

Attachment 1

Attachment 2



Supporting Documentation

Native Vegetation Clearing Permit

Shooting Star Access Track

10 January 2023

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LIST OF APPENDICES

Appendix 1: Protected Matters Search Tool Results

ABBREVIATIONS

The following table described various abbreviations and acronyms used throughout this report.

| Abbreviation | Meaning |
|--------------|--|
| ASRIS | Australian Soil Resource Information System |
| BC Act | <i>Biodiversity Conservation Act 2016</i> |
| The Bureau | Bureau of Meteorology |
| Coffey | Coffey Environments Pty Ltd |
| CPS | Clearing Permit System |
| DBCA | Department of Biodiversity, Conservation and Attractions |
| DCCEEW | Department of Climate Change, Energy, the Environment and Water |
| DMIRS | Department of Mines, Industry Regulation and Safety |
| DPIRD | Department of Primary Industries and Regional Development's |
| DPLH | Department of Planning Lands and Heritage |
| DWER | Department of Water and Environment Regulations |
| Ecologia | Ecologia Environment Pty Ltd |
| EP Act | <i>Environmental Protection Act 1986</i> |
| EPBC Act | <i>Environment Protection and Biodiversity Conservation Act 1999</i> |
| ESA | Environmental Sensitive Area |
| Fortescue | Fortescue Metals Group Limited |
| GDE | Groundwater Dependent Ecosystem |
| IBRA | Biogeographic Regionalisation for Australia |
| IDE | Indicative Disturbance Envelope |
| MBM | Mount Bruce Mining Pty Ltd |
| NVCP | Native Vegetation Clearing Permit |
| PEC | Priority Ecological Community |
| PMST | Protected Matters Search Tool |
| PPE | Purpose Permit Envelope |
| RIWI Act | <i>Rights in Water and Irrigation Act 1914</i> |
| TEC | Threatened Ecological Community |
| UCL | Unallocated Crown Land |

1. INTRODUCTION

Fortescue Metals Group Limited (Fortescue) is proposing to clear native vegetation for the purpose of track maintenance along an existing track to provide safe access to the Shooting Star Prospect. The proposed clearing is located approximately 105 kilometres (km) south-east of the township of Port Hedland within the Pilbara bioregion of Western Australia (Figure 1).

This report and its appendices provide all the relevant information required under Part V, Section 51E of the *Environmental Protection Act 1986* (EP Act), to assess the proposed re-clearing of an access track. This includes updated baseline environmental data, a digital PPE (shapefile) and assessment against the 10 Clearing Principles.

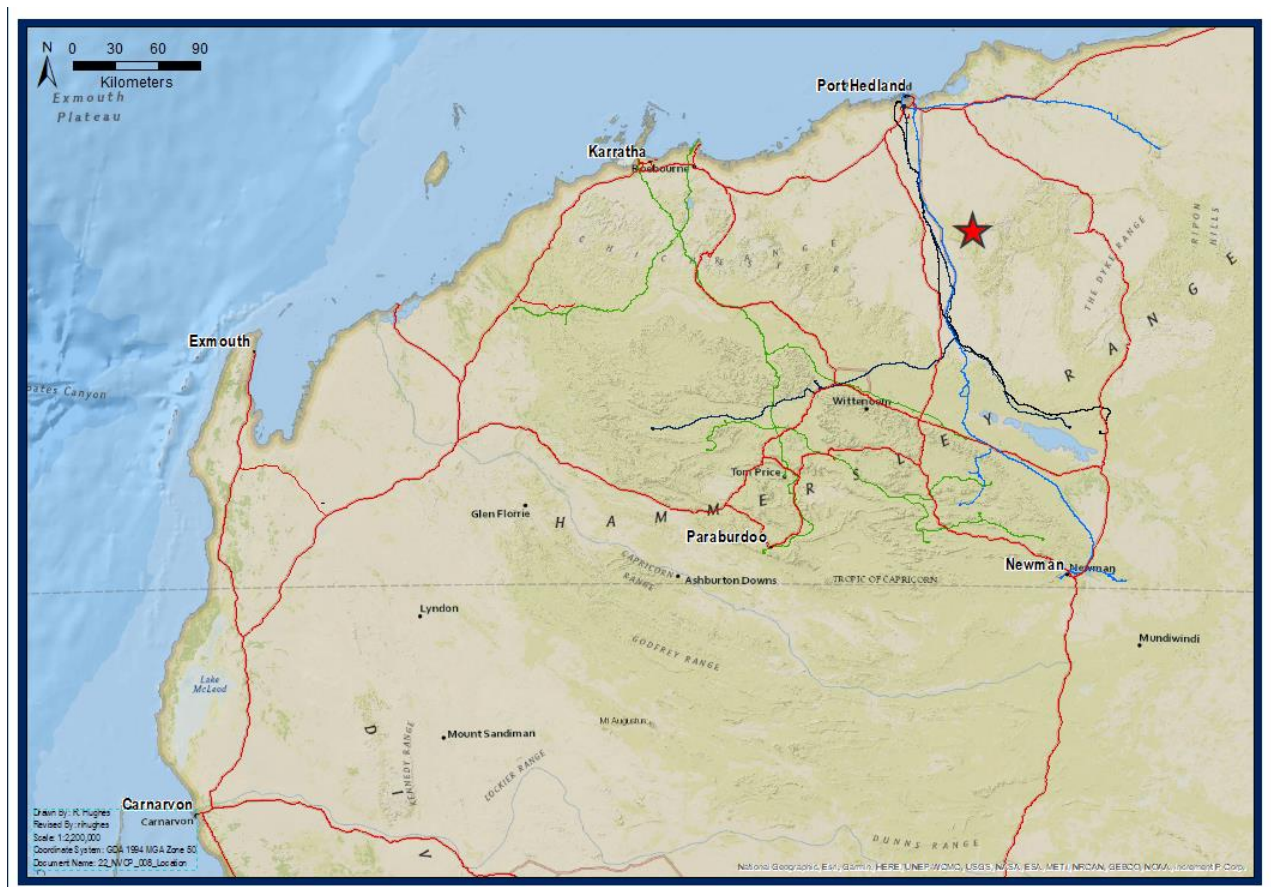


Figure 1 General location of the Shooting Star Prospect

1.1 Summary of Proposal

The key details of the Prospect and the proposed clearing are represented in Table 1.

Table 1 Key Details of the Proposed Clearing

| Site Details | | | |
|---------------------------------|--|---|------------------|
| Prospect Name | Shooting Star | | |
| Description of Operation | Fortescue Metals Group Limited (Fortescue) proposes to re-clear and maintain a historical access track to support its exploration activities across the Shooting Star Prospect | | |
| Total Clearing Proposed | Indicative Disturbance Footprint of 0.9765 ha, within a Purpose Permit Envelope of 0.9765 ha | | |
| Tenement Details | Tenement Details | Tenement Details | Tenement Details |
| | M45/1226 | FMG Magnetite Pty Ltd (61%) Formosa Steel IB Pty Ltd (39%) | Live |
| Clearing Method | No additional clearing will be conducted outside of existing windrows. Maintenance of existing track will be conducted mechanically using earth moving equipment. | | |
| Purpose of Clearing | The clearing is to allow for an existing access track to be maintained for the purpose of accessing the Shooting Star Prospect. | | |

1.2 Proponent Details

Details of the relevant proponent are contained in Table 2 below.

Table 2 Key Details of the Proponent

| Proponent Details | | | | |
|-----------------------|--|-----------------------------|-------|----------------------|
| Company Name | Fortescue Metals Group (FMG) Limited | | | |
| ACN | 57 002 594 872 | | | |
| Postal Address | Level 2, 87 Adelaide Terrace, East Perth WA 6004 | | | |
| Key Contact | Name | Rikki Hughes | Phone | +61 8 6235 9312 |
| | Position | Approvals Project Geologist | Email | rihughes@fmgl.com.au |

1.3 Proposed Clearing Activities

Access to the Shooting Star prospect area is via an existing historic track, of which Fortescue wishes to re-establish, to allow light vehicles (LVs), earthworks machinery and drill rigs to safely access exploration programmes in the area. The area subject to this application, has known occurrences of endangered priority flora species, *Quoya zonalis*, which have been mapped via several internal flora surveys conducted in the area on behalf of Fortescue. The track in which Fortescue wishes to re-establish is, in some instances, within the 50 m buffer area of a known location of *Q. zonalis*.

Fortescue proposes to re-clear and maintain this existing access track, which has an Indicative Disturbance Footprint (IDF) of 0.9765 ha (Figure 2). The purpose of this application is to allow the maintenance of this historical access track, including re-clearing within windrows, which in some instances are within the 50 m buffer zone of known *Q. zonalis* individuals, to support Fortescue’s exploration activities across the Shooting Star Prospect.

The tracks subject to this application will be used by light vehicles, exploration drill rigs and semi-trailers carrying earth moving equipment.

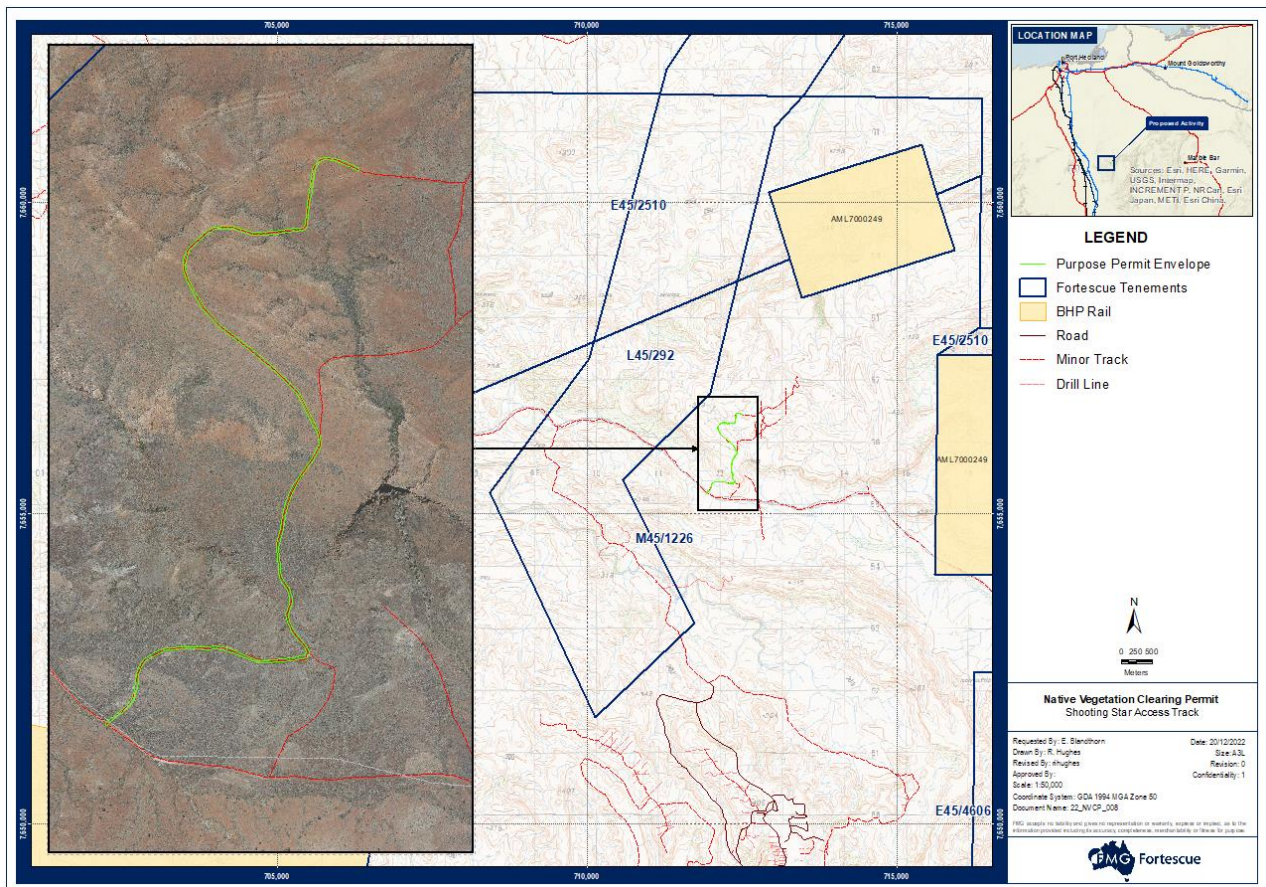


Figure 2 Purpose Permit Envelope (PPE) for Shooting Star Access Track

1.4 Relevant Approvals

A Native Vegetation Clearing Permit is required, as the proposed maintenance of the access track is located within an Environmentally Sensitive Area (ESA) declared under section 51B of the EP Act. Exemptions under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* do not apply.

2. BASELINE ENVIRONMENTAL DATA

2.1 Climate

The PPE is located within the Pilbara biogeographic region of Western Australia and experiences an arid-tropical climate with two distinct seasons; a hot summer from October to April and a mild winter from May to September. Temperatures are generally high, with summer temperatures frequently exceeding 40°C. Light frosts occasionally occur inland during July and August.

The Pilbara region includes two broad climatic zones; Coastal areas, as well as some higher rainfall inland areas, which have a semi-desert tropical climate, and can experience between 9 and 11 months of dry weather, with hot humid summers and warm winters. The remaining inland areas have a dry desert climate, typically with higher temperatures and lower rainfall, and often experience up to 12 months of dry weather, with hot dry summers and mild winters (van Vreeswyk, et al., 2004).

The closest climatic station is Marble Bar (Station Number 004106), which is 60 km NE of North Star. This station has a record of monthly climate statistics from 2000 – 2022 for temperature and rainfall (Figure 3). The monthly maximum temperatures range from 27.1°C to 42.0°C, with the hottest month being Marble Bar. While monthly minimum temperatures range from 12.2°C to 26.5°C, with the coldest month being July. The average annual rainfall for Marble Bar is 391.8mm, with January and August being the wettest (108.9mm) and driest (0.6mm) months, respectively (The Bureau, 2022).

Tropical cyclones, many of which originate in the Timor Sea, along with local thunderstorms, produce much of the summer and early autumn rainfall. Although tropical cyclones in the Pilbara region are considered a significant environmental risk in coastal areas, with respect to Marble Bar and the project area, the risk of environmental damage to these inland areas is not as high. The driest months are in spring (August to October), and winter rainfall is highly variable, generally decreasing from the coast through to inland areas (McKenzie & Bullen, 2009).

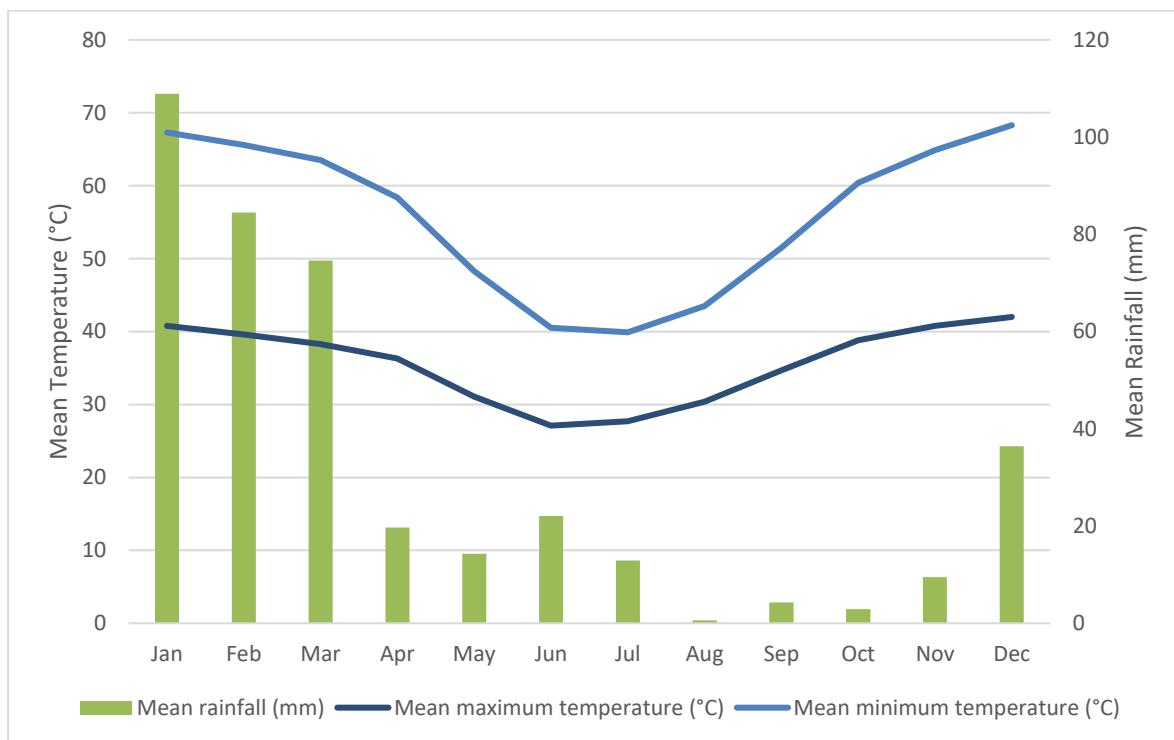


Figure 3 Climate Averages Marble Bar Station 4106

2.2 Existing Land Use

2.2.1 Land Tenure

The proposed disturbance occurs on Mining Licence 45/1229, held by Formosa Steel IB Pty Ltd (39%) and FMG Magnetite Pty Ltd (61%), a wholly owned subsidiary of Fortescue located at Level 2, 87 Adelaide Terrace, East Perth WA 6004.

This land is also considered unallocated crown land (UCL). The main use of the land surrounding the PPE is mineral exploration.

2.2.2 Native Title and Aboriginal Heritage

The proposed activities contained within this NVCP lie across the Nyamal Native Title Determination Area (Figure 4).

To ensure compliance with the *Aboriginal Heritage Act 1972* (AHA) Fortescue conducts both archaeological and ethnographic surveys over all land prior to the commencement of ground disturbing works. The area that is associated with the new disturbance under this POW has fully heritage surveyed, and no heritage sites were identified.

In line with Fortescue’s obligations under the AHA, should sites of Aboriginal heritage significance be identified during works being undertaken in the disturbance area the proposed activity will be

adjusted to avoid these sites. If deviations are required outside of the PoW area or in excess of the allowable disturbance under that PoW, Fortescue will apply to the Department of Mines, Industry Regulation and Safety (DMIRS) for a new PoW. This risk adverse approach has been discussed with the Department of Planning, Lands and Heritage (DPLH) and endorsed, as it provides a high level of protection for heritage sites.

Fortescue will also comply with new *Aboriginal Cultural Heritage Act 2021 (ACHA)* as it comes fully into effect.

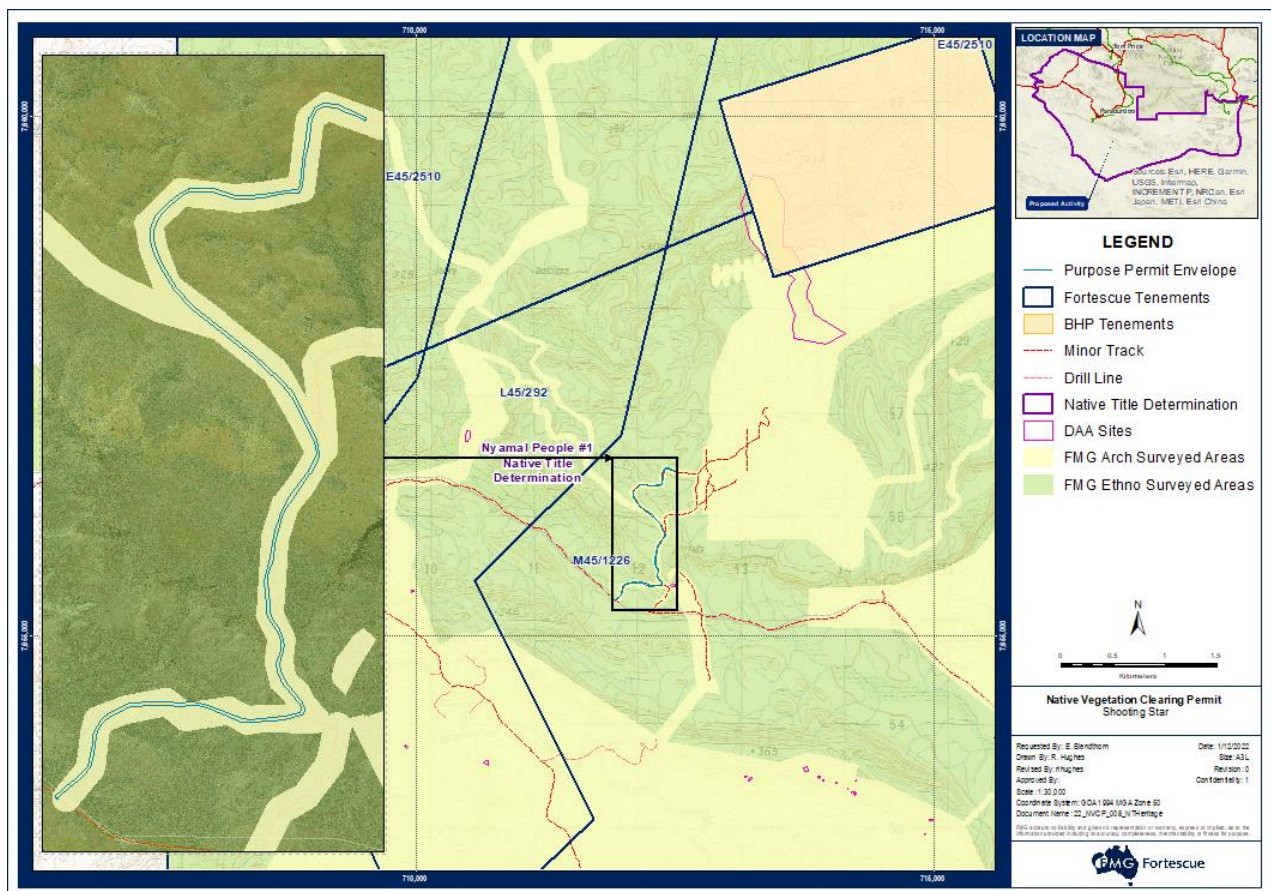


Figure 4 Heritage Sites and Survey Areas

2.3 Soil Landscapes

The Department of Primary Industries and Regional Development’s (DPIRD) have developed Technical Report 313; Soil-Landscape of Western Australia’s Rangelands and Interior (Tille, 2006). This document describes the hierarchy of soil-landscape mapping units; each level is a subdivision of its preceding level. Western Australia is divided into five main Regions, which are then sub-divided into Provinces. Provinces are in turn sub-divided in zones, which are then sub-divided into systems.

Tille’s (2006) document also provides a description of the soil-landscape regions, provinces and zones, while Vreeswyk et al. (2004) provides a description for the land systems in Technical

Bulletin 92; An Inventory and Condition Survey of the Pilbara Region, Western Australia. The PPE is located within Western region, Fortescue province, Nullagine Hills zone and Capricorn and Rocklea systems (Table 3; Figure 5).

Table 3 Hierarchy of Soil-landscapes Intersecting the PPE

| Hierarchy Level | Name | Description | Extent (ha) |
|-----------------|----------------------|---|-------------|
| Region | Western Region | Undulating plateaux (with plains, hills and ranges and coastal plains) on the rocks of the Yilgarn and Pilbara Cratons, Capricorn and Albany-Fraser Orogens and Carnarvon and Perth Basins. Deep sands (mostly red), Loamy earths (mostly red), Shallow loams (mostly red), Sandy duplexes, Stony soils and Sandy earths (mostly red). Mulga shrublands, spinifex grasslands and eucalypt woodlands/forests with acacia shrublands (and some mallee scrub, heaths and halophytic shrublands). Located in the west of Western Australia between Port Hedland, Israelite Bay, Cape Leeuwin and Exmouth. | 120,140,000 |
| Province | Fortescue Province | Hills and ranges (with stony plains and some alluvial plains and sandplains) on the volcanic, granitic and sedimentary rocks of the Pilbara Craton. Stony soils with Red loamy earths and Red shallow loams (and some Red/brown non-cracking clays, Red deep sandy duplexes and Red deep sands). Spinifex grasslands with kanji and snappy gum (and some mulga shrublands and tussock grasslands). Located in the Pilbara between Dampier, Port Hedland, Jigalong, Paraburdoo and Pannawonica. | 16,005,000 |
| Zone | Nullagine Hills Zone | Hills and ranges (with some stony plains) on volcanic and sedimentary rocks of the Pilbara Craton (including the Hamersley Basin) with Stony soils and Red shallow loams and sands. | 1,716,666 |
| System | Capricorn System | Rugged sandstone hills, ridges, stony footslopes and interfluves supporting low acacia shrublands or hard spinifex grasslands with scattered shrubs. | 529,600 |

The Capricorn Land System expands across 5,296 km² of the Pilbara and is typically associated with hilly ranges. It is characteristic of ragged sandstone hills and prominent ridges supporting shrubby spinifex grasslands. The predominant surface geology is sedimentary rocks, comprised of sandstone, greywacke, dolomite and shale. The soils are primarily stony soils, red shallow loams and some red shallow sands.

Clearing associated with the Project will result in shallow (<0.3 m) to no disturbance of soils for track maintenance. Risks associated with acidic and metalliferous drainage, sodic and dispersive materials, and naturally occurring radioactive materials are not considered relevant to the Project.

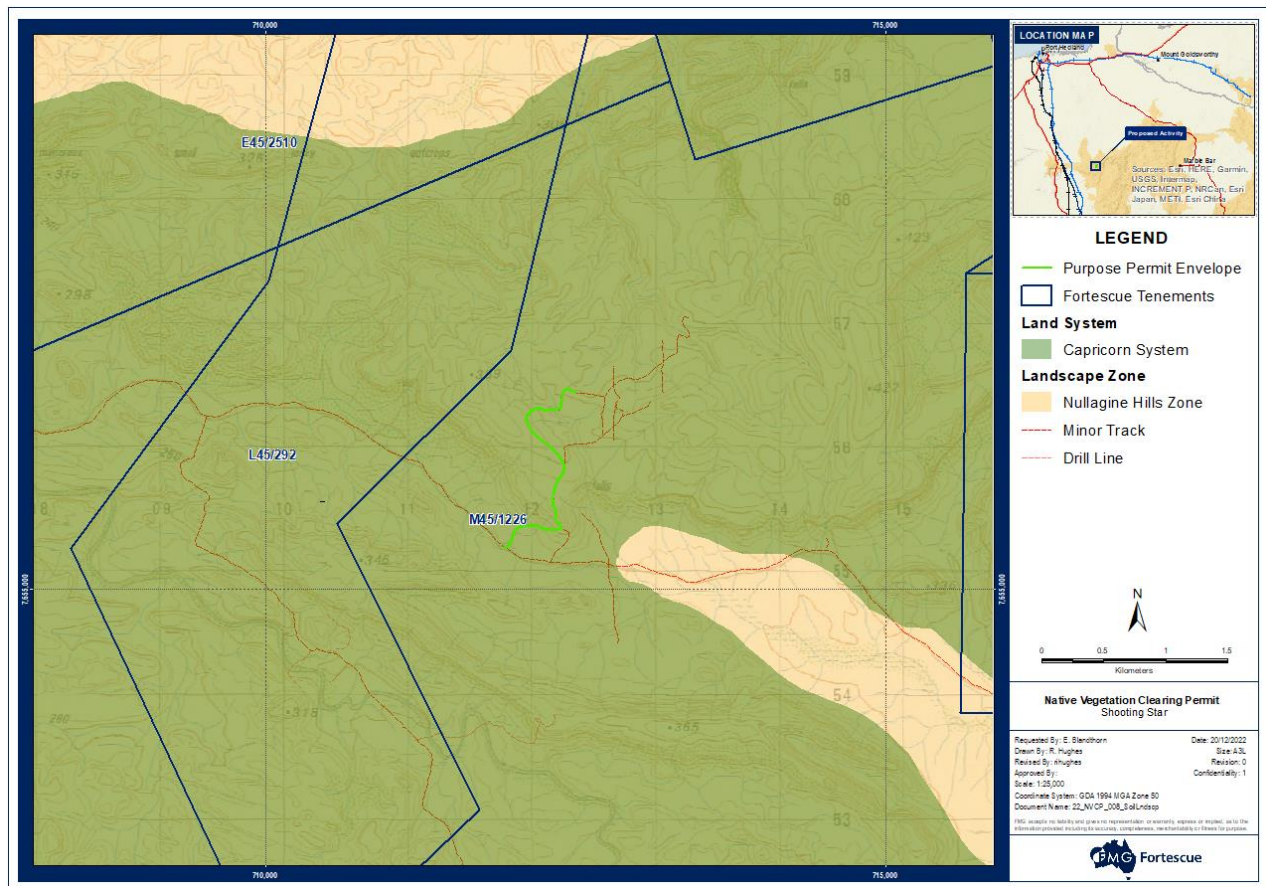


Figure 5 Location of PPE within the Capricorn System of the Nullagine Hills Zone

2.4 Flora and Vegetation

2.4.1 Interim Biogeographic Regionalisation for Australia

The PPE is located within the Pilbara biogeographic region of the Interim Biogeographic Regionalisation for Australia (IBRA). The Pilbara biogeographic region incorporates 17,831,892 ha and is further divided into the Chichester (PIL1), Fortescue Plains (PIL2), Hamersley (PIL3) and Roebourne (PIL4) subregions, described in the 2002 Biodiversity Audit of Western Australia's 53 Biogeographical Subregions (McKenzie, et al., 2002). The PPE occurs entirely within the Chichester subregion of the Pilbara bioregion (Figure 6).

The Chichester subregion, as described by McKenzie, et al. (2002), is the northern section of the Pilbara Craton consisting of undulating Archean granite and basal plains with significant areas of basaltic ranges. The dominant land use of the area is grazing of native pastures, with a number of Aboriginal lands and Reserves, Crown Reserves, Conservation Areas and Mining leases (Kendrick and McKenzie, 2001). The vegetation of the Chichester subregion is described by Kendrick and McKenzie (2001) as predominantly tree and shrub steppe (hummock grassland) communities with *Eucalyptus* trees, *Acacia* shrubs and *Triodia pungens* and *T. wiseana* hummock grasses. Mulga (*Acacia aneura*) communities occur in valleys and short bunch

grasslands occur on alluvial plains. Soils are primarily hard alkaline red soils on plains and pediments, and shallow and skeletal soils on 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 occurs to the north via numerous rivers (e.g. De Grey, Oakover, Nullagine, Shaw, Yule, Sherlock). Subregional area is 9,044,560ha (McKenzie, et al., 2002).

2.4.2 Regional Vegetation Mapping

Vegetation association units have been mapped and described on a regional scale by Beard (1975) and updated by DPIRD (2012). These vegetation association units are broad scale descriptors and attempt to depict the native vegetation as it was presumed at the time of European settlement. The PPE intersects the George Ranges 82 vegetation association unit which is dominated by hummock grasslands and low tree steppes with snappy gums over *Triodia wiseana* (Table 4; Figure 6)

Table 4 Beard Vegetation Units Intersecting the PPE

| Association | Description | Pre-European Extent (ha) | Current Extent (ha) | Extent mapped within the Purpose Permit Envelope (ha) |
|------------------|--|--------------------------|---------------------|---|
| George Ranges 82 | Hummock grasslands, low tree steppe; snappy gum over <i>T. wiseana</i> | 317,182 | 316,855 | 0.9765 |

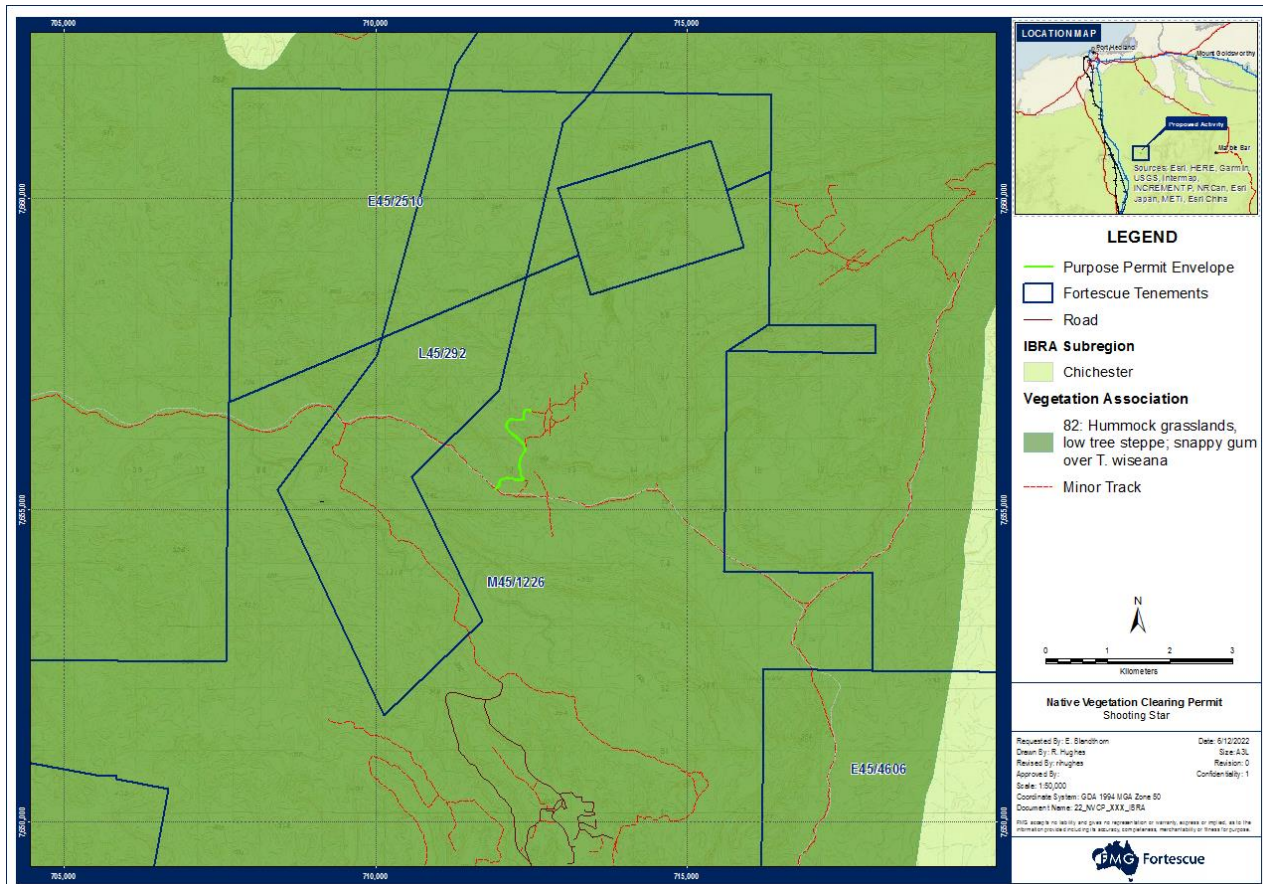


Figure 6 Location of the PPE within the Chichester IBRA Subregion and the Vegetation Association Unit

2.4.3 Flora and Vegetation Surveys

A total of ten flora and vegetation surveys have been conducted within a 10 km radius of the PPE, with three of the surveys encompassing the PPE area.

In 2011, a Level 2 Vegetation and Flora Assessment (NS-AS-EN-0001) was undertaken by ecologia Environment, on behalf of Fortescue (ecologia, 2012a); in 2015, a targeted *Quoya zonalis* (previously *Pityrodia* sp.) flora survey (662MIC0023-5530-SV-EN-0001) was undertaken across the Marble Bar region by ecologia (ecologia, 2016); and in 2020, Spectrum Ecology undertook a Targeted Flora and Vegetation Survey (NS-0000-RP-EN-0001) on behalf of Fortescue (Spectrum, 2021a).

Additionally, in 2020 and 2021, Spectrum Ecology conducted *Quoya zonalis* targeted surveys (IB-RP-EN-0003 and IB-0000-RP-EN-0001) over the Shooting Star and South Star prospects, just north and south of the PPE (Spectrum, 2020 & 2021b).

As well as the above surveys, a search of the DBCAs Threatened and Priority Flora database (DBCAs, 2022) and regional survey records was undertaken over a 10km radius from the PPE (Table 5).

2.4.4 Flora of Conservation Significance

One threatened flora species, as listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Biodiversity Conservation Act 2016* (BC Act), was identified within the 10 km search area. In addition, six flora species, as listed under the Department of Biodiversity, Conservation and Attractions (DBCA) priority list, were identified within the 10 km search area (Figure 7). Of the seven conservation significant flora species identified, only the *Quoya zonalis* (Endangered) occurs within close proximity to the PPE, with the 50m buffer area of approximately 28 recorded individuals, from three clusters, intersecting the PPE (**Error! Reference source not found.**).

Table 5 Conservation Significant Flora Identified within 10km of the PPE

| Species Name | EPBC Act* | BC Act** | DBCA listed*** | Recorded in Survey or database search |
|----------------------------------|------------|------------|----------------|---------------------------------------|
| <i>Quoya zonalis</i> | Endangered | Schedule 2 | - | Survey, Database |
| <i>Themeda sp. Panorama</i> | - | - | Priority 1 | Survey |
| <i>Triodia basitricha</i> | - | - | Priority 3 | Survey |
| <i>Euphorbia clementii</i> | - | - | Priority 3 | Survey, Database |
| <i>Abutilon sp. Pritzelianum</i> | - | - | Priority 3 | Survey |
| <i>Goodenia nuda</i> | - | - | Priority 4 | Survey |
| <i>Ptilotus mollis</i> | - | - | Priority 4 | Survey, Database |

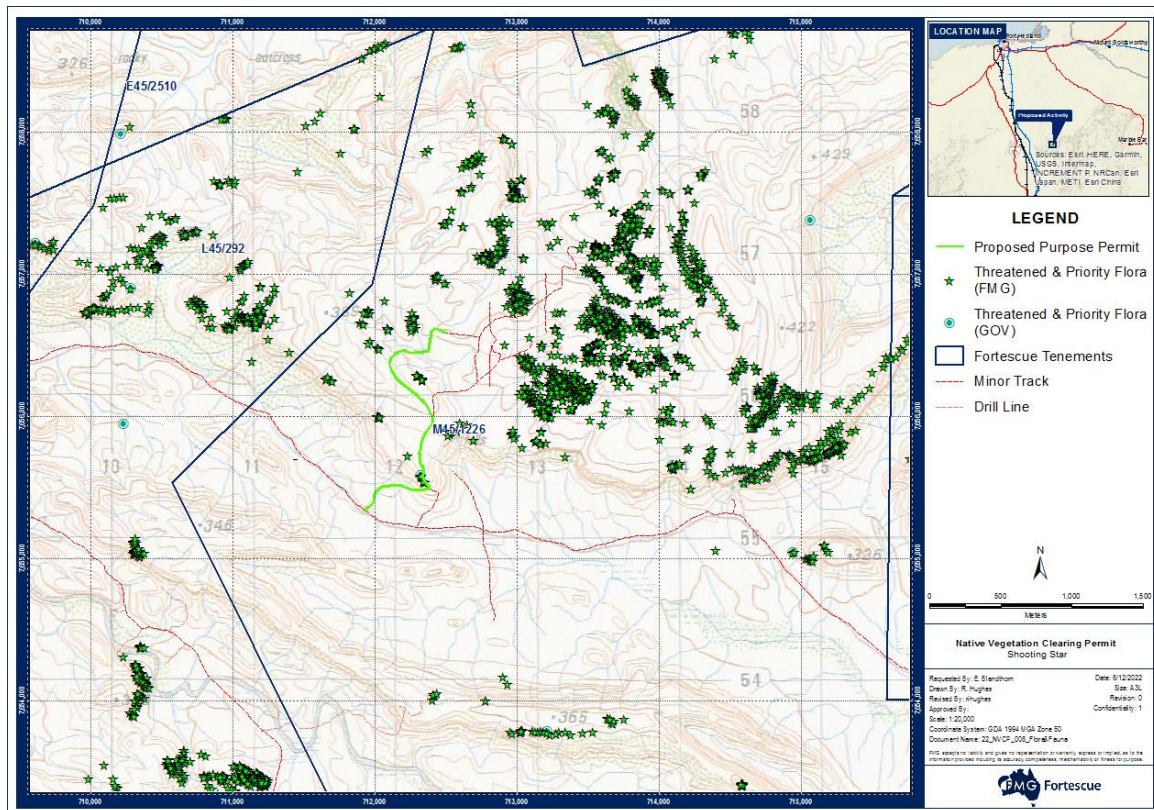


Figure 7 Conservation Significant Flora Identified within 10km of the PPE

2.4.5 Local Vegetation Mapping

The PPE intersects five vegetation types mapped by ecologia (ecologia, 2012a). These include the *Acacia* Shrubland and *Triodia* Hummock Grassland vegetation types (Table 6).

Table 6 Vegetation Types Mapped Across the PPE

| Vegetation Type | Brief Description |
|---|---|
| Acacia Shrubland (At) | <i>Acacia tumida</i> and <i>Grevillea wickhamii</i> tall shrubland over <i>Indigofera monophylla</i> sparse low shrubland. |
| Triodia Hummock Grassland (GwTe) | <i>Grevillea wickhamii</i> sparse mid shrubland over <i>Triodia epactia</i> or <i>Triodia schinzii</i> open hummock grassland and isolated <i>Eriachne ciliata</i> grasses and <i>Polycarpaea holtzei</i> herbs. |
| Triodia Hummock Grassland (TI) | <i>Triodia lanigera</i> open hummock grassland, with <i>Cyperus hesperius</i> isolated sedges, <i>Eriachne ciliata</i> isolated grasses and <i>Cleome viscosa</i> isolated herbs. |
| Acacia Open Shrubland (AtEm) | <i>Acacia tumida</i> and <i>Grevillea wickhamii</i> open tall shrubland over <i>Acacia orthocarpa</i> open mid shrubland over <i>Eriachne mucronata</i> isolated tussock grasses over <i>Dampiera candicans</i> isolated herbs. |
| Acacia Open Shrubland (AoTw) | <i>Acacia orthocarpa</i> open tall shrubland over <i>Triodia wiseana</i> open hummock grassland and <i>Eriachne pulchella</i> isolated tussock grasses. |

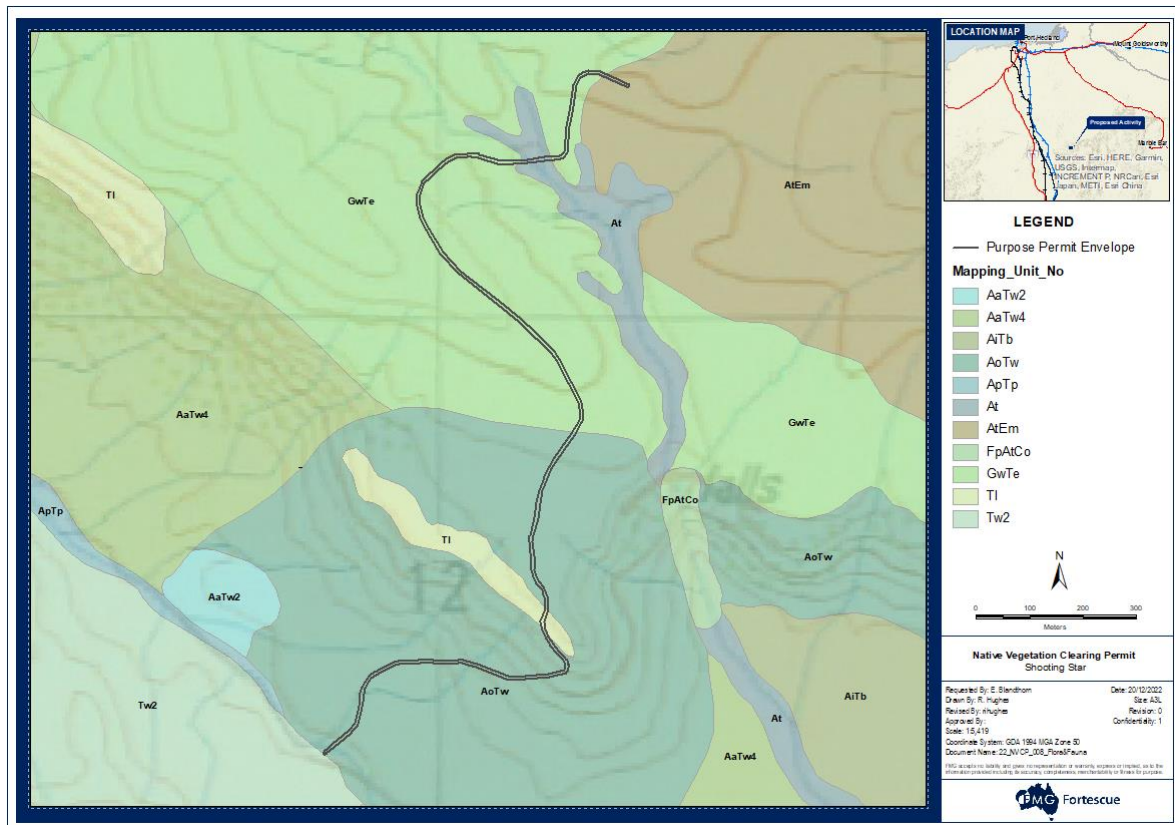


Figure 8 Vegetation Types Mapped Across the PPE

2.4.6 Conservation Reserves and Significant Vegetation Communities

In Western Australia, a vegetation community can be classified as a Threatened Ecological Community (TEC) by the Western Australian Minister for Environment, based on the assessment and recommendation of the Threatened Species Scientific Committee. TECs that are listed to be of State conservation significance in Western Australia are considered to be Environmentally Sensitive Areas (ESA) under Part V of the EP Act.

Potential TECs that do not meet survey criteria are added to the Priority Ecological Community (PEC) list under Priority 1, 2 or 3. Ecological communities that are adequately known, are rare but not threatened, meet criteria for “Near Threatened”, or that have been recently removed from the threatened list, are placed in Priority 4. Conservation dependent ecological communities are placed in Priority 5.

The database searches reveal that the PPE does not occur within or intersect with any known TEC or PEC. However, the PPE does intersect the buffer zone of 28 individuals of a known rare flora species, *Quoya zonalis* (endangered), and therefore is considered to intersect with several ESAs.

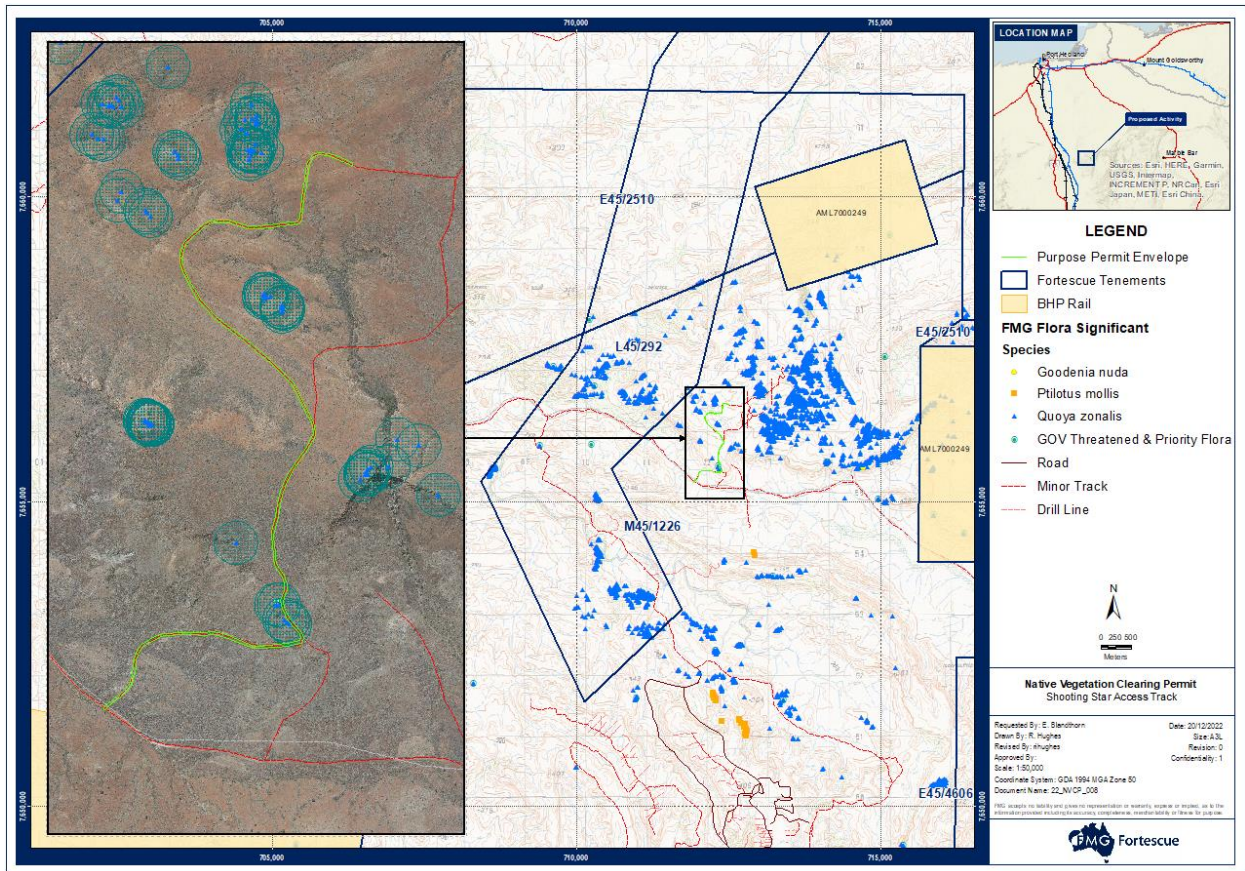


Figure 9 Conservation Reserves and Significant Vegetation Communities Map



Figure 10 *Quoya zonalis* in windrow of existing track. Photo taken by Rosie Sloan (June 2022).

2.4.7 Groundwater Dependent Ecosystems

Groundwater Dependent Ecosystems (GDE) are ecosystems that require permanent or intermittent access to groundwater. GDEs are dependent on the presence of groundwater to meet some, or all, of their water requirement to maintain their communities of plants and animals, ecological processes and ecosystem service (Richardson, et al., 2011).

A review of the GDE Atlas found the PPE to occur within an area mapped as moderate potential for a GDE. As the proposed activities for this PPE are not anticipated to go below 300mm of the surface, no impacts to the potential GDE are expected.

2.5 Vertebrate Fauna

2.5.1 Vertebrate Fauna Surveys

A desktop assessment identified three vertebrate fauna surveys that were undertaken within 10 km of the PPE, one of which, by ecologia Environment, encompassed the PPE area.

Ecologia Environment undertook a Level 2 Terrestrial Vertebrate Fauna Assessment (660NS-00000-RP-EN-0001) across the PPE in 2011 on behalf of Fortescue (ecologia, 2012b).

Additionally, a Targeted Level 2 Fauna Assessment (EX-RP-EN-0023) and a Terrestrial Vertebrate Fauna Assessment (662NS-0000-AS-EN-0004) were undertaken, on behalf of Fortescue, by Coffey Environments in 2014 (Coffey, 2014b) and Spectrum Ecology in 2021 (Spectrum, 2021c), respectively. These surveys were located approximately 5 km to the West and 10 km to the South.

A search of the Protected Matters Search Tool (PMST), DBCAs Threatened and Priority Flora database and regional survey records (DCCEEW, 2022; DBCA, 2022) was undertaken over a 10 km radius from the PPE (Appendix 1).

2.5.2 Habitat Mapping

The PPE intersects two habitat types mapped by ecologia Environment (ecologia, 2012b). These include the Hills/Ranges/Plateau and the Rocky Escarpments (Ridges/Mesa/Cliffs/Outcrops/Breakaways) habitat types (Table 7).

Table 7 Major Habitat Types Mapped Across the PPE

| Habitat Type | Brief Description |
|---|--|
| Hills/Ranges/Plateau | Open vegetation structure with low sparse Eucalypts and shrubland of <i>Acacia</i> sp. <i>Senna</i> sp. and <i>Solanum lasiophyllum</i> over tussock grassland of <i>Triodia</i> sp. |
| Rocky Escarpments (Ridges/Mesa/Cliffs/Outcrops/Breakaways) | Cliff faces along rocky ridges and breakaways with numerous vertical and horizontal crevices and rocky gorges with semi-permanent waterholes. |

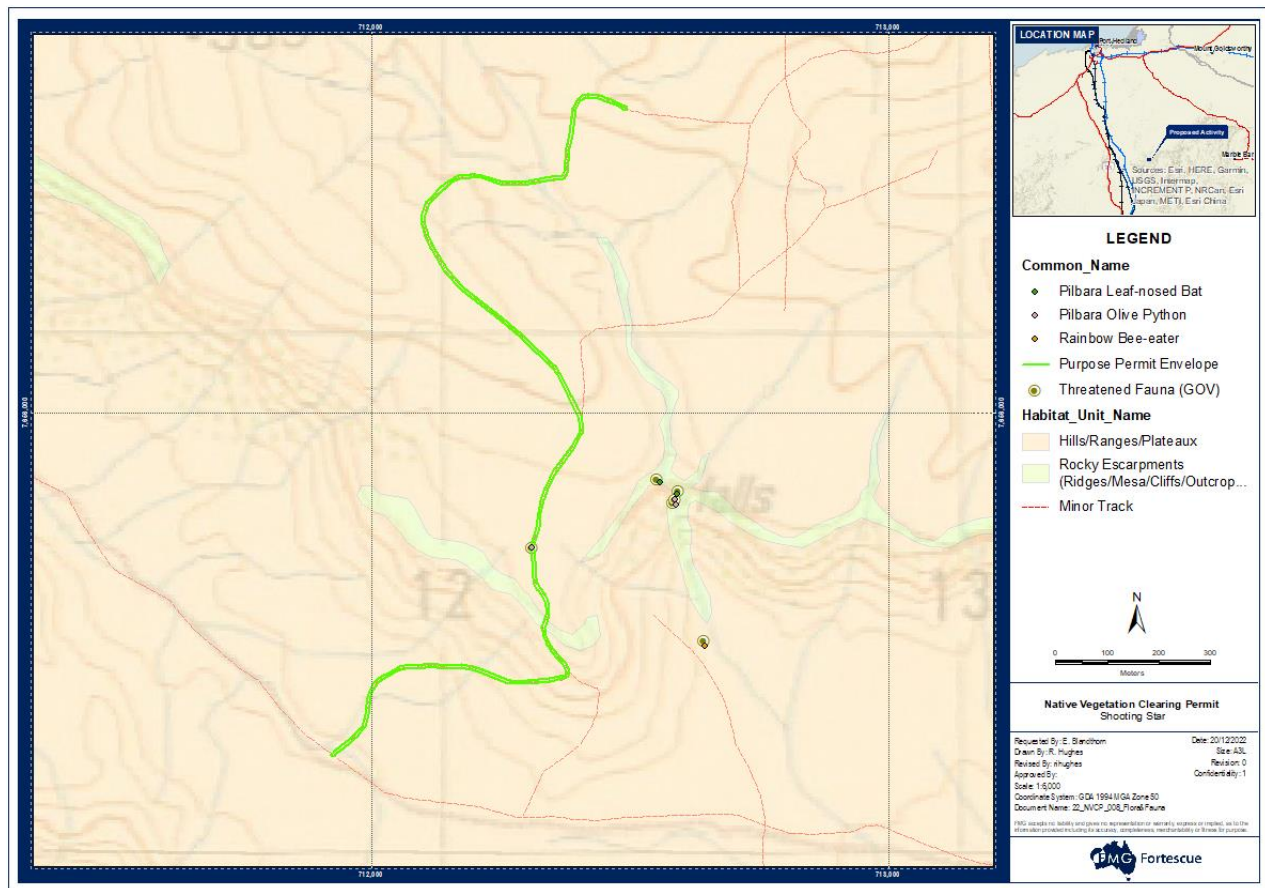


Figure 11 Fauna Habitat and Significant Fauna Mapped Across the PPE

2.5.3 Conservation Significant Fauna

A total of 14 vertebrate fauna species, listed as either threatened fauna (EPBC Act, BC Act Schedule) or as priority fauna (DBCA Priority list) have been recorded within, or have the potential to occur within, the 10 km search area (Table 8; Figure 12). Of the 14 conservation significant fauna species identified, one sighting of the Pilbara Olive Python (Vulnerable) has been recorded the PPE. As this species was transiting the area and the recorded fauna sighting was on the roadside, it is unlikely to still be in the area.

Table 8 Conservation Significant Fauna Identified within 20km of the PPE

| Species Name | Conservation Status | | | Recorded in Survey or Database Search |
|--|---------------------------------|------------|-------------|---------------------------------------|
| | EPBC Act | BC Act | DBCA listed | |
| Birds | | | | |
| <i>Calidris ferruginea</i> (Curlew Sandpiper) | Critically Endangered Migratory | Schedule 1 | - | Database Search |
| <i>Pezoporus occidentalis</i> (Night Parrot) | Endangered | Schedule 2 | - | Database Search |
| <i>Rostratula australis</i> / (<i>Rostratula benghalensis (sensu lato)</i>) (Australian Painted Snipe) | Endangered Migratory | Schedule 2 | - | Database Search |

| Species Name | Conservation Status | | | Recorded in Survey |
|---|---------------------|------------|-------|-------------------------|
| <i>Erythrotriorchis radiatus</i> (Red Goshawk) | Vulnerable | Schedule 3 | - | Database Search |
| <i>Falco hypoleucos</i> (Grey Falcon) | Vulnerable | Schedule 3 | - | Database Search |
| Mammals | | | | |
| <i>Dasyurus hallucatus</i> (Northern Quoll) | Endangered | Schedule 2 | - | Database Search, Survey |
| <i>Macrotis lagotis</i> (Greater Bilby) | Vulnerable | Schedule 3 | - | Database Search |
| <i>Macroderma gigas</i> (Ghost Bat) | Vulnerable | Schedule 3 | - | Database Search, Survey |
| <i>Rhinonicteris aurantia</i> (Pilbara Leaf-nosed Bat) | Vulnerable | Schedule 3 | - | Database Search, Survey |
| <i>Pseudomys chapmani</i> (Western Pebble-mound Mouse) | - | - | P4 | Survey |
| <i>Sminthopsis longicaudata</i> (Long-tailed Dunnart) | - | - | P4 | Survey |
| <i>Dasykaluta rosamondae</i> (Little Red Kaluta) | - | - | Other | Survey |
| Reptiles | | | | |
| <i>Liasis olivaceus barroni</i> (Olive Python - Pilbara subspecies) | Vulnerable | Schedule 3 | - | Database Search, Survey |
| <i>Liopholis kintorei</i> (Great Desert Skink) | Vulnerable | Schedule 3 | - | Database Search |
| <i>Anilius ganei</i> (Gane's blind snake - Pilbara) | - | - | P1 | Survey |

Based on preferred habitat, species which are possible and likely to occur within the PPE are discussed below.

2.5.3.1 Northern Quoll (*Dasyurus hallucatus*)

Northern Quolls are broadly distributed across the Pilbara bioregion. Habitat considered critical to the survival of this species includes rocky gorges and escarpments, diverse eucalypt forests with hollow logs, and offshore islands (DCCEE, 2005). Surveys undertaken across the region identified potential dispersal, denning and foraging habitat for the Northern Quoll among the Drainage Lines (Major) and Rocky Escarpment habitat types mapped by Coffey (2014b) and ecologia (2012b), and the Gorges/Gullies, Drainage line/River/Creek (minor) and Rocky Escarpment habitat types mapped by Spectrum (2021c).

The Level 2 Terrestrial Vertebrate Fauna Assessment (660NS-00000-RP-EN-0001) by ecologia Environment (ecologia, 2012b) included 34 records of the species, with at least 20 confirmed individuals of the Northern Quoll within the rocky escarpments/gullies and drainage habitats mapped across the survey area.

The PPE may be utilised by the Northern Quoll, whilst foraging or transiently moving through the area. However, as this PPE is for track maintenance, no additional habitat loss is proposed, it is unlikely that the proposed works will have a significant impact on the conservation status or distribution of this species.

2.5.3.2 Ghost Bat (*Macroderma gigas*) and Pilbara Leaf-nosed Bat (*Rhinonictoris aurantia*)

The Ghost Bat and Pilbara Leaf-nosed Bat (PLNB) are mainly found in the arid zone near rock outcrops, and roosts in caves, mines and rock clefts. The main threat to the Ghost Bat and Pilbara Leaf-nosed Bat is the loss of its remaining roost sites (DCCEEW, 2022; DCCEEW, 2022). Surveys undertaken across the region identified potential foraging and dispersal habitat for the Pilbara Leaf-nosed Bat among the Gorges/Gullies, Drainage line/River/Creek (minor) and Rocky Escarpment habitat types mapped by Spectrum (2021c), and the Rocky ridge/breakaway/gorge and Drainage line/River/Creek (Minor/Major) habitat types mapped by ecologia (2012b). The Hills, Ranges Plateaux and Minor Drainage Lines habitats may be used for foraging and dispersal by these species, although they do not represent denning, roosting, or breeding habitat.

Vertebrate surveys by ecologia Environment (ecologia, 2012b) and Spectrum Ecology (2021b) recorded 8 individuals of the Ghost Bat and 39 individuals of the PLNB within the rocky escarpments and gorges/gullies habitats mapped across the survey area.

Additionally, a targeted bat survey (650GV-5530-RP-EN0002) by GHD in 2021 contained 126 recordings of the PLNB and 10 recordings of the Ghost Bat.

Vegetation (NS-AS-EN-0001) and fauna (660NS-00000-RP-EN-0001) mapping by ecologia Environment (ecologia, 2012a & 2012b) and fauna habitat mapping (662NS-0000-AS-EN-0004) by Spectrum Ecology (2021c) across the region have indicated the potential for suitable roosting, dispersal and foraging habitat to occur within 10km of the PPE. Of this, only a small area (<1%) within the PPE may provide foraging and roosting habitat for both species. As this PPE is for track maintenance, no additional habitat loss is proposed, it is unlikely that the proposed works will have a significant impact on the conservation status or distribution of either species

2.5.3.3 Western Pebble Mound Mouse (*Pseudomys chapmani*)

This mouse is widely distributed, but patchy within the region, occurring across the central and southern Pilbara and extends into smaller ranges of the Little Sandy Desert (Start, 2008). Western Pebble-mound mice inhabit gently sloping hills of rocky ranges where the ground is stony and vegetated by Spinifex with a sparse overstorey of eucalypts and scattered shrubs of *Senna*, *Acacia* and *Ptilotus*. Ecologia (2012b) recorded four burrows/mounds of Western Pebble-mound Mouse within the *Triodia* Hummock Grassland and Acacia Shrubland habitats mapped across the survey area. It is possible that the Western Pebble-mound Mouse may be found within the PPE. However, the loss of <1ha of habitat will unlikely have a significant impact on the conservation status or distribution of this species.

2.5.3.4 Long-tailed Dunnart (*Sminthopsis longicaudata*)

The Long-tailed Dunnart is common in rocky screes, flat top hills and plateaus, sandstone ranges and breakaway habitat in the Pilbara, in spinifex hummock grasslands with sparse overstorey

(Western Australian Museum, 2021). Ecologia (ecologia, 2012b) recorded 3 individuals of the Long-tailed Dunnart within the *Triodia* Hummock Grassland and *Acacia* Shrubland habitats mapped across the survey area.

As the PPE encompasses vegetation habitats suitable for Long-tailed Dunnarts, this species may be found in the PPE, however it is unlikely that the loss of <1ha of habitat will have a significant impact on the conservation status or distribution of this species.

2.5.3.5 Gane's Blind Snake - Pilbara (*Anilius gane*)

The Gane's Blind Snake grows on average to 30 cm and is restricted to the Pilbara region, typically found between Newman and Pannawonica. This species is thought to be associated with moist gullies and gorges (Wilson and Swan, 2010). However, little is known about this species as it was recently described in 1998 and represented in the WA Museum by only eight specimens recorded from scattered localities at Pannawonica, Millstream and Newman (Bush and Maryan, 2011). The Rocky Escarpment within the project area potentially supports this species..

Two individual recordings of the Gane's Bline Snake have been made during monitoring surveys in 2014 (ecologia, 2015b) and 2018 (Spectrum, 2019). Both recording were within the *Acacia* Shrubland habitat mapped across the survey area. Therefore, this species may occur in the PPE, however it is unlikely that the loss of <1ha of habitat will have a significant impact on the conservation status or distribution of this species.

2.5.3.6 Pilbara Olive Python (*Liasis olivaceus barroni*)

The Pilbara Olive Python is known to inhabit watercourses and areas of permanent water in rocky gorges and gullies (DCCEEW, 2022).

Ecologia (2012b) recorded 9 individuals of the Pilbara Olive Python within the *Triodia* Hummock Grassland and *Acacia* Shrubland habitats mapped across the survey area.

Surveys undertaken across the region identified potential nesting, dispersal and foraging habitat for the Pilbara Olive Python among the Drainage lines/River/Creek (Minor), Rocky Escarpment and Gorges/Gullies habitat types mapped by Spectrum (2021c), and the Drainage Line (Major) habitat type mapped by Coffey (2014b).

There is no potential for areas of permanent water within the PPE. The Pilbara Olive Python may move transiently through the application area especially during times of heavy rainfall when ephemeral drainage lines are flowing or contain pooled water. However, due to the small scale of clearing associated with this Permit, and the positioning of tracks away from watercourses, it is unlikely this project will adversely impact the conservation status or distribution of this species.

2.5.4 Migratory and Marine Bird Species

Migratory and Marine bird species migrate to Australia along the East Asian-Australian Flyway and some of these bird species are known to use inland wetlands as their dominant habitat (Hansen et al. 2016). These bird species could potentially use suitable wetland habitats such as the Fortescue Marsh to migrate across the inland regions of Australia as they move to non-breeding sites in southern Australia. Migration pathways are not distinct, moving across any part of the Pilbara region and utilising any available wetland habitats.

- Australian Painted Snipe (*Rostratula australis*)
- Australian Kestrel (*Falco cenchroides*)
- Whistling Kite (*Haliastur sphenurus*)
- Sacred Kingfisher (*Todiramphus sanctus*)
- Magpie Lark (*Grallina cyanoleuca*)
- Barn Swallow (*Hirundo rustica*)
- Black-eared Cuckoo (*Chalcites osculans*)
- Cattle Egret (*Bubulcus ibis*)
- Common Sandpiper (*Actitis hypoleucos*)
- Curlew Sandpiper (*Calidris ferruginea*)
- Fork-tailed Swift (*Apus pacificus*)
- Grey Wagtail (*Motacilla cinerea*)
- Oriental Plover (*Charadrius veredus*)
- Oriental Pratincole (*Glareola maldivarum*)
- Pectoral Sandpiper (*Calidris melanotos*)
- Rainbow Bee-eater (*Merops ornatus*)
- Sharp-tailed Sandpiper (*Calidris acuminata*)
- Yellow Wagtail (*Motacilla flava*)
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*)

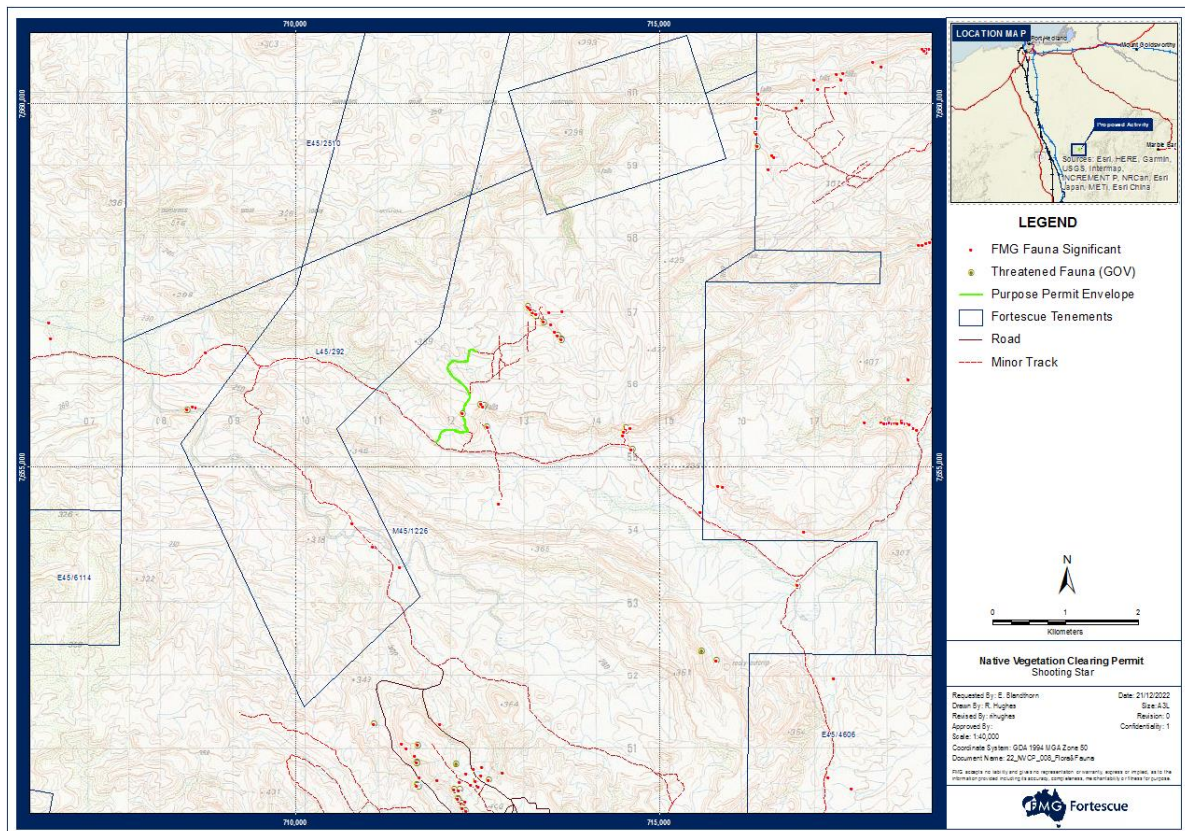


Figure 12 Conservation Significant Fauna Identified within 10 km of the PPE

2.6 Hydrology and Hydrogeology

The PPE occurs within the Turner River and Strelley River Catchments and is not located within any designated Public Drinking Water Source Areas (PDWSA). The Turner River has a catchment of 4,802 km² and is a major river of the Port Hedland Coast Catchment while the Strelley River has a catchment area of 2,805 km² and is a subcatchment of the Shaw River (Worley Parsons, 2012a).

Drainage lines in the region are ephemeral and generally only flow for short durations following rainfall events (Worley Parsons, 2012a). Intermittent flows normally occur during the wet season with long periods of no flow during the dry season.

The Six Mile Creek, a major creek, runs north to south approximately 10km to the east of the PPE (DWER, 2018). The PPE is largely situated on the hill tops at the head of local drainage catchments. A few minor drainage lines may be intercepted by clearing.

The PPE is located within the Pilbara Groundwater Area, a proclaimed groundwater area under the *Rights in Water and Irrigation Act 1914* (RIWI Act). This area has been identified as the Port Hedland Coast and De Grey River Basins, the hydrogeology is characterised by Precambrian rocks of which are principally volcanics, shales and iron formation. The Combined Fractured Rock Aquifer contains groundwater within the fractures of these Precambrian rocks.

3. ENVIRONMENTAL IMPACTS AND MANAGEMENT

3.1 Flora and Vegetation

3.1.1 Potential Risk Pathways and Impacts

There has been considerable effort expended to ensure the proposed works associated with this application, will have as minimal an impact on flora and vegetation as practicable.

Fortescue has identified a number of potential risk pathways associated with the proposed works which may impact flora and vegetation, including:

- Unauthorised or over clearing;
- Unauthorised vehicle movement;
- Introduction of weed species via increased vehicle movement; and
- Increased dust emissions/deposition via vehicle movement.

These risk pathways have the potential to cause:

- Direct loss of vegetation;
- Direct loss of conservation significant flora; and
- Degradation of vegetation

3.1.2 Direct Loss of Vegetation

The Georges Ranges 82 vegetation association unit is not representative of a threatened or priority ecological community (TEC or PEC) and makes up 3.5% of the Chichester IBRA sub-region. Fortescue proposes to clear an IDF of 0.9765ha which equates to <0.01% of the Georges Ranges 82. This application is for the re-clearing of an existing track and so the proposed clearing is unlikely to pose significant threat to the vegetation communities within the PPE.

3.1.3 Direct Loss of Flora of Conservation Significance

The closest record of endangered species *Quoya zonalis*, is located within the windrows of the existing track (see Figures 9 and 10), however proposed clearing is to be maintained within existing windrows and will not disturb any *Q. zonalis* individuals.

Given the size of the PPE and the nature of the clearing, it is unlikely to impact the conservation of any of these species.

3.1.4 Degradation of Vegetation

Degradation of vegetation can occur as a result of indirect impacts such as introduction of weeds and increase dust emissions.

Weeds

Clearing for development and increased movement of vehicles, including earth moving machinery may result in the spread of existing or the establishment of new, populations of weed species. Increased numbers of weeds can significantly impact vegetation community health as introduced species and native vegetation compete for water, nutrients and sunlight, resulting in degradation of vegetation.

Dust

Dust interferes with physiological processes such as transpiration in vegetation. Whilst background levels of dust are high in the Pilbara, elevated dust loads can be caused by vegetation clearing, ground disturbance and vehicle movement.

Research on the effects of dust deposition on vegetation health has been undertaken for Australian conditions. This research indicates that vegetation health is not impacted by the direct physical effects of mineral dust deposition until relatively high surface loads are experienced, at $>7\text{g/m}^2/\text{month}$ (Doley, 2006).

Clearing and maintenance of the access track associated with this application is likely to cause dust deposition on adjacent vegetation, however deposition levels will not approach the significant levels referred to in Doley (2006).

3.1.5 Management Measures

Based on the types of risk pathways identified, Fortescue has established relevant management action in order to minimise any impact on flora and vegetation (Table 9). Overall, Fortescue will continue to implement management strategies in accordance with our *Exploration Environmental Management Plan* (E-PL-EN-0002 Rev 7d) to minimise impacts on and protect conservation significant flora and vegetation.

Table 9 Risk Pathway, Impacts & Management Measures for Flora and Vegetation

| Risk Pathway and Impacts | Management Actions |
|---|---|
| <ul style="list-style-type: none"> • Unauthorised or over clearing resulting in unwanted direct loss of flora and vegetation | <ul style="list-style-type: none"> • Where significant flora and vegetation have been identified, ensure they are recorded in the Corporate GIS and Document Management System and appropriately flagged in the field. |
| <ul style="list-style-type: none"> • Unauthorised or over clearing | <ul style="list-style-type: none"> • Review the proposed ground disturbance and clearing against |

| Risk Pathway and Impacts | Management Actions |
|---|--|
| <p>resulting in direct loss of conservation significant flora</p> | <p>flora and vegetation data to avoid/minimise clearing of significant flora and vegetation.</p> <ul style="list-style-type: none"> • Ensure staff and contractors are aware of the location of significant flora and vegetation on site and their responsibility to ensure they are protected. • Conduct vegetation clearing in accordance with a permit issued under the <i>Land Use Certificate Procedure</i> 100-PR-TA-0001. Internal Land Use Certificates (LUC) will be required prior to commencement of activities, which may include: <ul style="list-style-type: none"> ○ pre-clearance checks for conservation significant flora and/or vegetation undertaken by suitably experienced personnel prior to ground disturbance, ○ areas to be cleared clearly delineated both on maps and on the ground, ○ post-clearing audits undertaken to assess compliance with internal permits. |
| <ul style="list-style-type: none"> • Unauthorised vehicle movement resulting in direct loss of flora and vegetation • Unauthorised vehicle movement resulting direct loss of conservation significant flora | <ul style="list-style-type: none"> • Vehicles will be confined to defined roads and access tracks. • All Threatened and Priority Flora are to be identified on the ground by appropriate flagging prior to clearing. • Ensure staff and contractors are aware of the location of significant flora and vegetation on site and their responsibility to ensure they are protected. |
| <ul style="list-style-type: none"> • Introduction of weed species via increased vehicle movement resulting in degradation of vegetation | <ul style="list-style-type: none"> • Vehicles will be confined to defined roads and access tracks. • Weed hygiene requirements are implemented for plant and equipment in identified weed risk areas and/or in areas where weed populations have been identified and high-risk activities are proposed to be undertaken in accordance with the <i>Weed Management Plan</i> 100-PL-EN-1017. |
| <ul style="list-style-type: none"> • Vehicle movements, ground disturbance and clearing activities leading to increased dust emissions/deposition resulting in degradation of vegetation | <ul style="list-style-type: none"> • Vehicles will be confined to defined roads and access tracks. • Vehicles will adhere to appropriate speed limits on all roads. |

3.2 Terrestrial Fauna

3.2.1 Potential Risk Pathways and Impacts

There has been considerable effort expended to ensure the proposed works associated with this application, will have as minimal an impact on terrestrial fauna as practicable.

Fortescue has identified a number of potential risk pathways associated with the proposed works which may impact flora and vegetation, including:

- Unauthorised or over clearing;
- Unauthorised vehicle movement;
- Introduction of weed species via increased vehicle movement; and
- Fauna and vehicle interaction.

These risk pathways have the potential to cause:

- Direct loss of fauna;
- Direct loss of fauna habitat; and
- Habitat degradation and fragmentation.

3.2.2 Direct Loss of Fauna

Increased movement of vehicles, including earth moving machinery may result in fauna injury or death. Vehicles may strike fauna species on roads, particularly slow-moving animals or species that are easily startled. Vehicles travelling at night are more likely to strike native fauna when visibility is reduced and animals are more active. Species such as birds of prey are also likely to feed off dead carcasses on roads and may also become victim to vehicle strike.

Fortescue keeps a record of all vehicle-related fauna incidents. The species with the highest number of vehicle strikes at Fortescue's sites is the kangaroo, usually at dawn and dusk.

Due to their migratory habits, it is likely any migratory or protected marine birds would avoid clearing areas, disperse into the surrounding landscape which supports similar habitat and return once rehabilitation is complete. Therefore, it is unlikely the proposed activities would significantly impact on the conservation status of these species.

3.2.3 Direct Loss of Fauna Habitat

The Capricorn Land System is common and widespread across the Nullagine Hills Zone (30.85%). Fortescue proposes to clear an IDF of 0.9765ha which equates to <0.01% of the

Capricorn Land System. The proposed clearing is unlikely to pose significant threat to fauna habitat within the PPE.

Critical habitat for the Northern Quoll, Pilbara Olive Python and Pilbara Leaf-nosed Bat has been mapped in the area (ecologia, 2012b), associated with the rocky ridges/breakaway/rocky gorges habitat. This fauna habitat covered a total of 519.8ha in the survey area, and so the 0.0096ha of rocky ridges/breakaway/rocky gorges habitat to be disturbed equates to less than 0.01% of the habitat area mapped during the survey. This application is for the re-clearing of an existing track and so this disturbance is considered to be insignificant and will not cause a significant impact on these species.

3.2.4 Habitat Degradation and Fragmentation

Vegetation clearing has the potential to result in fragmentation of fauna habitat reducing the connectivity of fauna populations. Fauna with large home ranges, such as ground mammals, are likely to be most at risk of habitat fragmentation.

The proposed disturbance is unlikely to pose significant threat to fauna habitat within the PPE. Management measures will be implemented to minimise clearing and maintain connectivity between fauna habitats.

Habitat degradation and fragmentation may also occur as a result of indirect impacts such as introduction of weeds.

Weeds

The introduction of weeds can lead to an indirect impact on native fauna by causing habitat degradation and fragmentation. Areas of dense weed infestation can reduce the ability of fauna to move through their habitat and impact on their ability to forage. Weed species palatable to feral herbivores may attract these animals to the area causing an increase in predation of native species, potential land degradation and further spreading of weed species either by movement of soil or in the animal's dung.

Through the implementation of weed hygiene management measures, it is not expected that the proposed works will result in significant spread of or the introduction of new weed populations.

3.2.5 Management Measures for Fauna

Based on the types of risk pathways identified, Fortescue has established relevant management action in order to minimise any impact on terrestrial fauna (Table 10). Overall, Fortescue will continue to implement management strategies in accordance with our *Exploration Environmental Management Plan* (E-PL-EN-0002 Rev 7d) to minimise impacts on and protect conservation significant fauna species and fauna habitat.

Table 10 Risk Pathway, Impacts & Management Measures for Fauna

| Risk Pathway and Impacts | Management Actions |
|---|--|
| <ul style="list-style-type: none"> • Unauthorised or over clearing resulting in direct loss of fauna habitat • Unauthorised or over clearing resulting in habitat fragmentation | <ul style="list-style-type: none"> • Where conservation significant fauna and associated habitat has been identified, ensure they are recorded in the Corporate GIS and Document Management System. • Review the proposed ground disturbance and clearing against fauna data to avoid/minimise clearing of conservation significant fauna habitat. • Ensure staff and contractors are provided with appropriate training to ensure conservation significant fauna and associated habitat are protected. • Conduct vegetation clearing in accordance with a permit issued under the <i>Land Use Certificate Procedure</i> 100-PR-TA-0001. Internal Land Use Certificates (LUC) will be required prior to commencement of activities, which may include: <ul style="list-style-type: none"> ○ pre-clearance checks for conservation significant flora and/or vegetation undertaken by suitably experienced personnel prior to ground disturbance, ○ areas to be cleared clearly delineated both on maps and on the ground, ○ post-clearing audits undertaken to assess compliance with internal permits. |
| <ul style="list-style-type: none"> • Unauthorised vehicle movement resulting in resulting in direct loss of fauna habitat | <ul style="list-style-type: none"> • Vehicles will be confined to defined roads and access tracks. |
| <ul style="list-style-type: none"> • Unauthorised vehicle movement resulting fauna strike | <ul style="list-style-type: none"> • Vehicles will be confined to defined roads and access tracks. • Vehicles will adhere to appropriate speed limits on all roads. • Vehicle movement will be restricted to daylight hours only. • Where injury or death has occurred to native fauna as a result of Fortescue exploration activities, investigate and report the incident. Causes of incidents will be determined and management procedures will be modified (as required), with measures taken to prevent re-occurrence of incidents. |

3.3 Hydrology and Hydrogeology

3.3.1 Potential Risk Pathways and Impacts

The PPE is situated on the hill tops at the head of local drainage catchments, a few minor drainage lines (unnamed) may be intercepted by clearing.

Fortescue has identified a number of potential risk pathways associated with the proposed works which may impact surface water and groundwater, including:

- Hydrocarbon spills;
- Increased risk of flooding cause by unauthorised or over clearing; and
- Increased risk of erosion cause by unauthorised or over clearing.

These risk pathways have the potential to cause:

- Degradation to the quality of surface water and groundwater; and
- Changes to surface water flows.

3.3.2 Degradation to the Quality of Surface Water and Groundwater

There is potential for hydrocarbon spills from vehicle fuel leaks or other accidents. This could in turn result in contamination of surface or ground waters. The risk of hydrocarbon spills is low, and with the implementation of management measures impacts are considered minor.

3.3.3 Changes to Surface Water Flows

Flooding events have the potential to significantly alter surface water flows. The PPE crosses a small number of minor drainage lines. Given the disturbance proposed is only re-clearing and maintenance of an existing road 4-5 m wide and typically occurs on the top of hills in the area, the clearing unlikely to significantly alter surface water flows or raise the potential for flooding.

The Pilbara is an actively eroding landscape and as such, sediment loads are expected to be naturally high during surface water flow events. Clearing for this proposal will expose a small area of bare surface but this is unlikely to significantly increase erosion or sediment loads during surface water flow events, particularly given its location at the top of the catchment.

3.3.4 Management Measures for Surface Water and Groundwater

Based on the types of risk pathways identified, Fortescue has established relevant management action in order to minimise any impact on surface water and groundwater (Table 11). Overall, Fortescue will continue to implement management strategies in accordance with our *Exploration*

Environmental Management Plan (E-PL-EN-0002 Rev 7d) to minimise impacts on and protect surface water and groundwater.

Table 11 Risk Pathway, Impacts & Management Measures for Fauna

| Risk Pathway and Impacts | Management Actions |
|--|---|
| <ul style="list-style-type: none"> Hydrocarbon spills resulting in the degradation of surface water and groundwater quality | <ul style="list-style-type: none"> Hydrocarbons and chemicals will be transported, stored and handled in accordance with the applicable legislation and Australian Standards. Spill response equipment to be available in each vehicle. |
| <ul style="list-style-type: none"> Increased risk of flooding and erosion cause by unauthorised or over clearing, resulting in changes to surface water flows | <ul style="list-style-type: none"> Floodways will be constructed at drainage line crossings Clearing of individual trees within the creek will be restricted to those absolutely necessary. |

4. ASSESSMENT AGAINST THE 10 CLEARING PRINCIPLES

The EP Act includes 10 principles that provide decision makers with a guide on whether native vegetation should be cleared. The principles, outlined in ‘Schedule 5 – Principles for Clearing Native Vegetation’, are used as a comparative tool by DWER and DMIRS in determining whether clearing activities are environmentally acceptable and capable of being appropriately managed. Table 12 assesses the proposed clearing against these Principles.

Table 12 Assessment against the 10 Clearing Principles

| Principle | Assessment |
|--|---|
| <p>a. Native vegetation should not be cleared if it comprises a high level of biological diversity.</p> | <p>Not at Variance As this permit is for the re-clearing and maintenance of an existing track, the area intersected by the PPE has been previously disturbed, and therefore the biological diversity is low compared to the surrounding area.</p> |
| <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</p> | <p>Not likely to be at Variance The re-clearing and maintenance of this track is temporary and unlikely to have a significant impact of the conservation of the species.</p> |
| <p>c. Native vegetation should not be cleared if it includes or is necessary for the continued existence of rare flora.</p> | <p>Not likely to be at Variance A targeted flora survey by ecologia (2016) identified the presence of <i>Quoya zonalis</i> (Endangered) within the survey area. The PPE intersects the buffer zone of approximately 28 individual plants, however, no plants are expected to be disturbed by the proposed clearing. This application is only for the re-clearing and maintenance of a pre-existing track, in which no individual <i>Q. zonalis</i> have been identified.</p> |
| <p>d. Native vegetation should not be cleared if it comprises the whole or a part of or is necessary for the maintenance of a threatened ecological community.</p> | <p>Not at Variance The vegetation within the PPE is not representative of a Threatened Ecological Community.</p> |
| <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>Not at Variance The Chichester IBRA sub-bioregion remains at 99.9% of its pre-European extent. The PPE does not occur in an area that has been extensively cleared.</p> |
| <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>Not likely to be at Variance The PPE occurs on top of hills and on slopes. Only very minor drainage lines will be intercepted by the clearing. Surface drainage will be maintained.</p> |
| <p>g. Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.</p> | <p>Not at Variance The management measures detailed in previous sections will assist in reducing the likelihood of land degradation occurring as a result of clearing for this permit. These</p> |

| Principle | Assessment |
|---|---|
| | management measures include surface water and weed management measures and progressive rehabilitation to reduce the amount of cleared land potentially at risk of erosion. The proposed disturbance is re-clearing of an existing track. |
| <p>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.</p> | <p>Not at Variance</p> <p>There are no nearby conservation areas. The nearest conservation area to the PPE is Mungaroo Range Nature Reserve approximately 80km south-west of the PPE.</p> |
| <p>i. Native vegetation should not be cleared if the clearing of vegetation is likely to cause deterioration in the quality of surface or underground water.</p> | <p>Not at Variance</p> <p>Majority of clearing is on top of a hill, and therefore not likely to impact surface or groundwater.</p> <p>Appropriate stormwater, vegetation clearing and materials handling management measures will be put in place to minimise the potential impact on water quality.</p> |
| <p>j. Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.</p> | <p>Not at Variance</p> <p>Given the tracks position in the landscape, changes to surface water flows will be negligible.</p> |

5. CONCLUSION

In conclusion, the proposal is considered to be not at variance with Principles **a, d, e, g, h, i** and **j** and not likely to be at variance to principles **b, c** and **f**.

- The area to be cleared is located in common vegetation types, which are not representative of threatened ecological communities.
- This permit is for the re-clearing of an existing track, and no DRF will be removed during this clearing.
- The clearing occurs on the top of hills and slopes and will not impact on surface water flow.
- No conservation estate occurs within close proximity to the clearing.
- The area is not an area of remnant vegetation.
- Management measures will reduce the impacts to as low as reasonably practicable.

6. REFERENCES

- Astron, 2016. *Pilbara Groundwater Dependent Vegetation Literature Review*, s.l.: Unpublished report prepared for Fortescue Metals Group Ltd .
- Atlas of Living Australia, 2022. *Dasykaluta rosamondae* : *Little Red Antechinus*. [Online] Available at: <https://bie.ala.org.au/species/https://biodiversity.org.au/afd/taxa/c7713b38-8ebd-4577-a0cd-a8eb7164be29> [Accessed 2022].
- Atlas of Living Australia, 2022. *Lerista flammicauda* : *Pilbara Flame-Tailed Slider*. [Online] Available at: https://bie.ala.org.au/species/https://biodiversity.org.au/afd/taxa/b7baa73e-8315-454c-9f99-5e941c1bf324#tab_recordsView [Accessed 2022].
- Beard, J. S., 1975. *Vegetation Survey of Western Australia: Pilbara 1:1 000,000 Vegetation Series*, s.l.: University of Western Australia Press, Nedlands, WA.
- Coffey Environments. 2014a. North Star Alternate Access Road, Flora and Vegetation Assessment. Unpublished report for Fortescue Metals Group.
- Coffey Environments. 2014b. North Star Alternate Access Road, Targeted Level 2 Fauna Assessment. Unpublished report for Fortescue Metals Group.
- CSIRO, 2014. *Australian Soil Resource Information System (ASRIS)*. [Online] Available at: <https://www.asris.csiro.au/> [Accessed 2022].
- DAFWA, 2012. *Soil-Landscape Mapping*, s.l.: Department of Agriculture and Food WA .
- DBCA, 2021. *Threatened Ecological Communities (DPAW-020)*. WA: Department of Biodiversity Conservation and Attractions.
- DBCA, 2022. *Threatened and Priority Flora (DBCA-036)*. WA: Department of Biodiversity Conservation and Attractions.
- DCCEEW, 2005. *Northern Quoll (Dasyurus hallucatus)*. [Online] Available at: <https://www.dcceew.gov.au/environment/biodiversity/threatened/assessments/dasyurus-hallucatus-2005> [Accessed 2022].
- DCCEEW, 2022a. *Species Profile and Threats Database: Liasis olivaceus barroni — Olive Python (Pilbara subspecies)*. [Online] Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=66699 [Accessed 2022].
- DCCEEW, 2022b. *Species Profile and Threats Database: Macroderma gigas — Ghost Bat*. [Online] Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=174 [Accessed 2022].
- DCCEEW, 2022c. *Species Profile and Threats Database: Rhinonictis aurantia (Pilbara form) — Pilbara Leaf-nosed Bat*. [Online] Available at: https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=82790 [Accessed 2022].
- Doley, D., 2006. Airborne particulates and vegetation: Review of physical interactions. *Clean Air and Environment Quality*, Volume 2, p. 40.
- Dunlop, J. N. & Sawle, M., 2013. *The Habitat and Life History of the Pilbara Ningau Timealeyi*. [Online] Available at: <https://museum.wa.gov.au/research/records-supplements/records/habitat-and-life-history-pilbara-ningau-timealeyi> [Accessed 2022].
- DWER, 2018. *Hydrographic Catchments - Catchments (DWER-028)*. Perth: s.n.
- DWER, 2018. *Hydrography, Linear (Hierarchy) (DWER-031)*. Perth: s.n.

- DWER, 2019. *Clearing Regulations - Environmentally Sensitive Areas (DWER-046)*. WA: Department of Water and Environmental Regulation (DWER).
- ecologia Environment. 2012a. North Star Vegetation and Flora Assessment. Unpublished report for Fortescue Metals Group.
- ecologia Environment. 2012b. North Star Project Level 2 Terrestrial Vertebrate Fauna Assessment. Unpublished report prepared for Fortescue Metals Group Ltd.
- ecologia Environment. 2012c. *Pityrodia* sp. Marble Bar Targeted Flora Survey. Unpublished report for Fortescue Metals Group.
- ecologia Environment. 2015a. North Star Slurry and Infrastructure Corridors Conservation Significant Flora and Vegetation Assessment. Unpublished report for Fortescue Metals Group.
- ecologia Environment. 2015b. North Star Hematite project, EPBC Listed Threatened Fauna Monitoring Report 2014. Unpublished report for Fortescue Metals Group.
- ecologia Environment. 2016. *Pityrodia* sp. Marble Bar Regional Flora Survey. Unpublished report for Fortescue Metals Group.
- Ecoscope (Australia) Pty Ltd. 2019. Glacier Valley Extension Flora and Vegetation Survey, North Star Project. Unpublished report for Fortescue Metals Group.
- Ecoscope (Australia) Pty Ltd. 2020. North Star Extension Flora and Vegetation Survey. Unpublished report for Fortescue Metals Group.
- GHD. 2021. Targeted Bat Surveys for Spectrum Ecology – IBO Glacier Valley Survey Report
- iNaturalist Australia, 2022. *Western Pebble Mouse (Pseudomys chapmani)*. [Online] Available at: <https://inaturalist.ala.org.au/taxa/45207-Pseudomys-chapmani> [Accessed October 2022].
- Kendrick, P and McKenzie, N. 2001, 'Pilbara 1 (PIL1 – Chichester subregion)', in: *A biodiversity audit of Western Australia's 53 biogeographical subregions in 2002*, eds. JE May & NL McKenzie, Department of Conservation and Land Management, Western Australia, pp. 547-558.
- McAlpin, S., 2001. *A Recovery Plan for the Great Desert Skink (Egernia kintorei) 2001-2011*. [Online] Available at: <https://www.dcceew.gov.au/environment/biodiversity/threatened/publications/recovery/recovery-plan-great-desert-skink> [Accessed 2022].
- McKenzie, N. L. & Bullen, R. D., 2009. The echolocation calls, habitat relationships, foraging niches and communities of Pilbara microbats.. *Records of the Western Australian Museum Supplement 78*,. pp. pp. 123-155..
- McKenzie, N. L., May, J. E. & McKenna, S., 2002. *Bioregional Summary of the 2002 Biodiversity Audit for WA*, Perth: Department of Conservation and Land Management (CALM).
- Richardson, E. et al., 2011. *Australian groundwater dependent ecosystems toolbox part 1: assessment framework*, Canberra: National Water Commission.
- Schoknecht, N. & Pathan, S., 2013. *Soil Groups of Western Australia - A Simple Guide to the Main Soils of Western Australia*, South Perth: Department of Agriculture and Food.
- Spectrum Ecology. 2019. Operational Areas, Nullagine and North Star: Conservation Significant Fauna Monitoring 2018. Unpublished report for Fortescue Metals Group.
- Spectrum Ecology. 2020. Quoya Zonalis Targeted Flora Survey, Iron Bridge. Unpublished report for Fortescue Metals Group.
- Spectrum Ecology. 2021a. Targeted Flora and Vegetation Survey, Iron Bridge, Unpublished report for Fortescue Metals Group.
- Spectrum Ecology. 2021b. Shooting Star & South Star Quoya zonalis Targeted Flora Survey, Iron Bridge. Unpublished report for Fortescue Metals Group.

Spectrum Ecology. 2021c. Iron Bridge Project: Glacier Valley, Terrestrial Vertebrate Fauna Assessment. Unpublished report for Fortescue Metals Group.

Start, A. N., 2008. Western Pebble-mouse, *Pseudomys chapmani*. in *S van Dyk and R Strahan (eds), The Mammals of Australia*, pp. 621-2.

Subterranean Ecology. 2012. North Star Project: Subterranean Fauna Survey. Unpublished report for Fortescue Metals Group.

The Bureau, 2022. *Climate Statistics for Australian Locations - Paraburdoo Aero (7185)*. [Online] Available at: http://www.bom.gov.au/climate/averages/tables/cw_007185.shtml [Accessed 12 October 2022].

Tille, P., 2006. *Soil-landscapes of Western Australia's Rangelands and Arid Interior*, s.l.: DPIRD (Formerly Department of Agriculture and Food).

van Vreeswyk, A. M., Payne, A. M., Leighton, K. A. & Hennig, P., 2004. *An Inventory and Condition Survey of the Pilbara Region, Western Australia*, Perth: Department of Agriculture and Food Western Australia.

Western Australian Museum, 2021. *Long-tailed Dunnart (Sminthopsis longicaudata)*. [Online] Available at: <https://museum.wa.gov.au/online-collections/names/sminthopsis-longicaudata> [Accessed 2022].

Wilson, S. and Swan, G. 2010. *A complete guide to reptiles of Australia, 3rd edition*. New Holland.

Worley Parsons. (2012a). Surface Water Studies, North Star Hematite Project. Unpublished.

Appendix 1: Protected Matters Search Tool Results



Australian Government

Department of Climate Change, Energy,
the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 06-Dec-2022

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

| | |
|---|------|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance (Ramsar) | None |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | None |
| Listed Threatened Ecological Communities: | None |
| Listed Threatened Species: | 12 |
| Listed Migratory Species: | 10 |

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <https://www.dcceew.gov.au/parks-heritage/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

| | |
|---|------|
| Commonwealth Lands: | None |
| Commonwealth Heritage Places: | None |
| Listed Marine Species: | 15 |
| Whales and Other Cetaceans: | None |
| Critical Habitats: | None |
| Commonwealth Reserves Terrestrial: | None |
| Australian Marine Parks: | None |
| Habitat Critical to the Survival of Marine Turtles: | None |

Extra Information

This part of the report provides information that may also be relevant to the area you have

| | |
|---|------|
| State and Territory Reserves: | None |
| Regional Forest Agreements: | None |
| Nationally Important Wetlands: | None |
| EPBC Act Referrals: | 5 |
| Key Ecological Features (Marine): | None |
| Biologically Important Areas: | None |
| Bioregional Assessments: | None |
| Geological and Bioregional Assessments: | None |

Details

Matters of National Environmental Significance

Listed Threatened Species

[[Resource Information](#)]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.

Number is the current name ID.

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|-----------------------|--|-----------------|
| BIRD | | | |
| Calidris ferruginea Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area | In feature area |
| Erythrotriorchis radiatus Red Goshawk [942] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Falco hypoleucos Grey Falcon [929] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Pezoporus occidentalis Night Parrot [59350] | Endangered | Species or species habitat may occur within area | In feature area |
| Rostratula australis Australian Painted Snipe [77037] | Endangered | Species or species habitat may occur within area | In feature area |
| MAMMAL | | | |
| Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331] | Endangered | Species or species habitat known to occur within area | In feature area |
| Macroderma gigas Ghost Bat [174] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| Macrotis lagotis Greater Bilby [282] | Vulnerable | Species or species habitat likely to occur within area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|--|--|
| Rhinonicteris aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| PLANT | | | |
| Quoya zonalis listed as Pityrodia sp. Marble Bar (G.Woodman & D.Coultas GWDC Opp 4) | | | |
| Pilbara Foxglove [91588] | Endangered (listed as Pityrodia sp. Marble Bar) | Species or species habitat known to occur within area | In feature area |
| REPTILE | | | |
| Liasis olivaceus barroni | | | |
| Olive Python (Pilbara subspecies) [66699] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Liopholis kintorei | | | |
| Great Desert Skink, Tjakura, Warrarna, Mulyamiji [83160] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Listed Migratory Species | | | [Resource Information] |
| Scientific Name | Threatened Category | Presence Text | Buffer Status |
| Migratory Marine Birds | | | |
| Apus pacificus | | | |
| Fork-tailed Swift [678] | | Species or species habitat likely to occur within area | In feature area |
| Migratory Terrestrial Species | | | |
| Hirundo rustica | | | |
| Barn Swallow [662] | | Species or species habitat may occur within area | In feature area |
| Motacilla cinerea | | | |
| Grey Wagtail [642] | | Species or species habitat may occur within area | In feature area |
| Motacilla flava | | | |
| Yellow Wagtail [644] | | Species or species habitat may occur within area | In feature area |
| Migratory Wetlands Species | | | |
| Actitis hypoleucos | | | |
| Common Sandpiper [59309] | | Species or species habitat may occur within area | In feature area |
| Calidris acuminata | | | |
| Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|--|-----------------------|--|-----------------|
| Calidris ferruginea Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area | In feature area |
| Calidris melanotos Pectoral Sandpiper [858] | | Species or species habitat may occur within area | In feature area |
| Charadrius veredus Oriental Plover, Oriental Dotterel [882] | | Species or species habitat may occur within area | In feature area |
| Glareola maldivarum Oriental Pratincole [840] | | Species or species habitat may occur within area | In feature area |

Other Matters Protected by the EPBC Act

| Listed Marine Species | | | [Resource Information] |
|---|-----------------------|--|--|
| Scientific Name | Threatened Category | Presence Text | Buffer Status |
| Bird | | | |
| Actitis hypoleucos Common Sandpiper [59309] | | Species or species habitat may occur within area | In feature area |
| Apus pacificus Fork-tailed Swift [678] | | Species or species habitat likely to occur within area overfly marine area | In feature area |
| Bubulcus ibis as Ardea ibis Cattle Egret [66521] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Calidris acuminata Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area | In feature area |
| Calidris ferruginea Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area overfly marine area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---------------------|--|-----------------|
| Calidris melanotos Pectoral Sandpiper [858] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425] | | Species or species habitat likely to occur within area overfly marine area | In feature area |
| Charadrius veredus Oriental Plover, Oriental Dotterel [882] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Glareola maldivarum Oriental Pratincole [840] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Haliaeetus leucogaster White-bellied Sea-Eagle [943] | | Species or species habitat may occur within area | In feature area |
| Hirundo rustica Barn Swallow [662] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Merops ornatus Rainbow Bee-eater [670] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Motacilla cinerea Grey Wagtail [642] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Motacilla flava Yellow Wagtail [644] | | Species or species habitat may occur within area overfly marine area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|--|---------------------|--|-----------------|
| Rostratula australis as Rostratula benghalensis (sensu lato) | | | |
| Australian Painted Snipe [77037] | Endangered | Species or species habitat may occur within area overfly marine area | In feature area |

Extra Information

| EPBC Act Referrals | | | | [Resource Information] |
|--|-----------|-----------------------|-------------------|--------------------------|
| Title of referral | Reference | Referral Outcome | Assessment Status | Buffer Status |
| Controlled action | | | | |
| Abydos Direct Shipping Ore (DSO) Project, Stage 2 | 2013/6985 | Controlled Action | Post-Approval | In buffer area only |
| Abydos Direct Shipping Ore Project | 2012/6345 | Controlled Action | Post-Approval | In buffer area only |
| North Star Hematite Project | 2012/6530 | Controlled Action | Post-Approval | In buffer area only |
| North Star Magnetite Project | 2012/6689 | Controlled Action | Post-Approval | In feature area |
| Not controlled action | | | | |
| Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia | 2015/7522 | Not Controlled Action | Completed | In feature area |

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact us](#) page.

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