Hill (S. van Leeuwen 3835) with High Open Shrubland of <i>Acacia inaequilatera</i> on red brown loamy sand on lower hill slopes and stony plains.
<i>Triodia</i> low hummock grassland	CP TragTpTw AbAsySeao Ese	Low hummock grassland of <i>Triodia angusta</i> , <i>Triodia pungens</i> , and <i>Triodia wiseana</i> with mid to tall sparse shrubland to scattered shrubs of <i>Acacia bivenosa</i> (wispy form), <i>Acacia synchronicia</i> , and <i>Senna artemisioides</i> subsp. <i>oligophylla</i> with low scattered tree of <i>Eucalyptus socialis</i> subsp. <i>eucentrica</i> on red-brown clay loam on calcrete stony plains and platforms.
	FP Tp(±Tw) AssAdErlo EnpoTtChf	Low hummock grassland of <i>Triodia pungens</i> , ± <i>Triodia wiseana</i> with mid to tall sparse shrubland of <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> , <i>Acacia dictyophleba</i> , and <i>Eremophila longifolia</i> over mid to low sparse tussock grassland of <i>Enneapogon polyphyllus</i> , <i>Themeda triandra</i> , and <i>Chrysopogon fallax</i> on brown silty clay loam on drainage areas/ floodplains and minor drainage lines.

Broad Floristic Formation	Vegetation Association Description	
FP Trag(±Tw) AbAsyAsi EgExCh	Low hummock grassland of <i>Triodia angusta</i> , ± <i>Triodia wiseana</i> with mid to low scattered shrubs of <i>Acacia bivenosa</i> , <i>Acacia synchronicia</i> , and <i>Acacia sibirica</i> with occasional low scattered trees of <i>Eucalyptus gamophylla</i> , <i>Eucalyptus xerothermica</i> , and <i>Corymbia hamersleyana</i> on brown clay loam on low slopes, drainage areas/ floodplains and undulating hills.	
HC TvTp EgEk AhAmaHc Seel	Low hummock grassland of <i>Triodia vanleeuwenii</i> and <i>Triodia pungens</i> with low sparse woodland of <i>Eucalyptus gamophylla</i> and <i>Eucalyptus kingsmillii</i> over tall sparse shrubland of <i>Acacia hamersleyensis</i> , <i>Acacia maitlandii</i> and <i>Hakea chordophylla</i> over low isolated shrubs of <i>Seringia elliptica</i> on red clay loam on hillcrests and summits.	
HS Ts(±TragTw) AbHallAads SeahSeglErf s	Low hummock grassland of <i>Triodia vanleeuwenii</i> ± <i>Triodia angusta</i> , and <i>Triodia wiseana</i> with mid to tall sparse shrubland to scattered shrubs of <i>Acacia bivenosa</i> , <i>Hakea lorea</i> subsp. <i>lorea</i> , and <i>Acacia adsurgens</i> over low scattered shrubs of <i>Senna artemisioides</i> subsp. <i>helmsii</i> , <i>Senna glutinosa</i> subsp. <i>xluerssenii</i> , and <i>Eremophila fraseri</i> subsp. <i>fraseri</i> on brown silty loam on undulating low hills.	
HS TvTp EIIcdd SeelAspCac a HcAmaAh SeggMiv ErmuErla	Low hummock grassland of <i>Triodia vanleeuwenii</i> and <i>Triodia pungens</i> with low sparse woodland of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and <i>Corymbia deserticola</i> subsp. <i>deserticola</i> over with low sparse shrubland of <i>Seringia elliptica</i> , <i>Acacia spondylophylla</i> and <i>Calytrix carinata</i> with tall isolated shrubs of <i>Hakea chordophylla</i> , <i>Acacia maitlandii</i> and <i>Acacia hamersleyensis</i> over mid isolated <i>Senna glutinosa</i> subsp. <i>glutinosa</i> and <i>Mirbelia viminalis</i> low isolated tussock grasses of <i>Eriachne mucronata</i> and <i>Eriachne lanata</i> on red clay loam on hill crests, hill slopes and ridgelines/ tops.	
HS TvTp HcAiHll AmaAbSegg Asp EIIApr	Low hummock grassland of <i>Triodia vanleeuwenii</i> and <i>Triodia pungens</i> with tall isolated shrubs of <i>Hakea chordophylla</i> , <i>Acacia inaequilatera</i> and <i>Hakea lorea</i> subsp. <i>lorea</i> over mid isolated shrubs of <i>Acacia maitlandii</i> , <i>Acacia bivenosa</i> and <i>Senna glutinosa</i> subsp. <i>glutinosa</i> over low isolated shrubs of <i>Acacia spondylophylla</i> with low isolated trees of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and <i>Acacia pruinocarpa</i> on red silty clay loam on hillcrests/ upper hillslopes and undulating low hills.	
HS Tw AinAbAads EgEIICh	Low hummock grassland of <i>Triodia wiseana</i> with mid to tall sparse shrubland to scattered shrubs of <i>Acacia inaequilatera</i> , <i>Acacia bivenosa</i> , and <i>Acacia adsurgens</i> with low scattered trees of <i>Eucalyptus gamophylla</i> , <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> , and <i>Corymbia hamersleyana</i> on brown silty loam on undulating hills and lower slopes.	
<i>Triodia</i> mid hummock grassland	HS Tw Ai EfrSeglSeg g Ptro	Mid hummock grassland of <i>Triodia wiseana</i> with tall isolated shrubs of <i>Acacia inaequilatera</i> over mid isolated shrubs of <i>Eremophila fraseri</i> , <i>Senna glutinosa</i> subsp. <i>xluerssenii</i> and <i>Senna glutinosa</i> subsp. <i>glutinosa</i> over low isolated shrubs of <i>Ptilotus rotundifolius</i> mid to tall scattered shrubs on red clay loam on low hills, slopes and undulating hills.
<i>Triodia</i> mid open hummock grassland	FP Tp Eg AbAte AsiAancAa Cc	Mid open hummock grassland of <i>Triodia pungens</i> with low open <i>Eucalyptus gamophylla</i> woodland over mid open shrubland of <i>Acacia bivenosa</i> and <i>Acacia tetragonophylla</i> with tall isolated shrubs of <i>Acacia sibirica</i> , <i>Acacia ancistrocarpa</i> and <i>Acacia aptaneura</i> over mid sparse tussock grassland of <i>Cenchrus ciliaris</i> on red sandy clay loam on floodplains.
	GO Tp DopAmAnl AhPI Cf Ermu	Mid open hummock grassland of <i>Triodia pungens</i> with mid sparse shrubland of <i>Dodonaea pachyneura</i> , <i>Acacia monticola</i> and <i>Androcalva luteiflora</i> with tall sparse shrubland of <i>Acacia hamersleyensis</i> and <i>Petalostylis labicheoides</i> with low sparse woodland of <i>Corymbia ferritcola</i> over low sparse tussock grassland of <i>Eriachne mucronata</i> on red sandy clay loam cliffs, upper slopes, gorges and gullies.
	HS TwTbr AbAiErfs Asp	Mid open hummock grassland of <i>Triodia wiseana</i> and <i>Triodia brizoides</i> with mid to tall open shrubland of <i>Acacia bivenosa</i> , <i>Acacia inaequilatera</i> and <i>Eremophila fraseri</i> subsp. <i>fraseri</i> over low scattered shrubs of <i>Acacia spondylophylla</i> on red silty loam on hillslopes, hillcrest/ upper hillslopes and undulating low hills.
	SP TwTp AiAadsAanc AsiApr Segg	Mid open hummock grassland of <i>Triodia wiseana</i> and <i>Triodia pungens</i> with tall sparse shrubs of <i>Acacia inaequilatera</i> , <i>Acacia adsurgens</i> and <i>Acacia ancistrocarpa</i> with isolated low trees of <i>Acacia sibirica</i> and <i>Acacia pruinocarpa</i> over mid isolated shrubs of <i>Senna glutinosa</i> subsp. <i>glutinosa</i> on red clay loam on stonyplains, floodplains and minor drainage lines.
<i>Triodia</i> open hummock grassland	FP TscTp ExAaApr AteAssGrwh	Open Hummock Grassland of <i>Triodia schinzii</i> and <i>Triodia pungens</i> with Low Open Woodland of <i>Eucalyptus xerothermica</i> , <i>Acacia aptaneura</i> and <i>Acacia pruinocarpa</i> over Scattered Shrubs of <i>Acacia tetragonophylla</i> , <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> and <i>Grevillea wickhamii</i> subsp. <i>hispidula</i> on red brown clay loam on floodplains.

Broad Floristic Formation		Vegetation Association Description
	HS TsTpTb AaAprAw AteEreErlI	Open Hummock Grassland of <i>Triodia</i> sp. Shovelanna Hill (S. van Leeuwen 3835), <i>Triodia pungens</i> and <i>Triodia basedowii</i> with Low Open Woodland of <i>Acacia aptaneura</i> , <i>Acacia pruinocarpa</i> and <i>Acacia wanyu</i> and Open Shrubland of <i>Acacia tetragonophylla</i> , <i>Eremophila exilifolia</i> and <i>Eremophila latrobei</i> subsp. <i>latrobei</i> on red sandy loam on hill slopes.
	SP TI AancApa ApAprCh	Open Hummock Grassland of <i>Triodia lanigera</i> with Open Shrubland of <i>Acacia ancistrocarpa</i> and <i>Acacia pachyacra</i> and Scattered Low Trees of <i>Acacia paraneura</i> , <i>Acacia pruinocarpa</i> and <i>Corymbia hamerselyana</i> on red sandy loam on stony plains.

The Onshore Environmental (2014) *Consolidation of Regional Vegetation Mapping BHP Billiton Iron Ore Pilbara Tenure (Appendix 1)* undertook a detailed review of all previous flora and vegetation surveys across BHP's Pilbara operations (162 baseline flora and vegetation surveys between 2004 and 2013). This review was supported by field visits where the analysis indicated that further information was required to confirm the exact vegetation associations.

Historical survey reports often used different techniques and/or nomenclature, however they generally utilised similar field methods. The Project resolved the inconsistencies between previous vegetation mapping and created one consolidated regional Geographic Information System (GIS) database which:

- Serves as BHP's base line vegetation dataset;
- Maps and describes a total of 53 broad floristic communities with 218 distinct vegetation associations across BHP's Pilbara operations; and
- Provides consistency in methods and nomenclature across BHP's Pilbara operations.

Vegetation mapping from surveys conducted post Onshore Environmental (2014) follow the same nomenclature and are overlaid in the GIS database to replace the consolidated habitat mapping in the area of the new/ updated mapping.

The vegetation consolidation project also identified one Threatened Ecological Community (TEC) and six Priority Ecological Communities (PECs) within the Project Area. None of the vegetation associations or landforms identified within the boundaries of CPS 5617/5 are associated with a TEC or PEC (Onshore Environmental, 2014, Biologic, 2021a, 2021b and 2022a). The closest PEC is more than 35 km north of CPS 5617/5.

The distinct mapped broad floristic communities and vegetation associations identified within CPS 5617/5 extend or occur beyond the permit boundary. It is considered unlikely that any changes in vegetation associations and local species over the time since the vegetation consolidation project would lead to elevated significance of the vegetation given that none of the vegetation associations identified within the Amendment Application Area were affiliated with any TECs or PECs and there are no vegetation associations within the Amendment Application Area that would be likely to be included in any updates to TEC or PEC listings. This is supported by the observations from the more recent surveys conducted over the southern portions of the Amendment Application Area (Biologic, 2021a and 2021b)

Vegetation condition within the Amendment Application Area ranges from excellent to completely degraded.

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 Amendment Application Area.

Five Priority flora have been identified within the Amendment Application Area (**Figure 3**):

- *Eremophila magnifica* subsp. *magnifica* (Priority 4);
- *Eremophila naaykensis* (Priority 3);
- *Euphorbia inappendiculata* var. *inappendiculata* (Priority 2);
- *Isotropis parviflora* (Priority 3); and
- *Lepidium catapycnon* (Priority 4).

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

3.4.3 Weeds

Twenty seven introduced flora species (weeds) have been recorded within the Amendment Application Area (**Table 4**). One Declared Pest under s22 of the *Biosecurity and Agriculture Management Act, 2007* (BAM Act) **Tamarix aphylla* (Athel Pine) has been recorded from the Amendment Application Area. 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 Amendment Application Area

Species	Common Name	DPAW Rating (DPAW, 2016)	Declared Pest ¹
* <i>Aerva javanica</i>	Kapok Bush	High and Rapid	No
* <i>Agave americana</i>	Century Plant	High and Slow	No
* <i>Argemone ochroleuca</i>	Mexican Poppy	Unknown 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>Chloris barbata</i>	Purpletop Feathertop	High and Rapid	No
* <i>Chloris virgata</i>	Feathertop Rhodes Grass	High and Rapid	No
* <i>Citrullus amarus</i>	Bitter melon	Unknown and Moderate	No
* <i>Cynodon dactylon</i>	Couch	High and Rapid	No
* <i>Echinochloa colona</i>	Awnless Barnyard Grass	High and Rapid	No
* <i>Erigeron bonariensis</i>	Flax leaf Fleabane		No
* <i>Euphorbia hirta</i>	Asthma Plant	Low and Slow	No
* <i>Flaveria trinervia</i>	Speedy Weed		No
* <i>Lactuca serriola</i>	Prickly Lettuce		No
* <i>Malvastrum americanum</i>	Spiked Malvastrum	High and Rapid	No
* <i>Rumix vesicarius</i>	Ruby Dock	High and Rapid	No
* <i>Schinus molle</i>	Pepper Tree		No
* <i>Setaria verticillata</i>	Whorled Pigeon Grass	High and Rapid	No
* <i>Sisymbrium orientale</i>	Indian Hedge Mustard	Low and Unknown	No
* <i>Solanum nigrum</i>	Black Berry Nightshade	Low and Rapid	No
* <i>Sonchus oleraceus</i>	Common Sowthistle	Low and Rapid	No
* <i>Tamarindus indica</i>	Tamarind	Low and Slow	No
* <i>Tamarix aphylla</i>	Athel Pine	High and Rapid	Yes
* <i>Tribulus terrestris</i>	Caltrop	Unknown and Moderate	No
* <i>Vachellia farnesiana</i>	Mimosa Bush	High and Rapid	No
* <i>Washingtonia filifera</i>	Cotton Palm	High and Rapid	No

3.4.4 Fauna Habitats and Significant Fauna

Biologic (2017, 2020, 2022b and 2022c) identified the following nine vertebrate fauna habitats within the Amendment Application Area:

¹ *Biosecurity and Agriculture Management Act, 2007* (BAM Act) s22

Figure 4: Whaleback Strategic NVCP CPS 5617/5 Renewal – Terrestrial Fauna Habitat

- **Hillcrest / Hill slope:** These fauna habitats tend to be more open and structurally simple due to their recent depositional history than other fauna habitats, and are dominated by varying species of spinifex. A common feature of these habitats is a rocky substrate, often with exposed bedrock, and skeletal red soils. These are usually dominated by *Eucalyptus* woodlands, *Acacia* and *Grevillea* scrublands and *Triodia* spp. low hummock grasslands.
- **Breakaway / Cliff:** Breakaways/Cliffs are rugged, incised rocky hills and ranges. They tend to contain large rock fragments and more rock outcropping than other fauna habitats. Significant habitat features such as caves were sometimes encountered in this habitat type. Vegetation can be dense and complex in areas of soil deposition or sparse and simple where erosion has occurred.
- **Gorge / Gully:** Gorges and gullies are rugged, steep-sided valleys incised into the surrounding landscape. Gorges tend to be deeply incised, with vertical cliff faces, while gullies are more open (but not as open as Minor Drainage Lines). Caves and rock pools are most often encountered in this habitat type. Vegetation can be dense and complex in areas of soil deposition or sparse and simple where erosion has occurred.
- **Drainage Area / Floodplain:** Characterised by *Eucalyptus xerothermica* and *Corymbia hamersleyana* woodland over broad-leaved *Acacia* shrubland on sandy loam soils sometimes with exposed rocky areas. These can have high vegetation density, complexity and diversity, and because they tend to occur on accretional or depositional areas, often have deeper and richer soils than other fauna habitats. Grasses tend to be dominated by tussock grasses rather than spinifex, or the weed Buffel Grass **Cenchrus ciliaris*.
- **Minor Drainage Line:** Located within the minor gullies and depressions, generally through the Crest/Slope habitat. Consists primarily of *Acacia* low shrubland. The understorey generally lacks density and often consists solely of sparse tussock grassland, often including the weed Buffel Grass **Cenchrus ciliaris* where it has been introduced. The substrate can be sandy in places but generally consists of a skeletal loam gravel or stone.
- **Major Drainage Line:** Major Drainage Lines comprise mature River Red Gums (*Eucalyptus camaldulensis*), Coolibahs and stands of Silver Cadjeput (*Melaleuca argentea*) over river pools. Open, sandy or gravelly riverbeds characterise this habitat type. In ungrazed areas, the vegetation adjacent to the main channel or channels is denser, taller and more diverse than adjacent terrain and can include reedbeds around pools.
- **Mulga Woodland:** This habitat includes woodlands and other ecosystems in which Mulga (*Acacia aneura*) is dominant, either as the principal *Acacia* species or mixed with others. It consists of disintegrating groves on stony soils with spinifex. This habitat type is grouped with other habitat occurring on the plains; however it is noted that small groves of Mulga occur on ridgelines.
- **Sand Plain:** Sand Plain habitat is characterised by relatively deep sandy soils supporting dense spinifex grasslands and sparse shrubs. This habitat transitions into patches of Mulga in places. This habitat often occurs as terraces along Major Drainage Lines.
- **Stony Plain:** These are erosional surfaces of gently undulating plains, ridges and associated footslopes. Mainly support hard spinifex (and occasionally soft spinifex) with a mantle of gravel and pebbles.

A significant Ghost Bat cave located east of Orebody 35 has been clipped from the NVCP boundary a 50 m buffer as disturbance to this cave was not considered in the Orebody 35 referral.

The Biologic (2017) *Consolidated Fauna Habitat Mapping BHP Billiton Iron Ore Pilbara Tenure (Appendix 5)* undertook a detailed review of all previous fauna surveys across BHP's Pilbara operations and the outputs from the Onshore Environmental (2014) consolidation project. This review was supported by field visits where the analysis indicated that further information was required to confirm the fauna habitats.

The Project resolved the inconsistencies between previous mapping and created one consolidated regional Geographic Information System (GIS) database which:

- Serves as BHP's baseline fauna habitat dataset;
- Maps and describes a total of 17 fauna habitats across BHP's Pilbara operations; and
- provides consistency in methods and nomenclature across BHP's Pilbara operations.

Vertebrate habitat mapping from surveys conducted post Biologic (2017) follow the same nomenclature and are overlaid in the GIS database to replace the consolidated habitat mapping in the area of the new/ updated mapping.

The Consolidated habitat mapping is supported by recent surveys (Biologic 2020 and 2022), which covered the southern areas of the Amendment Application Area. These surveys did not find any previously unrecorded fauna species, nor identify new fauna species that are likely to occur within the Amendment Application Area.

The fauna habitats identified within CPS 5617/5 extend beyond the Amendment Application Area and are common in the surrounding region.

The surveys undertaken across the Amendment Application Area have resulted in ten fauna species of significance being recorded from within the Amendment Application Area (**Figure 5**):

- Common Greenshank (*Tringa nebularia*) (Migratory EPBC Act and BC Act);
- Common Redshank (*Tringa totanus*) (Migratory EPBC Act and BC Act);
- Common Sandpiper (*Actitis hypoleucos*) (Migratory EPBC Act and BC Act);
- Ghost Bat (*Macroderma gigas*) (Vulnerable EPBC Act and BC Act);
- Marsh Sandpiper (*Tringa stagnatilis*) (Migratory EPBC Act and BC Act);
- Northern Quoll (*Dasyurus hallucatus*) (Endangered EPBC Act and BC Act);
- Peregrine Falcon (*Falco peregrinus*) (Other Specially Protected Fauna BC Act);
- Pilbara Olive Python (*Liasis olivaceus barroni*) (Vulnerable EPBC Act and BC Act);
- Western Pebble-mound Mouse (*Pseudomys chapmani*) (Priority 4 DBCA); and
- Wood Sandpiper (*Tringa glareola*) (Migratory EPBC Act and BC Act).

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

- Fork-tailed Swift (*Apus pacificus*) (Migratory EPBC Act and BC Act);
- Glossy Ibis (*Plegadis falcinellus*) (Migratory EPBC Act and BC Act);
- Grey Falcon (*Falco hypoleucos*) (Vulnerable EPBC Act and BC Act);
- Long-toed Stint (*Calidris subminuta*) (Migratory EPBC Act and BC Act);
- Pectoral Sandpiper (*Calidris melanotos*) (Migratory EPBC Act and BC Act);
- Pilbara Flat-headed Blind Snake (*Anilius ganei*) (Priority 1 DBCA);
- Pilbara Leaf-nosed Bat (*Rhinonictoris aurantia*) (Vulnerable EPBC Act and BC Act); and
- Sharp-tailed Sandpiper (*Calidris acuminata*) (Migratory EPBC Act and BC Act).

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 Amendment Application Area

Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood	Potential Impact on Species
Birds					
Common Greenshank (<i>Tringa nebularia</i>)	Migratory EPBC Act Migratory BC Act	This species occurs both in coastal areas and inland, where it inhabits estuaries, mudflats, mangroves, lagoons, billabongs, sewage farms and flooded cropland (Birds Australia, 2010).	The Common Greenshank was recorded foraging in the Artificial Wetland on the Mount Whaleback Tailings Dam (Onshore Environmental, 2013; Biologic, 2011). Although there is no natural habitat in the Amendment Application Area the artificial water sources provide foraging habitat for this species.	Recorded	Low Proposed activities under the Amendment Application Area are unlikely to have an impact given the lack of suitable habitat, the species high mobility and wide distribution, and that its preferred habitat is present in the surrounding region.
Common Redshank (<i>Tringa totanus</i>)	Migratory EPBC Act Migratory BC Act	The Common Redshank has an estimated flyway population of 75,000 and an estimated Australian population of only about 200 (Geering <i>et al.</i> , 2007). In Australia the Common Redshank is found in a variety of sheltered coastal habitats, most commonly on softer substrates associated with tidal creeks in mangrove forests and occasionally on inland wetlands (Geering <i>et al.</i> , 2007). There are few, if any, inland records of this bird in Australia (Geering <i>et al.</i> , 2007). In Western Australia this species generally found from Roebuck Bay south to Coral Bay with some records further south from the Peel Inlet (Johnstone and Storr, 1998).	The Common Redshank was recorded foraging in the Artificial Wetland habitat of the Tailings Dam (Onshore Environmental, 2013). Although there is no natural habitat in the Amendment Application Area the artificial water sources provide foraging habitat for this species.	Recorded	Low Proposed activities under the Amendment Application Area are unlikely to have an impact on the Common Redshank given the lack of suitable habitat, the species high mobility and wide distribution, and that its preferred habitat is present in the surrounding region.
Common Sandpiper (<i>Actitis hypoleucos</i>)	Migratory EPBC Act Migratory BC Act	<i>Actitis hypoleucos</i> is a nonbreeding migratory shorebird which utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The muddy margins utilised by the species are often narrow, and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags (Geering <i>et al.</i> 2007).	The Common Sandpiper was recorded foraging in the Artificial Wetland habitat of the Tailings Dam (Onshore Environmental, 2013). Although there is no natural habitat in the Application Area the Artificial Wetland provide foraging habitat for this species.	Recorded	Low Proposed activities under the Amendment Application Area are unlikely to have an impact on the Common Sandpiper given the lack of suitable habitat, the species high mobility and wide distribution, and that its preferred habitat is present in the surrounding region.
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 Amendment 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 Amendment Application Area.	Possible	Negligible As this species is entirely aerial and not reliant on terrestrial habitats, the impact to this species is considered to be negligible.

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Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood	Potential Impact on Species
Glossy Ibis (<i>Plegadis falcinellus</i>)	Migratory EPBC Act Migratory BC Act	The Glossy Ibis inhabits areas of freshwater wetlands, irrigated areas, and margins of dams, floodplains, brackish and saline wetlands, tidal mudflats, pastures, lawns and public gardens (Johnstone and Storr, 2004). This species is a casual vagrant in dry and hilly areas and is mainly a non-breeding visitor to Western Australia (Johnstone and Storr, 1998).	The Major Drainage Line habitat and the Artificial Wetlands of the ARD pond, evaporation pond and tailings dam provide suitable foraging habitat for this species. The majority of records of this species are from Ophthalmia Dam which is located approximately 12 km to the east of the Amendment Application Area.	Possible	Low The proposed activities are unlikely to have an impact on this species given its high mobility and their preferred habitat is present in the surrounding region.
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 Amendment Application Area.	Possible	Low Proposed activities under the Amendment 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.
Long-toed Stint (<i>Calidris subminuta</i>)	Migratory EPBC Act Migratory BC Act	The Long-toed Stint is a moderately common summer non-breeding migrant that occurs along the coast and inland waterways of Western Australia. It inhabits mainly inland freshwater swamps, lagoons, claypans, sewerage ponds, salt lakes and estuaries (Johnstone and Storr, 1998). This Migratory bird breeds in Siberia to the North Pacific and migrates to Australian waters in August to April (Pizzey and Knight, 2007). This species prefers coastal and inland swamps for habitat (Simpson and Day, 2004).	There is no natural habitat for this species in the Application Area however the ARD dam, tailings dam and evaporation pond complex (Artificial Wetland) may provide foraging habitat for this species. The only recent record of this species in the vicinity of the Amendment Application Area is from Ophthalmia Dam which is located approximately 12 km to the east of the Application Area.	Possible	Low The proposed activities are unlikely to have an impact on this species given its high mobility and their preferred habitat is present in the surrounding region.
Pectoral Sandpiper (<i>Calidris melanotos</i>)	Migratory EPBC Act Migratory BC Act	The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands (Higgins & Davies, 1996).	There is no natural habitat for this species in the Application Area however the ARD dam, tailings dam and evaporation pond complex (Artificial Wetland) may provide foraging habitat for this species. The only recent record of this species in the vicinity of the Amendment Application Area is from Ophthalmia Dam which is located approximately 12 km to the east of the Application Area.	Possible	Low The proposed activities are unlikely to have an impact on this species given its high mobility and their preferred habitat is present in the surrounding region.

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Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood	Potential Impact on Species
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 Amendment Application Area. No suitable breeding habitat is known from the Amendment Application Area.	Recorded	Low 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.
Sharp-tailed Sandpiper (<i>Calidris acuminata</i>)	Migratory EPBC Act Migratory BC Act	The Sharp-tailed Sandpiper is a summer non-breeding migratory shorebird that occurs along most of the coast of Western Australia except for the south coast, and in well watered parts of the interior and casually in the arid east south of Lake Gregory (Johnstone and Storr, 1998). The Sharp-tailed Sandpiper uses fresh and salt water wetlands as its preferred habitat. Eighty Mile Beach has peak numbers in August to September (Johnstone and Storr, 1998). It inhabits both coastal and inland areas but prefers non-tidal fresh or brackish wetlands (Geering <i>et al.</i> , 2007).	There is no natural habitat for this species in the Application Area however the ARD dam, tailings dam and evaporation pond complex (Artificial Wetland) may provide foraging habitat for this species. The only recent record of this species in the vicinity of the Amendment Application Area is from Ophthalmia Dam which is located approximately 12 km to the east of the Application Area.	Possible	Low The proposed activities are unlikely to have an impact on this species given its high mobility and their preferred habitat is present in the surrounding region.
Wood Sandpiper (<i>Tringa glareola</i>)	Migratory EPBC Act Migratory BC Act	The Wood Sandpiper is a summer non-breeding migratory shorebird that occurs along the coast and inland regions of Western Australia. It primarily inhabits shallow fresh waters such as lagoons, swamps, claypans, dams and sewerage ponds (Johnstone and Storr 1998; Geering <i>et al.</i> , 2007).	There is no natural habitat for this species in the Application Area however the ARD dam, tailings dam and evaporation pond complex (Artificial Wetland) may provide foraging habitat for this species. Wood Sandpipers were recorded within the Amendment Application Area from the margins of the Artificial Wetland on the Mount Whaleback Tailings Dam. This species is widely distributed over Western Australia, mainly around the coastal areas.	Recorded	Low The proposed activities are unlikely to have an impact on this species given its high mobility and their preferred habitat is present in the surrounding region.

Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood	Potential Impact on Species
Mammals					
<p>Ghost Bat (<i>Macroderma gigas</i>)</p>	<p>Vulnerable EPBC Act Vulnerable BC Act</p>	<p>Ghost Bats are patchily distributed across most of northern Australia, however the contraction in the distribution in central Australia has left the Pilbara population of ghost bats isolated by extensive sandy deserts (Worthington-Wilmer <i>et al.</i>, 1994). Ghost Bats roost in caves that are generally associated with Gorge/Gully or Breakaway/Cliff habitats. Unpublished satellite tracking data suggest Ghost Bats preferentially forage on productive plain areas with thin mature woodland over patchy or clumped tussock or hummock grass (<i>Triodia</i> species) on sand or stony ground (Bat Call WA, 2021). Ghost Bats also use vantage points presented by tall, isolated trees on the edge of these woodlands and grasslands, as well as along watercourses to search for prey (Bat Call WA, 2021). These foraging habitats are considered to represent critical foraging habitat when situated within 12 km of a critical roost (i.e. Category 1, 2 and 3 (when found in an apartment block) caves) (Bat Call WA, 2021).</p>	<p>Ghost Bats prefer to roost in deep humid caves which are not present in the Amendment Application Area. This species was recorded in the Gorge/Gully habitat in the southern central section of the Amendment Application Area from the presence of a few scats. Evidence of the species (scats) was also recorded in a cave (Category 4) situated in Gorge/Gully habitat in the far south-west corner in the area that is excluded from the Amendment Application Area. It is expected that the species forages over much of the Amendment Application Area. This species has been previously recorded in the vicinity of the Amendment Application Area with suitable roost caves known from the surrounding area. A cave to the south of the Amendment Application Area has been categorised as a critical roost (Category 2 cave) and, as such, critical foraging habitat for the Ghost Bat occurs in suitable foraging habitat types of Drainage Area/Floodplain, Minor Drainage Line, Mulga Woodland and Stony Plain within 12 km of this roost.</p> <p>The level of assessment for the OB35 Iron Ore Mine referral to the EPA on 24th November 2011 was set at Not Assessed. This referral included the removal of three non-significant caves at OB35 with the retention of the eastern most cave. This easternmost cave is considered to be a non-significant potential day roost and has been clipped out of the Amendment Application area with a 50 m buffer.</p>	<p>Recorded</p>	<p>Low</p> <p>This species would forage across the Amendment Application Area and its surrounds.</p> <p>The one potential day roost identified within the Amendment Application Area that has not been assessed for disturbance under Part IV of the EP Act has been clipped from the Amendment Application Area with a 50 m buffer.</p>

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Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood	Potential Impact on Species
Northern Quoll (<i>Dasyurus hallucatus</i>)	Endangered EPBC Act Endangered BC Act	<p>Northern Quoll populations occur in six geographical centres around Australia, including: Drummond Range, central Queensland; the wet tropics of Northern Queensland; northern Cape York Peninsula; northern and western Top End, Northern Territory; north Kimberley and the Pilbara, Western Australia (Braithwaite and Griffiths, 1994).</p> <p>Northern Quoll denning habitat in the Pilbara is associated with rocky habitats or riverine habitats with mature Eucalypt trees with hollows (SEWPaC, 2011).</p>	<p>There has been one record of this species within the rail corridor in the Amendment Application Area on the BHP rail line in 2007. This was a dead specimen. Northern Quoll scats were recorded from a cave approximately 250 m west of the Amendment Application Area. These scats were determined to be greater than 12 months old (Biologic 2020). Additional scats were found from a cave approximately 6 km west of the Amendment Application Area. These were determined to be greater than 36 months old and could not be conclusively identified to be from Northern Quoll (Biologic 2020).</p> <p>If present this species may forage within the Major Drainage Line habitat of the Amendment Application Area, but would be unlikely to be reliant of this habitat as larger areas of the same habitat in better condition occur outside the Amendment Application Area.</p>	Recorded	<p>Low</p> <p>This species is unlikely to occur in the Amendment Application Area..</p> <p>If present the species would be in low numbers and likely only to be transitory to the Amendment Application Area.</p> <p>More suitable habitat in better condition occurs outside the Amendment Application Area and in the broader region.</p>
Pilbara Leaf-nosed Bat (<i>Rhinonicteris aurantia</i>)	Vulnerable EPBC Act Vulnerable BC Act	<p>As they are poor thermoregulators, the Pilbara Leaf-nosed Bat requires hot, humid, deep caves or disused mine shafts in which to roost (van Dyck and Strahan, 2008), at least in the dry season. These bats have been recorded in isolated populations in the Pilbara, and are present only where suitable roosting niches are available. They are generally sparsely distributed. The Pilbara Leaf-nosed Bat forages within and in the vicinity of roost caves and more broadly along waterbodies with suitable fringing vegetation supporting prey species (Threatened Species Scientific Committee, 2016).</p>	<p>The caves located within the Amendment Application Area have been identified as unsuitable roost sites for this species. The Pilbara Leaf-nosed Bat prefers deep caves which were not present in the Amendment Application Area. There have been no previous records of this species in the vicinity of the Amendment Application Area.</p>	Possible	<p>Low</p> <p>The habitat within the Amendment Application Area does not provide suitable roost caves for this species. It is therefore unlikely this will impact this species.</p>

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 Stony Plain habitat of the Amendment Application Area is suitable for this species. This species has been recorded within the Amendment Application Area and is widespread and commonly recorded adjacent to the Amendment Application and in the broader region.	Recorded	<p>Low</p> <p>There are large areas of suitable habitat adjacent to the Amendment Application Area.</p> <p>This species has been recorded in the vicinity of the Amendment Application Area and is relatively widespread in the Pilbara. The habitat within the Amendment 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.</p> <p>Active mounds of the Western Pebble-mound Mouse will be avoided using a 10 m buffer, where practicable.</p>
Reptiles					
Pilbara Flat-headed Blind Snake (<i>Anilius ganei</i>)	Priority 1 DBCA	The Pilbara Flat-Headed Blind Snake is endemic to the Pilbara. This insectivorous species feeds on termites and their eggs, and larvae and pupae of ants (Wilson and Swan, 2008). This species is fossorial and is rarely encountered. There are few records of the species in the Pilbara, however, given the species preference for rocky stony soils, it could occur broadly across the region.	Little is known about this species habitat preferences and it may occur within habitats of the Amendment Application Area. This species has been recorded in a gorge site in the exclusion areas in the west of the Amendment Application Area. It is possible that this species may forage within the Amendment Application Area.	Possible	<p>Low</p> <p>No Pilbara Flat-headed Blind Snakes have been recorded from the Amendment Application Area.</p> <p>This species may utilise the habitat types within the Application Area however is unlikely to be reliant on the areas within the Amendment Application Area, particularly as a majority of its preferred habitat (gorge/gully) including the one record of this species have been clipped out of the Amendment Application Area.</p>

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Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood	Potential Impact on Species
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.	One anecdotal (1998) record of the Pilbara Olive Python has occurred within the Whaleback Tailings Dam. It has also been recorded from a small cave, behind a water seep in a deep gorge in the exclusion areas in the west of the Amendment Application Area. Additionally, the Pilbara Olive Python has been recorded in Nankunya, which is situated in Gorge/Gully habitat located in the far south-west corner that is excluded from the Amendment Application Area. The Pilbara Olive Python is likely to be transient across the Amendment Application Area.	Recorded	Low The Pilbara Olive Python's preferred habitat (large Gorge/Gullies) have been clipped from the Amendment Application Area. There was a Pilbara Olive Python identified in the Gorge/Gully habitat located in the far south-west corner that is excluded from the Amendment Application Area. It is therefore unlikely there would be any impact this species.

3.5 GROUNDWATER

The Amendment Application Area is located in the Pilbara Groundwater Area, proclaimed under the *Rights in Water and Irrigation Act 1914* (RIWI Act) (DWER, 2020). Aquifers in the Mt Whaleback / Newman area are comprised of mineralised Joffre and Dales Gorge (orebodies) and fractured bedrock (Johnson and Wright, 2001). Dewatering of orebodies is undertaken to facilitate mining. Groundwater levels outside the mine area are largely unaffected by dewatering (Johnson and Wright, 2001). Groundwater is fresh to brackish (total dissolved solids 420 – 2800 mg/L) (Johnson and Wright, 2001).

There is one main aquifer within the Amendment Application Area, the 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, 2015).

The Amendment Application Area is also located in the Newman Water Reserve, a Public Drinking Water Source Area (DoW, 2009a). The Newman Water Reserve was established to protect the Newman town water supply, which is sourced from bores drilled into in-filled paleovalleys to the northeast and west of the town (DoW, 2009a). The Newman Water Reserve protects catchments that recharge the superficial aquifer from which the bores draw their supply (DoW, 2009a). Mining and extractive industries are compatible land uses in a Public Drinking Water Source Area (DoW, 2009a).

3.6 SURFACE WATER

The Amendment Application Area is located in the Pilbara Surface Water Area, proclaimed under the RIWI Act (DoW, 2009b). There are no permanent watercourse or wetlands within or associated with the Amendment Application Area. Whaleback Creek along with other unnamed minor drainage lines within the Amendment Application Area 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 Whaleback 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 Whaleback Hub 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.

At the Whaleback Hub all environmental management is currently governed by MS 963 (below water table mining at Orebodies 29, 30 and 35), NVCP CPS 5617 and Environmental Licence L4503/1975/14.

All personnel carrying out works associated with the Whaleback Hub are required to comply with the Sustainable Development Policy, MS 963, NVCP CPS 5617, Environmental Licence L4503/1975/14, the PEHR 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 Amendment 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 Amendment Application Area is located outside the Amendment 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 Amendment 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 Amendment 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 Amendment 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 Amendment 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 Amendment 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 Amendment 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 Amendment 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.	Five Priority flora species were recorded in the Amendment 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 nine broad fauna habitat types within the Amendment Application Area (**Figure 4**).

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

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

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

Table 7: Assessment against Principle B components

Principle	Criteria	Assessment	Outcome
<p>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.</p>	<p>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.</p>	<p>Nine BC Act protected species have been recorded from the Amendment Application Area with a further seven BC Act protected species considered 'possible' or 'likely' to occur within the Amendment Application Area (Table 5). The proposed activities are unlikely to have a significant impact on these species as:</p> <ul style="list-style-type: none"> • All species are wide-ranging and found throughout the broader region; • All suitable gorge and gully habitat has been clipped from the Amendment Application Area; • All suitable cave habitat has been clipped from the Amendment Application Area with a 50 m buffer; • All species are only likely to forage within the Amendment Application Area; • These species do not exclusively depend on any habitat type or feature within the Amendment Application Area; and • Similar habitat is well represented outside the Amendment Application Area. 	<p>Not at variance with clearing principle.</p>
	<p>b2) Native vegetation should not be cleared if it is or is likely to be habitat for Priority Listed Fauna.</p>	<p>One priority fauna species has been recorded within the Amendment Application Area, with another one species potentially occurring. As detailed in Table 5 these species is unlikely to be impacted for the following reasons:</p> <ul style="list-style-type: none"> • The preferred habitat for these species is well represented outside the Amendment Application Area; • Similar habitat within close vicinity to the Amendment Application Area was found to be the same or better condition than that of the Amendment Application Area; • All suitable gorge and gully habitat has been clipped from the Amendment Application Area; and • Active mounds of the Western Pebble-mound Mouse will be avoided using a 10 m buffer, where practicable. 	<p>Not at variance with clearing principle.</p>
	<p>b3) Native vegetation should not be cleared if it is or is likely to be habitat for fauna that is otherwise significant.</p>	<p>Habitat found within the Amendment Application Area may be suitable for use by conservation significant fauna, however similar habitat in the same or better condition is widespread in the Amendment Application Area surrounds</p>	<p>Not at variance with clearing principle.</p>
	<p>b4) Native vegetation should not be cleared if it provides significant habitat for fauna species in the local area.</p>	<p>Habitat within the Amendment 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 Amendment Application Area.</p>	<p>Not at variance with clearing principle.</p>

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Principle	Criteria	Assessment	Outcome
	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 Amendment 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 Amendment Application Area is not considered to contain significant habitat for faunal assemblages that are not also present in other areas within the vicinity. The Amendment 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 Amendment Application Area.

Table 8 provides an assessment of the proposed clearing activities within the Amendment 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 Amendment 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 Amendment 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 identified within the boundaries of CPS 5617/5 are associated with a TECs or PECs (Onshore Environmental, 2014, Biologic 2021a and 2021b). The closest PEC is more than 35 km north (**Section 3.4.1**).

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

Table 9: Assessment against Principle D components

Principle	Criteria	Assessment	Outcome
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.	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.	No EPBC Act TECs are present in the Amendment Application Area.	Not at variance with clearing principle.
	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> .	No EPBC Act TECs or associated native vegetation will be impacted by the proposed works.	Not at variance with clearing principle.
	d3) Native vegetation should not be cleared if other significant ecological communities are present.	No other significant ecological communities are known to occur or are likely to occur within the Amendment Application Area.	Not at variance with clearing principle.
	d4) Native vegetation should not be cleared if it is necessary for the maintenance of other significant ecological communities.	No DBCA listed TECs or associated native vegetation will be impacted by the proposed works.	Not at variance with clearing principle.
	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.	No DBCA listed PECs or associated native vegetation will be impacted by the proposed works.	Not at variance with clearing principle.

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 Amendment 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 Amendment Application Area.

Table 10 provides an assessment of the proposed clearing activities within the Amendment 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 Amendment 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 Amendment 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 Amendment 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 Amendment 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 Amendment 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 Amendment 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 watercourses or wetlands within or associated with the Amendment Application Area. Whaleback Creek and a number of unnamed non-perennial minor drainage lines run south to north across the Amendment Application Area.

Where practicable, existing cleared tracks will be used to cross the Whaleback 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 Amendment 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 Amendment 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>A number of unnamed non-perennial minor drainage line run south to north across the Amendment Application Area.</p> <p>Where practicable, existing cleared tracks will be used to cross the Whaleback 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 Amendment Application Area.</p> <p>The Amendment Application Area contains the highly disturbed Whaleback Creek and several non-perennial minor creeks.</p> <p>Where practicable, existing cleared tracks will be used to cross the Whaleback 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 Amendment 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 Amendment Application Area or adjacent areas.

6.7.2 Changes to pH

The Amendment Application Area is not in an area at risk of acid sulphate soils and there are no recorded acid sulphate soils within the Amendment 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

Twenty seven introduced flora species have been recorded in the Amendment Application Area (**Table 5**). One Declared Pest under s22 of the BAM Act **Tamarix aphylla* (Athel Pine) has been recorded from the Amendment Application Area.

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 Amendment 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 Amendment 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 Amendment 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 Amendment Application Area is not within any conservation areas as listed by the DBCA or those protected under the EPBC Act. The closest conservation area is Karijini National Park which is more than 100 km north west of the Amendment Application Area.

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

An assessment of the proposed clearing activities within the Amendment 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 Amendment 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 Amendment 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 100 km north-west of the Amendment 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 Amendment 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.

The disturbance footprint of the Amendment Application Area does not intersect any significant watercourses. Whaleback Creek and a number of unnamed non-perennial minor drainage line run across the Amendment Application Area.

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 Whaleback 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 Amendment 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 Amendment Application Area due to the small amount of clearing within the Amendment 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 Amendment 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 Amendment 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 Amendment 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 Amendment 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 Amendment Application Area is situated within the Nyiyaparli Native Title Determination. A number of heritage sites were identified within the Amendment Application Area (site details are not provided here out of respect of the wishes of the Traditional Owners). All heritage sites will be avoided in this area. 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

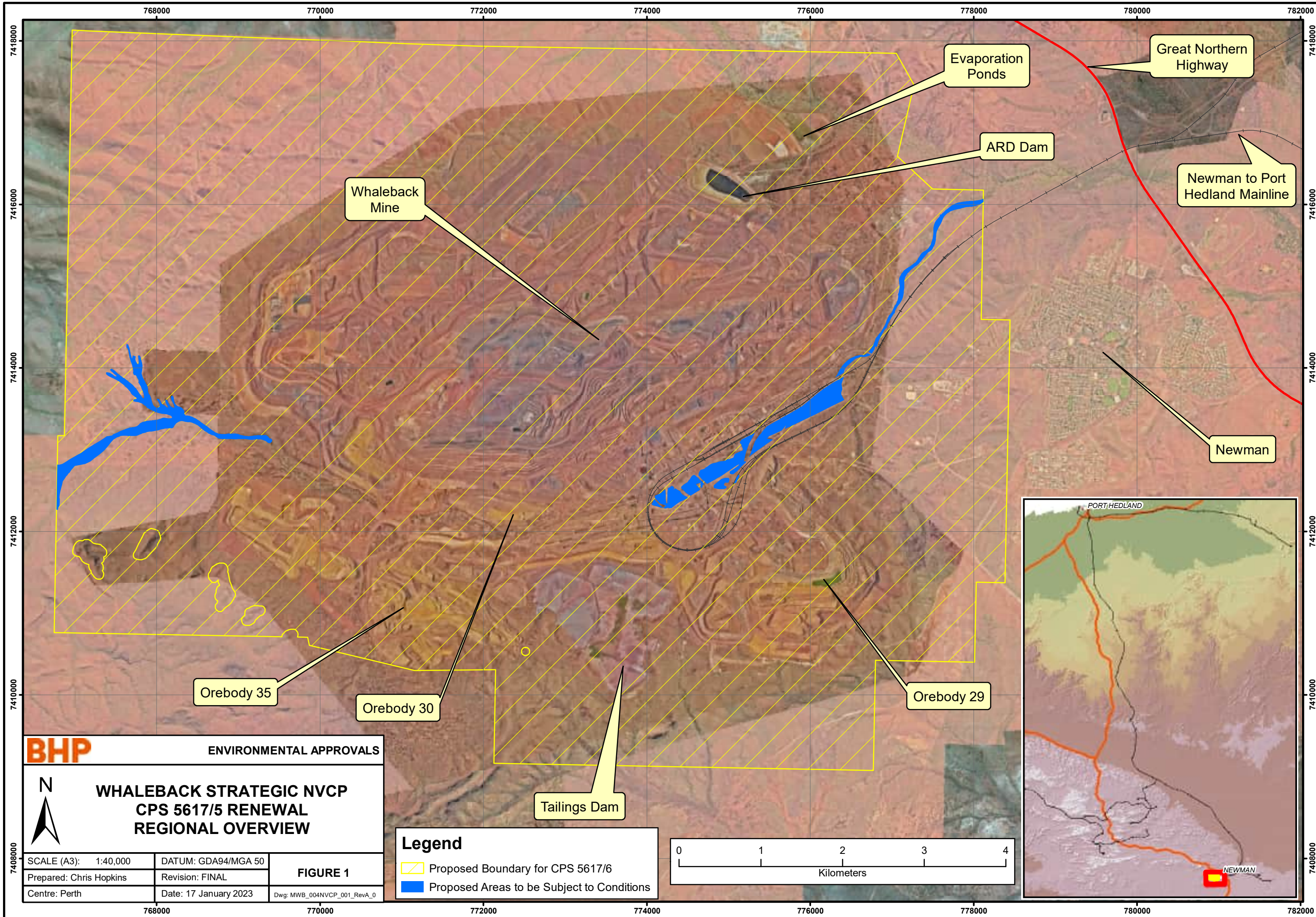
The proposed clearing in the Amendment Application Area is unlikely to be at variance to any of the Ten Clearing Principles. CPS 5617/5 authorises the clearing of up to 2,010.30 ha. To date BHP has cleared 982.40 ha and the clearing of the remaining 1,027.9 ha within an Amendment Application Area of 8,884.50 ha is unlikely to have any significant negative impacts on biodiversity and environmental values in the area.

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Figures



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ENVIRONMENTAL APPROVALS



**WHALEBACK STRATEGIC NVCP
CPS 5617/5 RENEWAL
REGIONAL OVERVIEW**

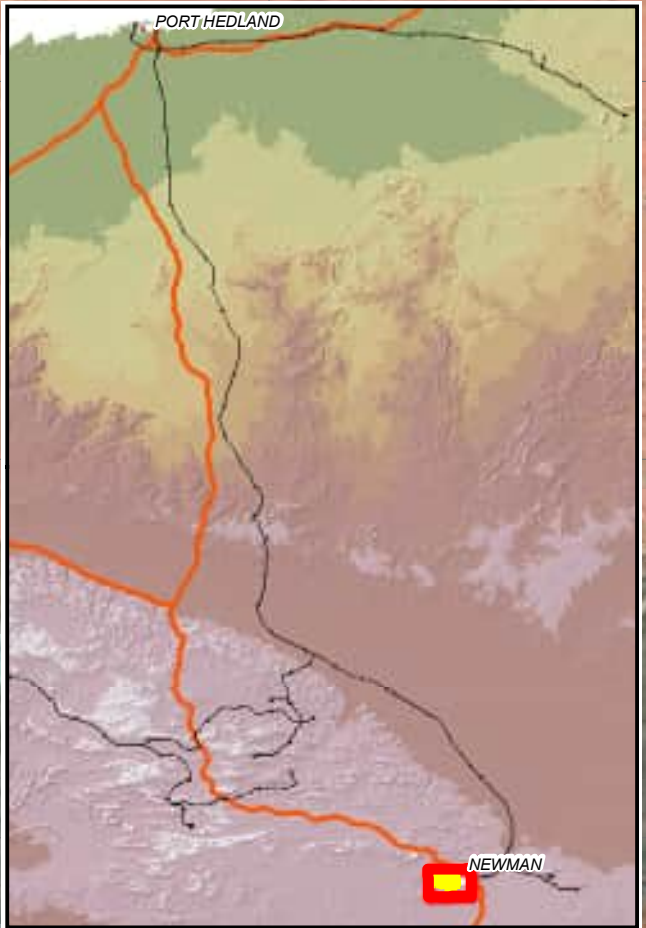
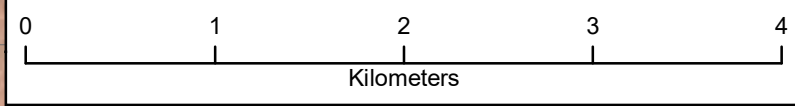
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Prepared: Chris Hopkins	Revision: FINAL
Centre: Perth	Date: 17 January 2023

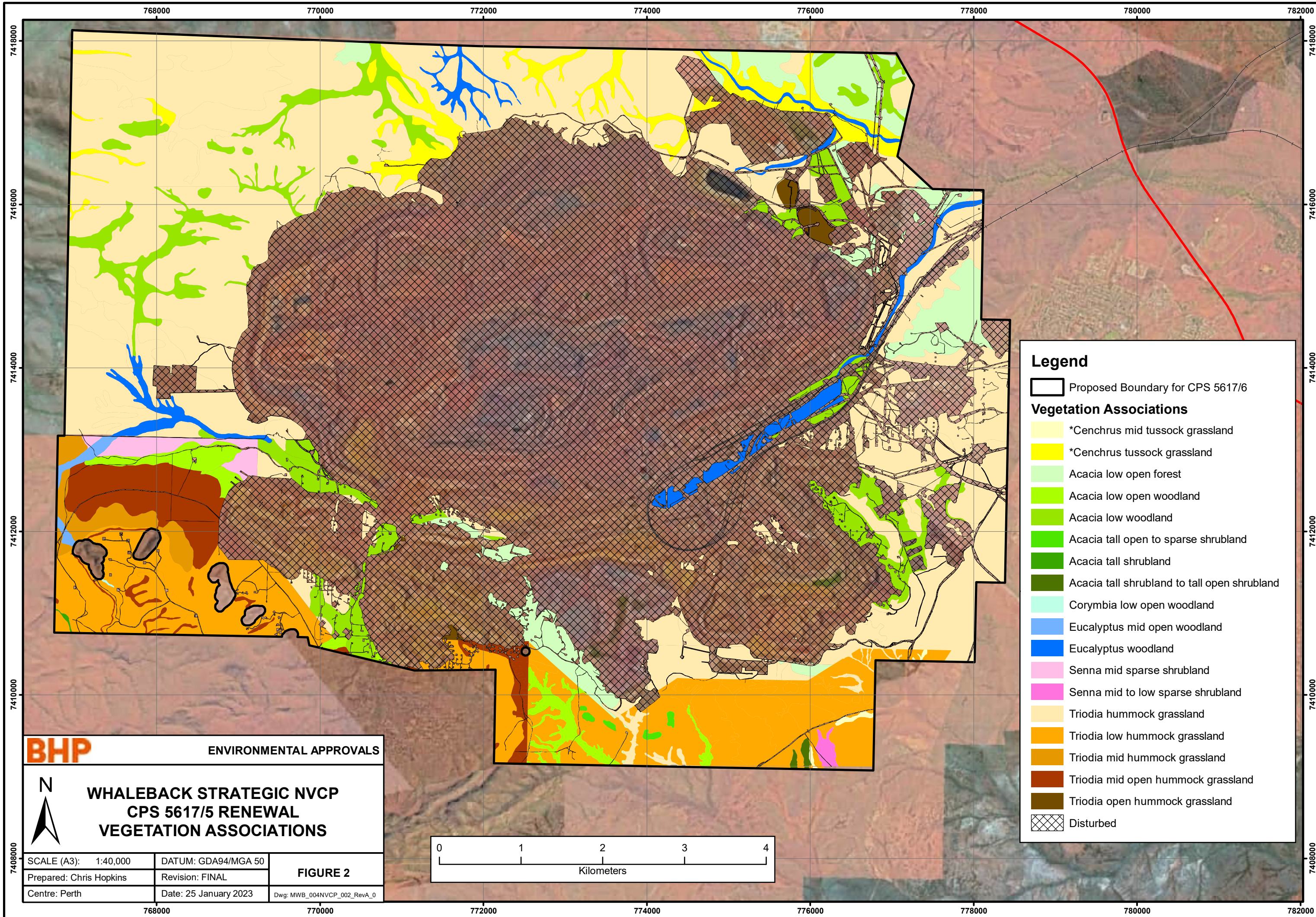
FIGURE 1

Dwg: MWB_004NVCP_001_RevA_0

Legend

- Proposed Boundary for CPS 5617/6
- Proposed Areas to be Subject to Conditions






Legend

 Proposed Boundary for CPS 5617/6

Vegetation Associations

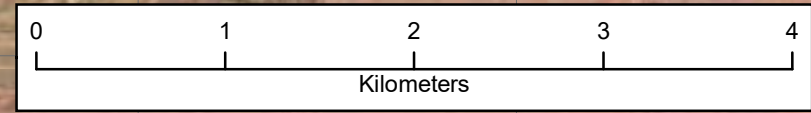
-  *Cenchrus mid tussock grassland
-  *Cenchrus tussock grassland
-  Acacia low open forest
-  Acacia low open woodland
-  Acacia low woodland
-  Acacia tall open to sparse shrubland
-  Acacia tall shrubland
-  Acacia tall shrubland to tall open shrubland
-  Corymbia low open woodland
-  Eucalyptus mid open woodland
-  Eucalyptus woodland
-  Senna mid sparse shrubland
-  Senna mid to low sparse shrubland
-  Triodia hummock grassland
-  Triodia low hummock grassland
-  Triodia mid hummock grassland
-  Triodia mid open hummock grassland
-  Triodia open hummock grassland
-  Disturbed

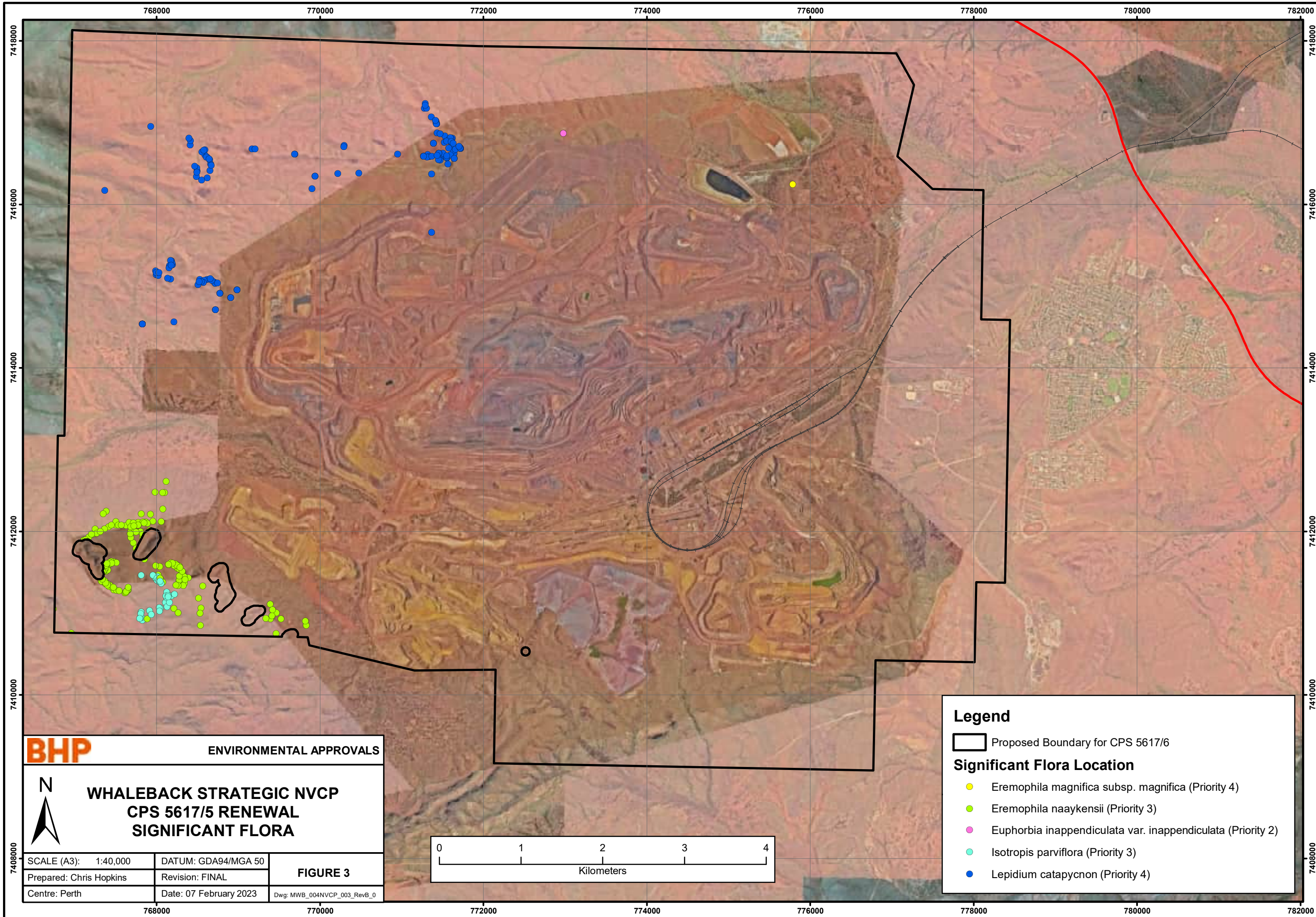
BHP ENVIRONMENTAL APPROVALS


**WHALEBACK STRATEGIC NVCP
CPS 5617/5 RENEWAL
VEGETATION ASSOCIATIONS**

SCALE (A3): 1:40,000	DATUM: GDA94/MGA 50	FIGURE 2
Prepared: Chris Hopkins	Revision: FINAL	
Centre: Perth	Date: 25 January 2023	

Dwg: MWB_004NVCP_002_RevA_0





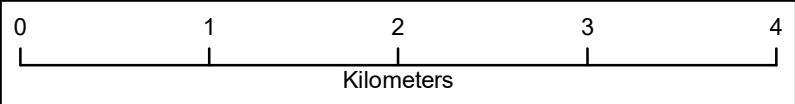
ENVIRONMENTAL APPROVALS



**WHALEBACK STRATEGIC NVCP
CPS 5617/5 RENEWAL
SIGNIFICANT FLORA**

SCALE (A3): 1:40,000 DATUM: GDA94/MGA 50
Prepared: Chris Hopkins Revision: FINAL
Centre: Perth Date: 07 February 2023 Dwg: MWB_004NVCP_003_RevB_0

FIGURE 3

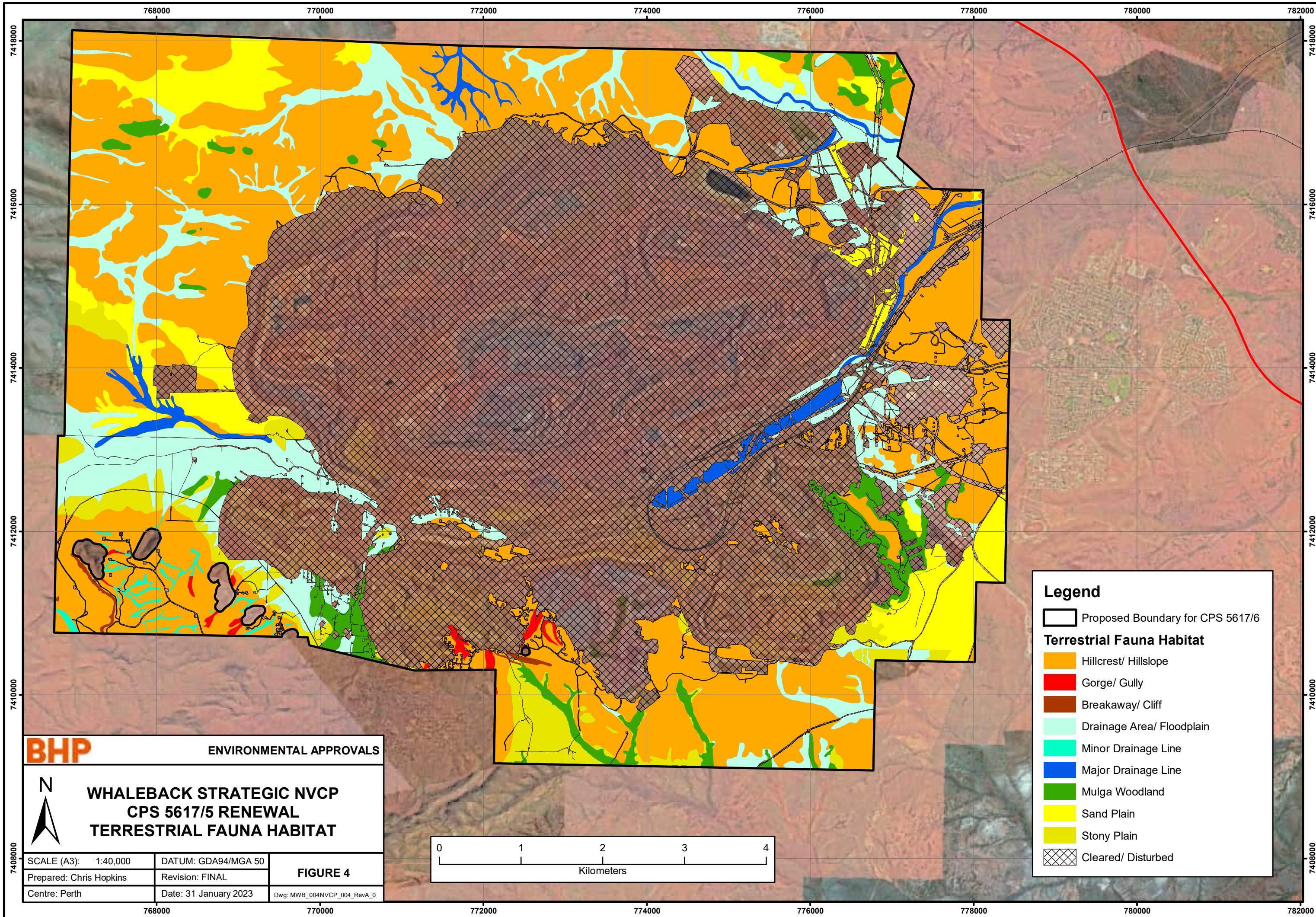


Legend

Proposed Boundary for CPS 5617/6

Significant Flora Location

- Eremophila magnifica subsp. magnifica (Priority 4)
- Eremophila naaykensis (Priority 3)
- Euphorbia inappendiculata var. inappendiculata (Priority 2)
- Isotropis parviflora (Priority 3)
- Lepidium catapycnon (Priority 4)



Legend

- Proposed Boundary for CPS 5617/6
- Terrestrial Fauna Habitat**
- Hillcrest/ Hillslope
- Gorge/ Gully
- Breakaway/ Cliff
- Drainage Area/ Floodplain
- Minor Drainage Line
- Major Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain
- Cleared/ Disturbed

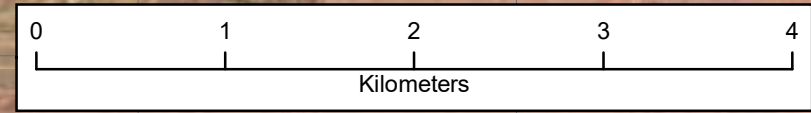
BHP ENVIRONMENTAL APPROVALS

**WHALEBACK STRATEGIC NVCP
CPS 5617/5 RENEWAL
TERRESTRIAL FAUNA HABITAT**

SCALE (A3): 1:40,000 DATUM: GDA94/MGA 50 **FIGURE 4**

Prepared: Chris Hopkins Revision: FINAL

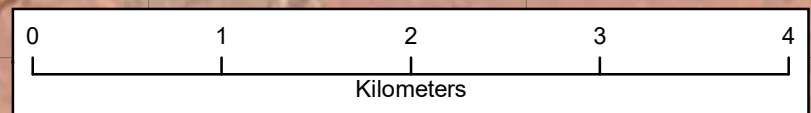
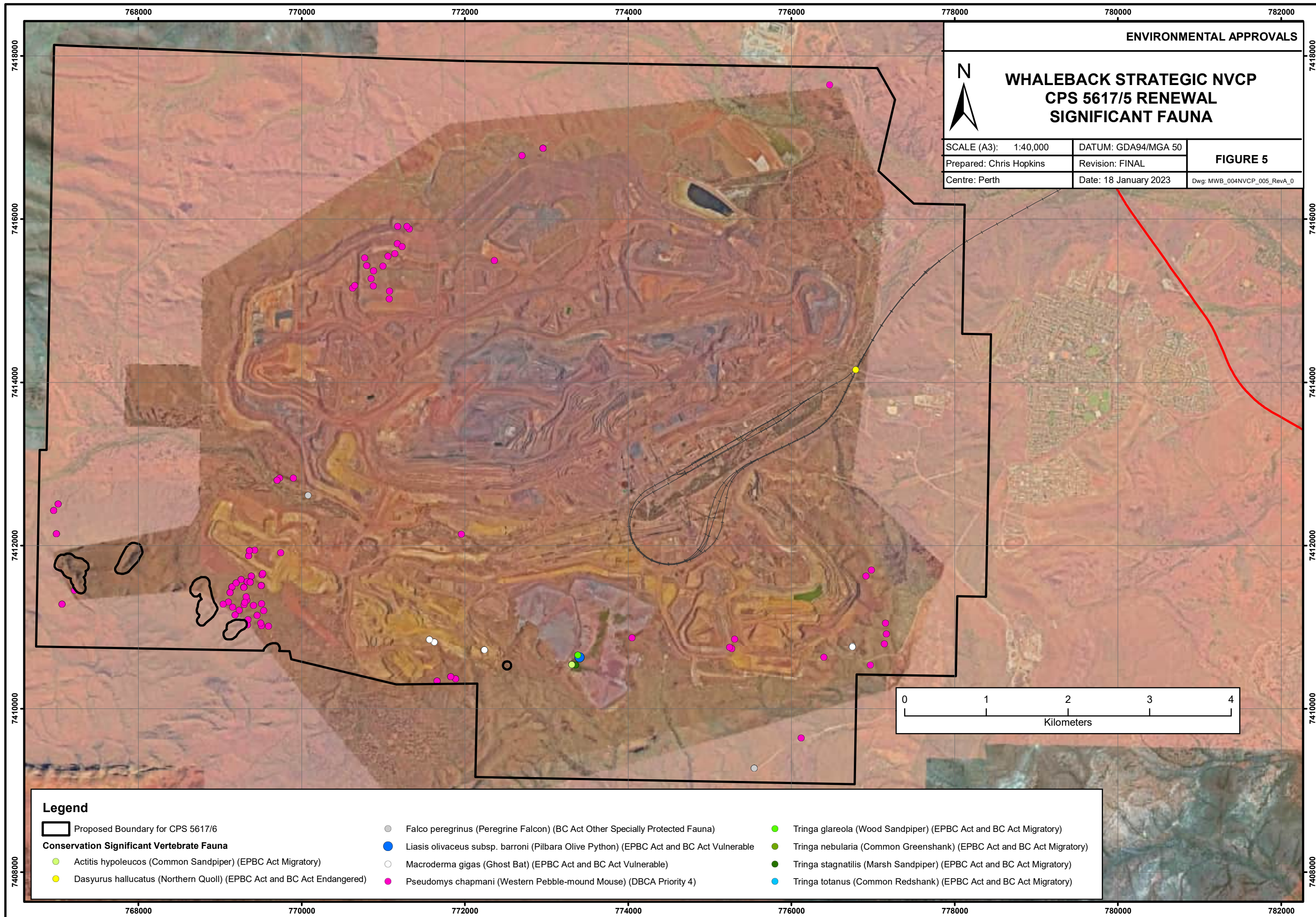
Centre: Perth Date: 31 January 2023 Dwg: MWB_004NVCP_004_RevA_0





WHALEBACK STRATEGIC NVCP CPS 5617/5 RENEWAL SIGNIFICANT FAUNA

SCALE (A3): 1:40,000	DATUM: GDA94/MGA 50	FIGURE 5
Prepared: Chris Hopkins	Revision: FINAL	
Centre: Perth	Date: 18 January 2023	



Legend

- Proposed Boundary for CPS 5617/6
- Conservation Significant Vertebrate Fauna**
- Actitis hypoleucos (Common Sandpiper) (EPBC Act Migratory)
- Dasyurus hallucatus (Northern Quoll) (EPBC Act and BC Act Endangered)
- Falco peregrinus (Peregrine Falcon) (BC Act Other Specially Protected Fauna)
- Liasis olivaceus subsp. barroni (Pilbara Olive Python) (EPBC Act and BC Act Vulnerable)
- Macroderma gigas (Ghost Bat) (EPBC Act and BC Act Vulnerable)
- Pseudomys chapmani (Western Pebble-mound Mouse) (DBC Priority 4)
- Tringa glareola (Wood Sandpiper) (EPBC Act and BC Act Migratory)
- Tringa nebularia (Common Greenshank) (EPBC Act and BC Act Migratory)
- Tringa stagnatilis (Marsh Sandpiper) (EPBC Act and BC Act Migratory)
- Tringa totanus (Common Redshank) (EPBC Act and BC Act Migratory)

Appendices

Appendix 1: *Consolidation of Regional Vegetation Mapping BHP Billiton Iron Ore Pilbara Tenure (Onshore Environmental, 2014)*

**Appendix 2: *Western Ridge Pipeline Reconnaissance Flora and Vegetation Survey*
(Biologic, 2021a)**

**Appendix 3: *Western Ridge Single Season Detailed Flora and Vegetation Survey*
(Biologic, 2021b)**

Appendix 4: *Western Ridge Paddy Bore Area Reconnaissance Flora and Vegetation Survey* (Biologic, 2022a)

Appendix 5: *Consolidated Fauna Habitat Mapping 2017* (Biologic, 2017)

Appendix 6: *Western Ridge Targeted Vertebrate Fauna* (Biologic, 2020)

Appendix 7: *Western Ridge Pipeline Targeted Fauna* (Biologic, 2022b)

**Appendix 8: *Western Ridge Paddy Bore Area Vertebrate Fauna Assessment*
(Biologic, 2022b)**