Attachment 2

Supporting Documentation

Native Vegetation Clearing Permit

Shooting Star Drilling Programme

24 April 2023

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ABBREVIATIONS

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

Abbreviation	Meaning
ASRIS	Australian Soil Resource Information System
BC Act	*Biodiversity Conservation Act 2016*
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	*Environmental Protection Act 1986*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
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	*Rights in Water and Irrigation Act 1914*
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 mineral exploration drilling and associated track construction to test and evaluate the Shooting Star Project area for large tonnage iron ore resources. 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).

The Shooting Star deposit is a greenfields exploration prospect, thought to be an extension of the magnetite deposit at the neighbouring Iron Bridge Magnetite Project. The Shooting Star exploration drilling programme aims to test and evaluate the area for large magnetite iron ore resources to add to the resource value of Iron Bridge. The programme consists of reverse circulation (RC) drilling and associated track construction within the 50m boundary of declared rare flora species *Quoya zonalis.*

A maximum of 4.75 hectares (ha) of native vegetation within a permit area of 353 ha may be cleared in order to complete the drilling programme. The proposed permit boundary is shown on Figure 2.

This document has been prepared to support Fortescue's application for a Permit to Clear Native Vegetation (Purpose Permit) under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. It describes the scope of the proposed activities and clearing areas, as well as an assessment of the activities and clearing areas against the 10 'Clearing Principles', as defined in Schedule 5 of the *Environmental Protection Act 1986* (EP Act).

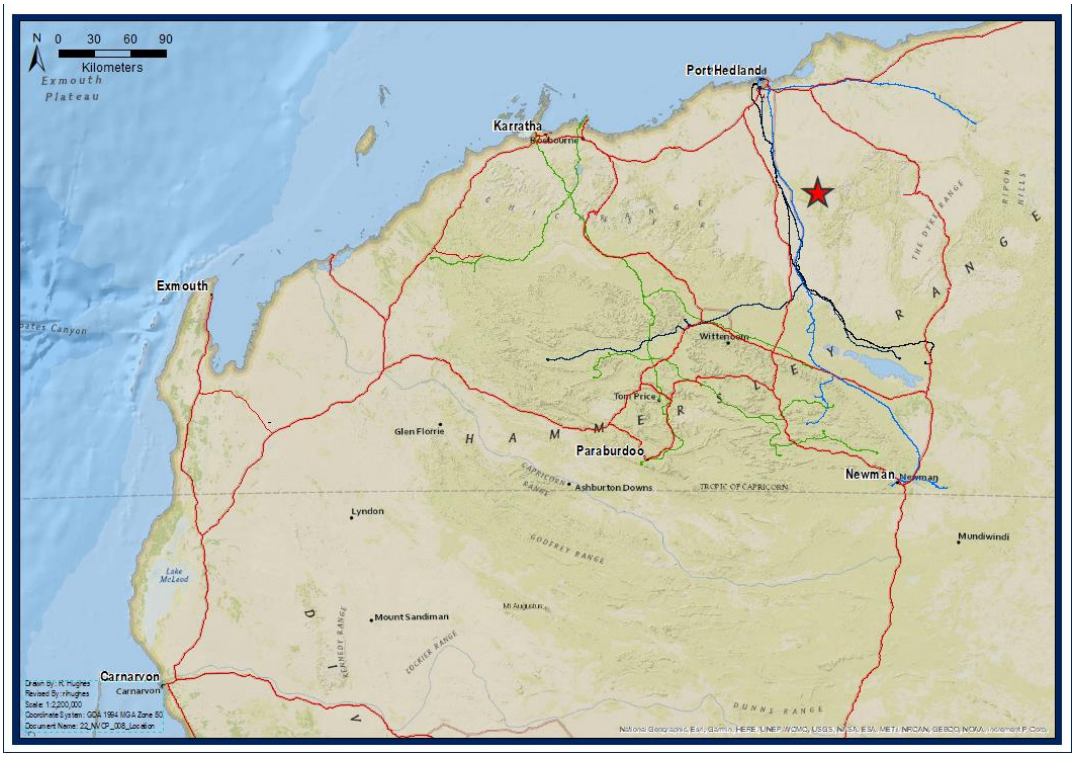

Figure 1 General location of the Shooting Star Prospect

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 clear native vegetation for the purpose of mineral exploration drilling and associated track construction to test and evaluate the Shooting Star Project area for large tonnage iron ore resources.		
Total Clearing Proposed	Indicative Disturbance Footprint of 4.75 ha, within a Purpose Permit Envelope of 353 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	Clearing will be majority raised blade, with blade down clearing used for cut-and-fill tracks and pads. Clearing will be conducted mechanically using earth moving equipment.		
Purpose of Clearing	The clearing is for the purpose of mineral exploration drilling and associated track construction to test and evaluate the Shooting Star Project area for large tonnage iron ore resources.		

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 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

A maximum of 4.75 ha of native vegetation will be cleared within a permit boundary of 353 ha.

The Shooting Star exploration drilling programme, assessed and approved under a Programme of Works (PoW) application (Reg ID 83219), consists of reverse circulation (RC) drilling and associated pad and track construction. The RC drilling involves 40 holes on pads 25m wide and 30m long, and the construction of 6 km of access tracks and drill lines, with an average width of

4.5m, to allow light vehicles (LVs), earthworks machinery and drill rigs to safely access the exploration programme.

Fortescue proposes to clear native vegetation for the purpose of mineral exploration drilling and associated track construction, which has an Indicative Disturbance Footprint (IDF) of 4.75 ha (Figure 2). The purpose of this application is to allow the clearing of tracks and pads, which in some instances are within the 50 m buffer zone of known *Q. zonalis* individuals, required for the undertaking of Fortescue's exploration activities across the Shooting Star Prospect.

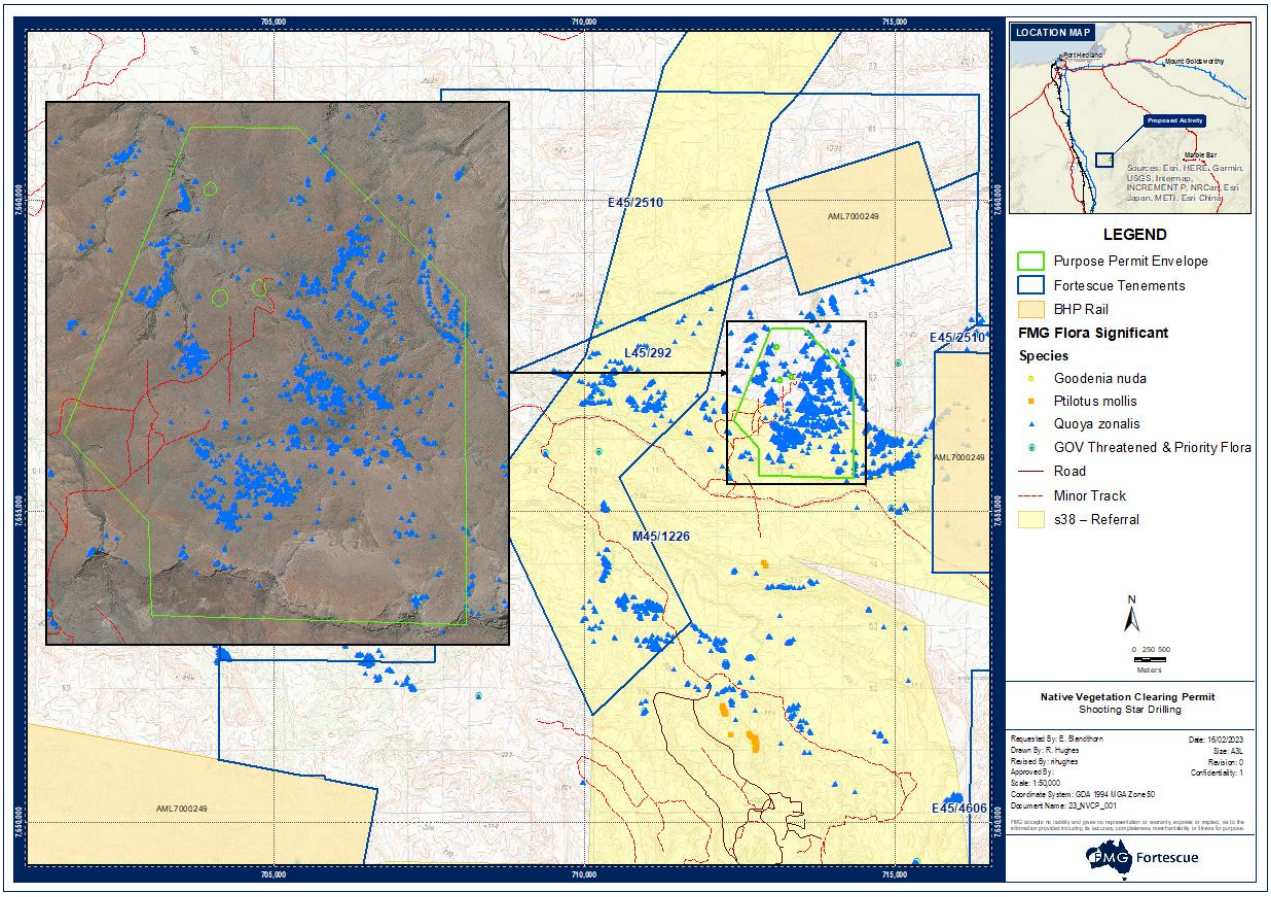

Figure 2 Purpose Permit Envelope (PPE) for Shooting Star RC Drilling Programme

1.4 Relevant Approvals

A Native Vegetation Clearing Permit is required, as the proposed disturbance 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.

The proposed works were originally approved under a Programme of Works (PoW) application (Reg ID 83219). This Native Vegetation Clearing Permit (NVCP) application is to support the approved PoW (RegID 83219).

As the proposed clearing for the exploration drilling programme, subject to this permit application, falls within 50 meters of known *Quoya zonalis* plants and, although all proposed disturbance is planned to avoid all recorded individuals, there may be inadvertent impacts as a result of the proposed works. Therefore, Fortescue has attained an 'Application for Authorisation to Take Flora' (TFL 2223-0114) under Section 40 of the *Biodiversity Conservation Act 2016* (BC Act).

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).

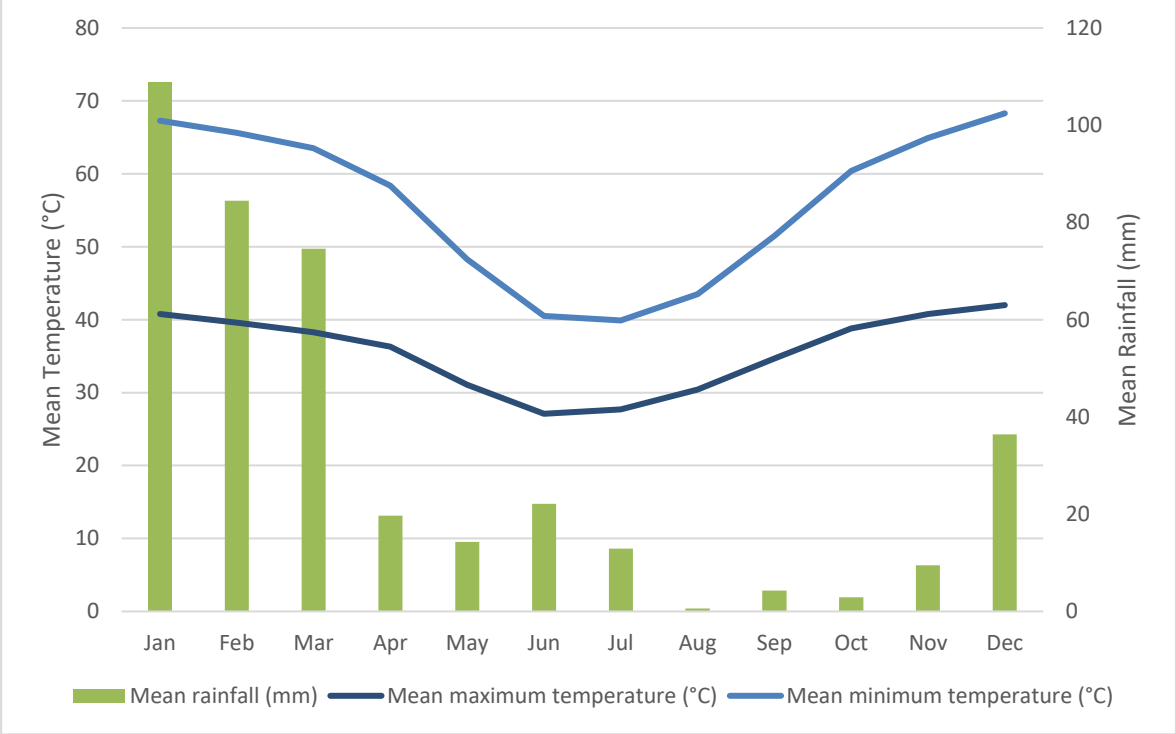

Figure 3 Climate Averages Marble Bar Station 4106

2.2 Existing Land Use

2.2.1 Land Tenure

The proposed disturbance occurs on Mining Licence 45/1226, held in joint venture 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 and mining.

2.2.2 Native Title and Aboriginal Heritage

The proposed activities contained within this NVCP lie across the Nyamal People #1 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. These surveys will be completed prior to conducting disturbance in relation to this PoW. In line with Fortescue's obligations under the AHA, all sites recorded during heritage surveys will be avoided by the PoW. Fortescue will also comply with new *Aboriginal Cultural Heritage Act 2021* (ACHA) as it comes fully into effect.

Should sites of Aboriginal heritage significance be identified in the disturbance area through heritage surveys still to be completed, the proposed activity will be adjusted to avoid these sites. Following completion of heritage surveys, 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 averse 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.

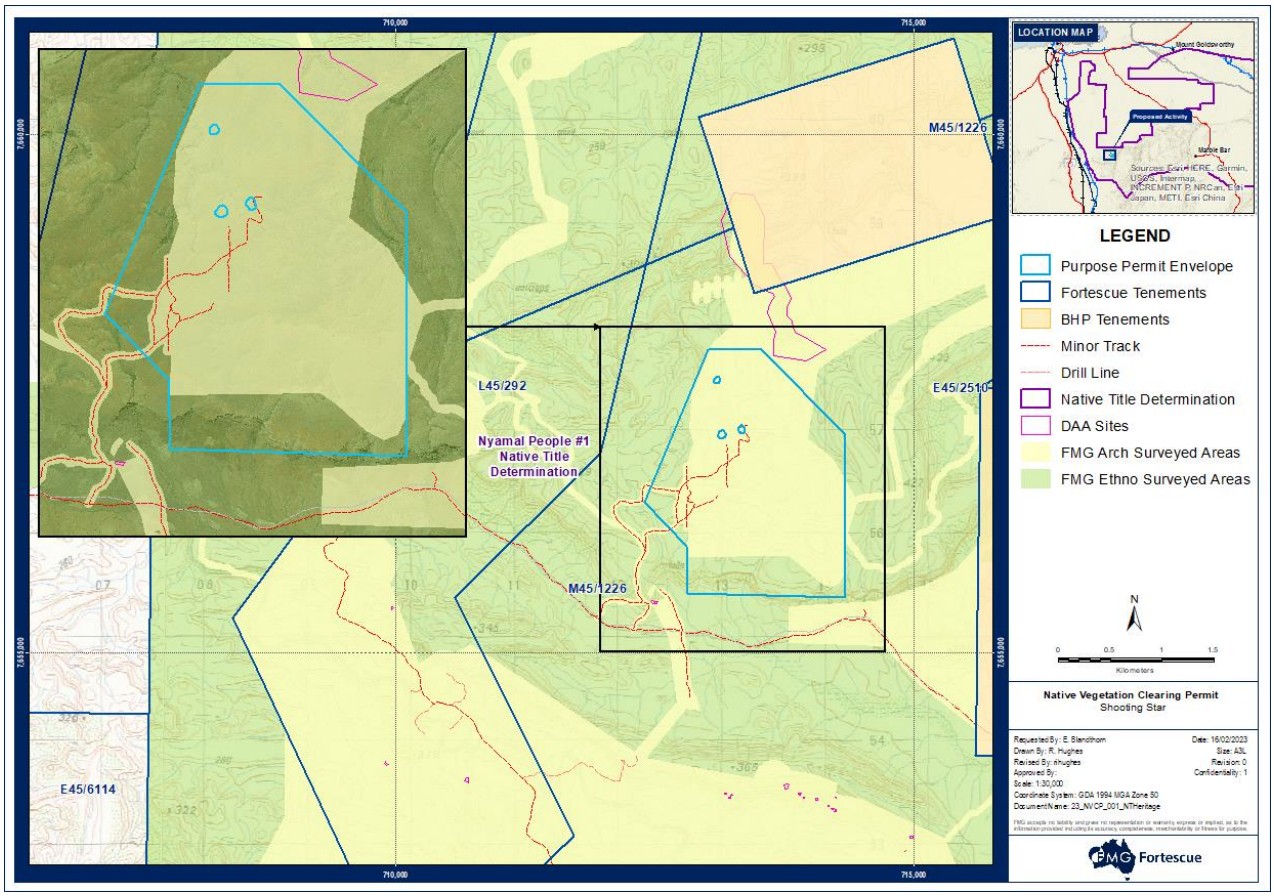

Figure 4 Heritage Sites and Survey Areas

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 km^2 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.

A majority of the proposed clearing will use a raised-blade, resulting in the shallow (<0.3 m) disturbance of soils for track and pad construction. However, in some circumstances, where pads and tracks are to be constructed on hillsides or uneven grounds, blade-down clearing will be utilised. Risks associated with acidic and metalliferous drainage, sodic and dispersive materials, and naturally occurring radioactive materials are 'not considered relevant' to the Project. The PPE is classified as 'Extremely Low Probability' for Acid Sulfate Soils. The potential occurrence of Acid

Sulfate Soils across the PPE was inferred from CSIRO (2014) mapping provided by the Australian Soil Resource Information System (ASRIS).

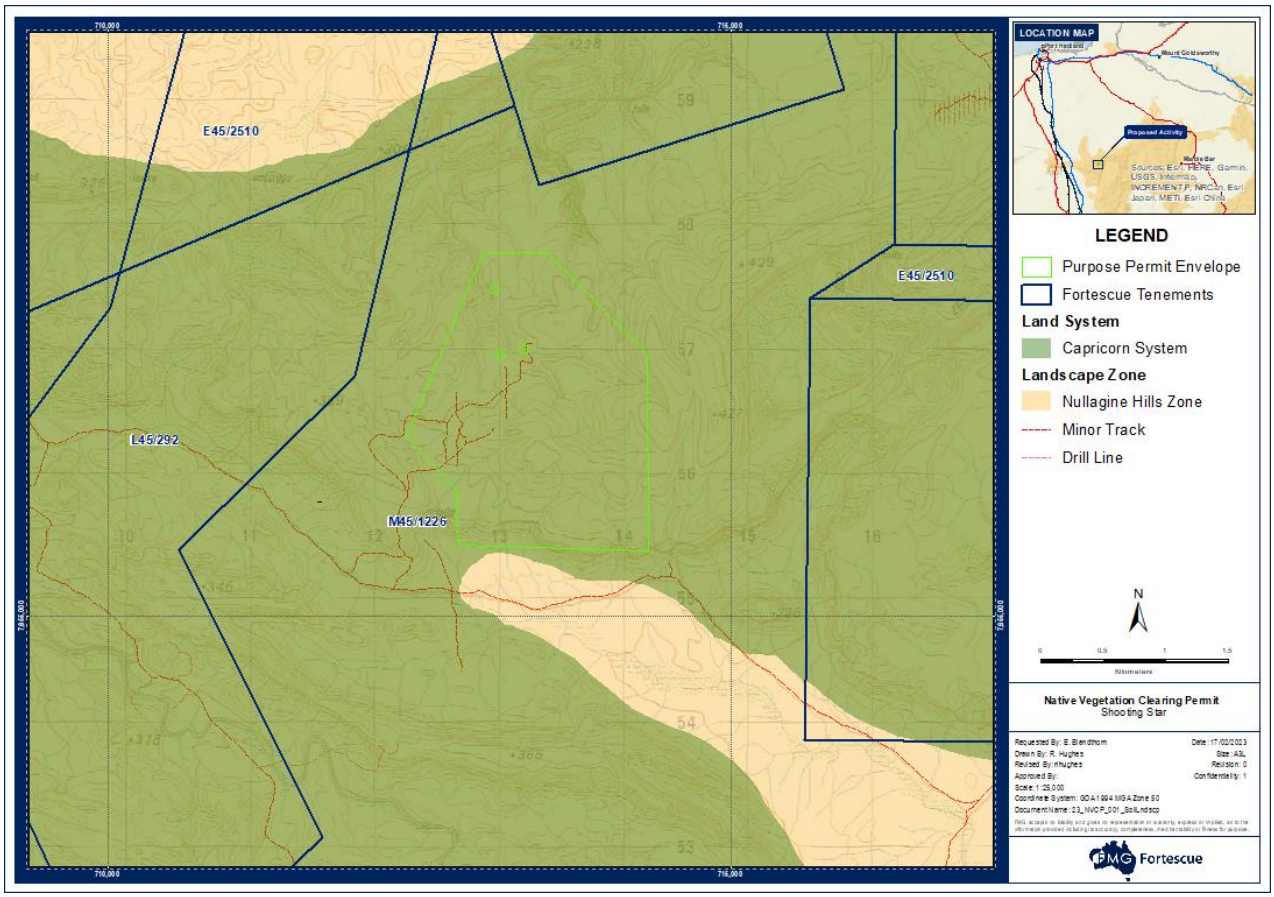

Figure 5 Location of PPE within the Capricorn System of the Nullagine Hills Zone

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 *T. wiseana*	317,182	316,855	353

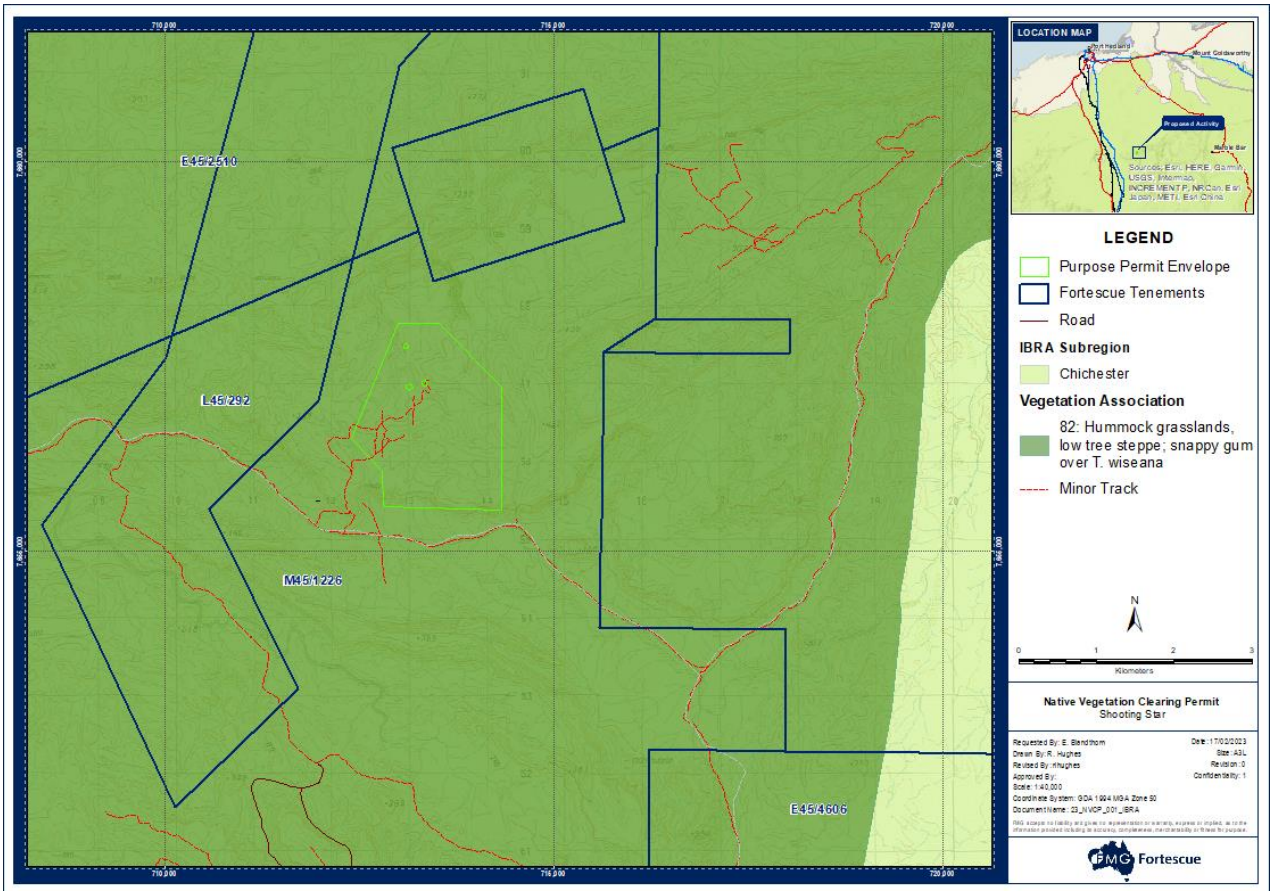

Figure 6 Location of the PPE within the Chichester IBRA Subregion and the Vegetation Association Unit

2.4.3 Flora and Vegetation Surveys

A total of four flora and vegetation surveys have been conducted across the PPE area, two of which were conducted in the past three years.

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 and 2021, Spectrum Ecology undertook a Targeted Flora and Vegetation Survey (NS-0000-RP-EN-0001) and a targeted *Quoya zonalis* flora survey (IB-0000-RP-EN-0001) across the Shooting Star and South Star Prospects (Spectrum, 2020; Spectrum, 2021).

As well as the above vegetation and flora surveys, a search of the DBCA's Threatened and Priority Flora database (DBCA, 2022) and regional survey records was undertaken over a 10 km 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* (EPBC Endangered) occurs within the PPE area (Figure 9)

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
Quoya zonalis (Pilbara Foxglove)	Endangered	Schedule 2	-	Database, Survey
Themeda sp. Panorama (J. Nelson et al. NS 102)	-	-	P1	Database
Euphorbia clementii	-	-	P3	Database, Survey
Triodia basitricha	-	-	P3	Database
Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	-	-	P3	Survey
Goodenia nuda	-	-	P4	Survey
Ptilotus mollis	-	-	P4	Database, Survey

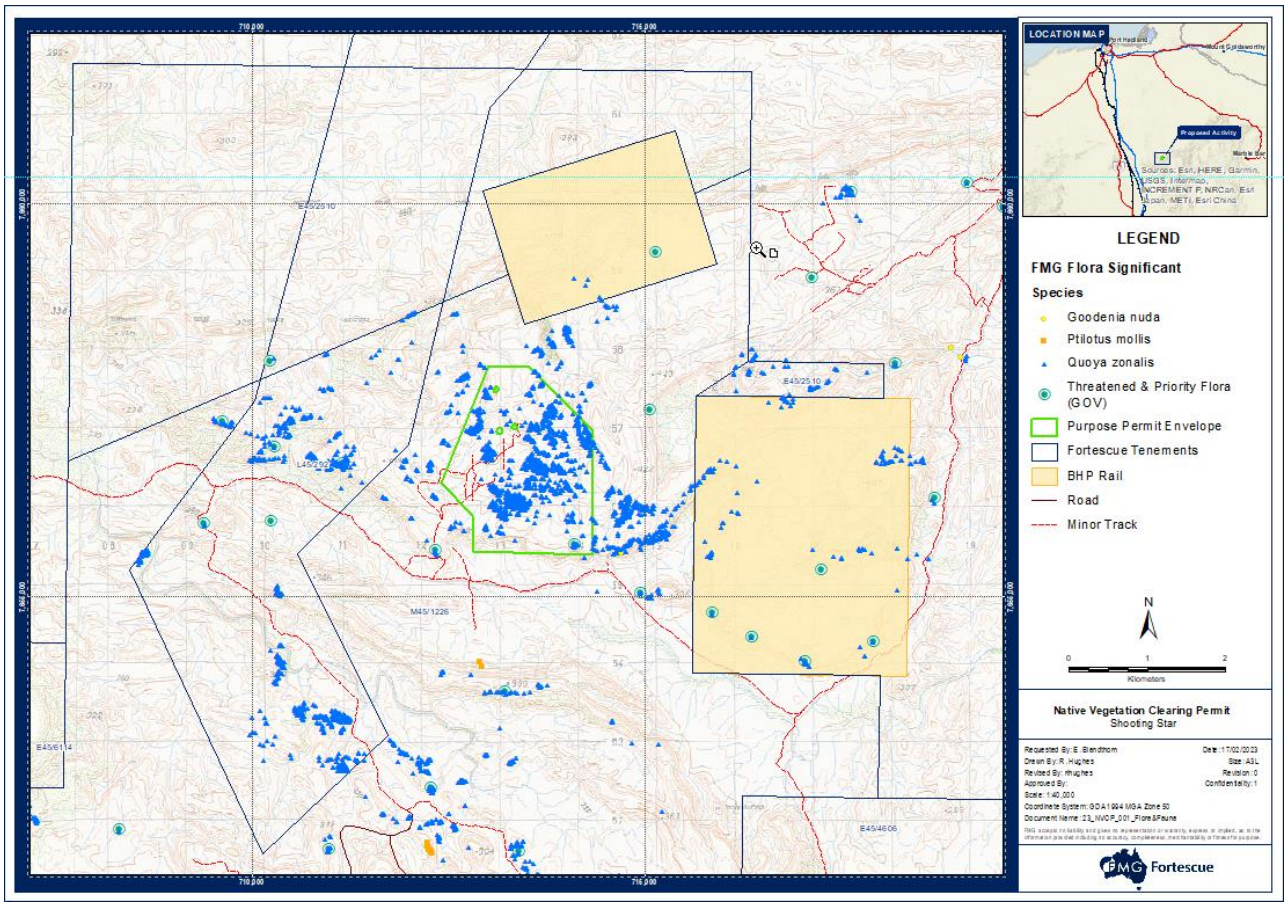

Figure 7 Conservation Significant Flora Identified within 10km of the PPE

2.4.5 Local Vegetation Mapping

The PPE intersects six 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 Open Shrubland (AtEm)	*Acacia tumida* and *Grevillea wickhamii* open tall shrubland over *Acacia orthocarpa* open mid shrubland over *Eriachne mucronata* isolated tussock grasses over *Dampiera candicans* isolated herbs.
Triodia Hummock Grassland (GwTe)	*Grevillea wickhamii* sparse mid shrubland over *Triodia epactia* or *Triodia schinzii* open hummock grassland and isolated *Eriachne ciliata* grasses and *Polycarpaea holtzei* herbs.
Acacia Shrubland (At)	*Acacia tumida* and *Grevillea wickhamii* tall shrubland over *Indigofera monophylla* sparse low shrubland.
Acacia Open Shrubland (AoTw)	*Acacia orthocarpa* open tall shrubland over *Triodia wiseana* open hummock grassland and *Eriachne pulchella* isolated tussock grasses.
Triodia Hummock Grassland (Tl)	*Triodia lanigera* open hummock grassland, with *Cyperus hesperius* isolated sedges, *Eriachne ciliata* isolated grasses and *Cleome viscosa* isolated herbs.

Vegetation Type	Brief Description
Triodia Hummock Grassland (AiTb)	*Acacia inaequilatera* and *Grevillea wickhamii* sparse tall shrubland over *Acacia acradenia* sparse mid shrubland over *Triodia basedowii* and *Triodia wiseana* hummock grassland.

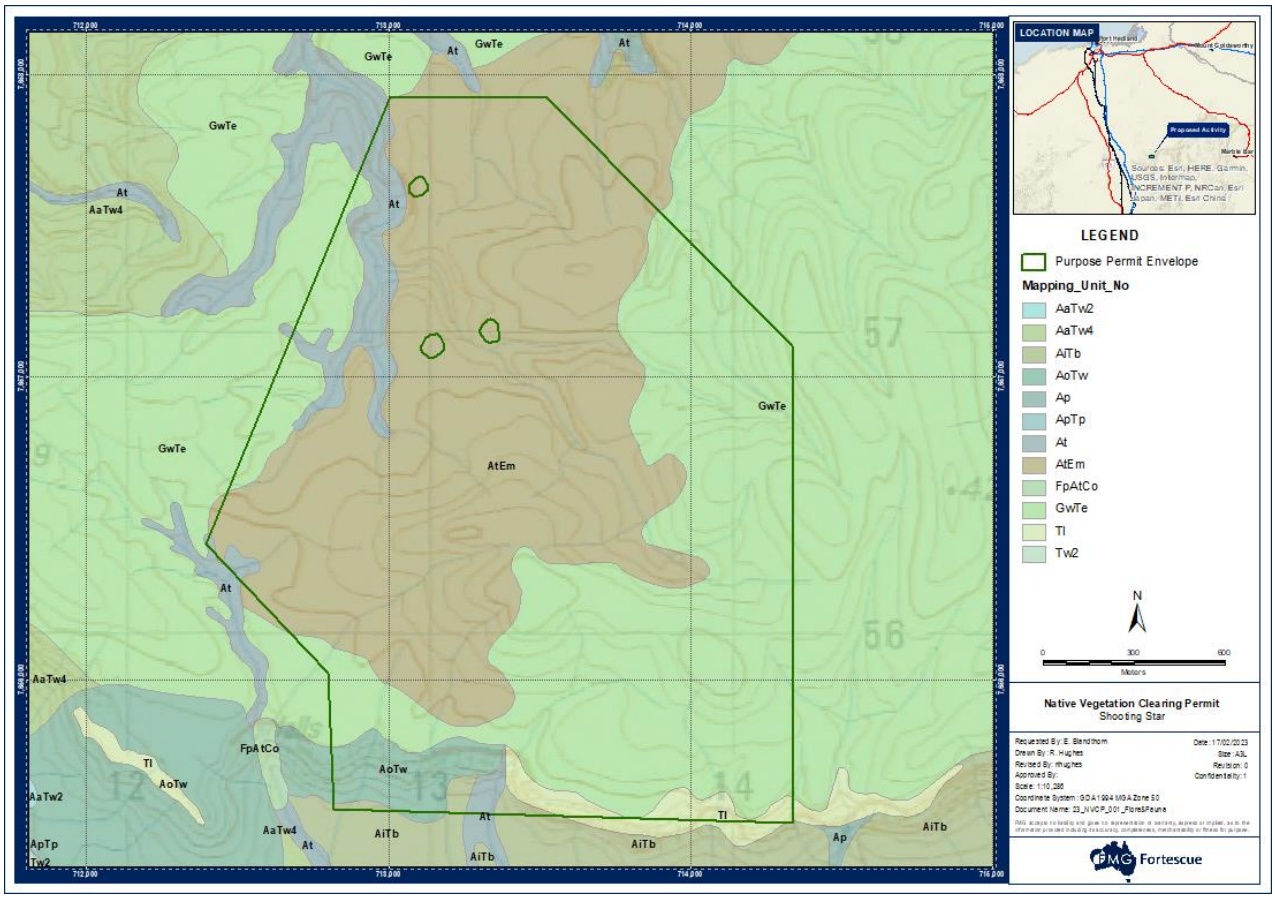

Figure 8 Vegetation Types Mapped Across the PPE

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, as the PPE area intersects with the 50m buffer zone of known declared rare flora species, *Quoya zonalis* (EPBC endangered), it is considered to intersect with an ESA, as described under Part V of the EP Act.

Several targeted flora surveys have identified a combined total of 4240 *Q. zonalis* plants within the PPE area, although the proposed disturbance will likely only fall within the buffer zone of less than 5% of these, with the indicative disturbance footprint making up only 1.35% of the total PPE area.

This taxon is thought to be relatively abundant within the North Star area (ecologia, 2012b), with an estimated 9,848 individuals from 67 populations in 2015 (ecologia, 2016). Additionally, a total of 1'825 individuals were recorded within three areas during a recent survey by Spectrum (2020). *Q. zonalis* was often recorded as groups of plants and was commonly recorded on rocky hillslopes high in the landscape, especially on mesa edges and gullies, and on rocky granite outcrops (Spectrum, 2021).

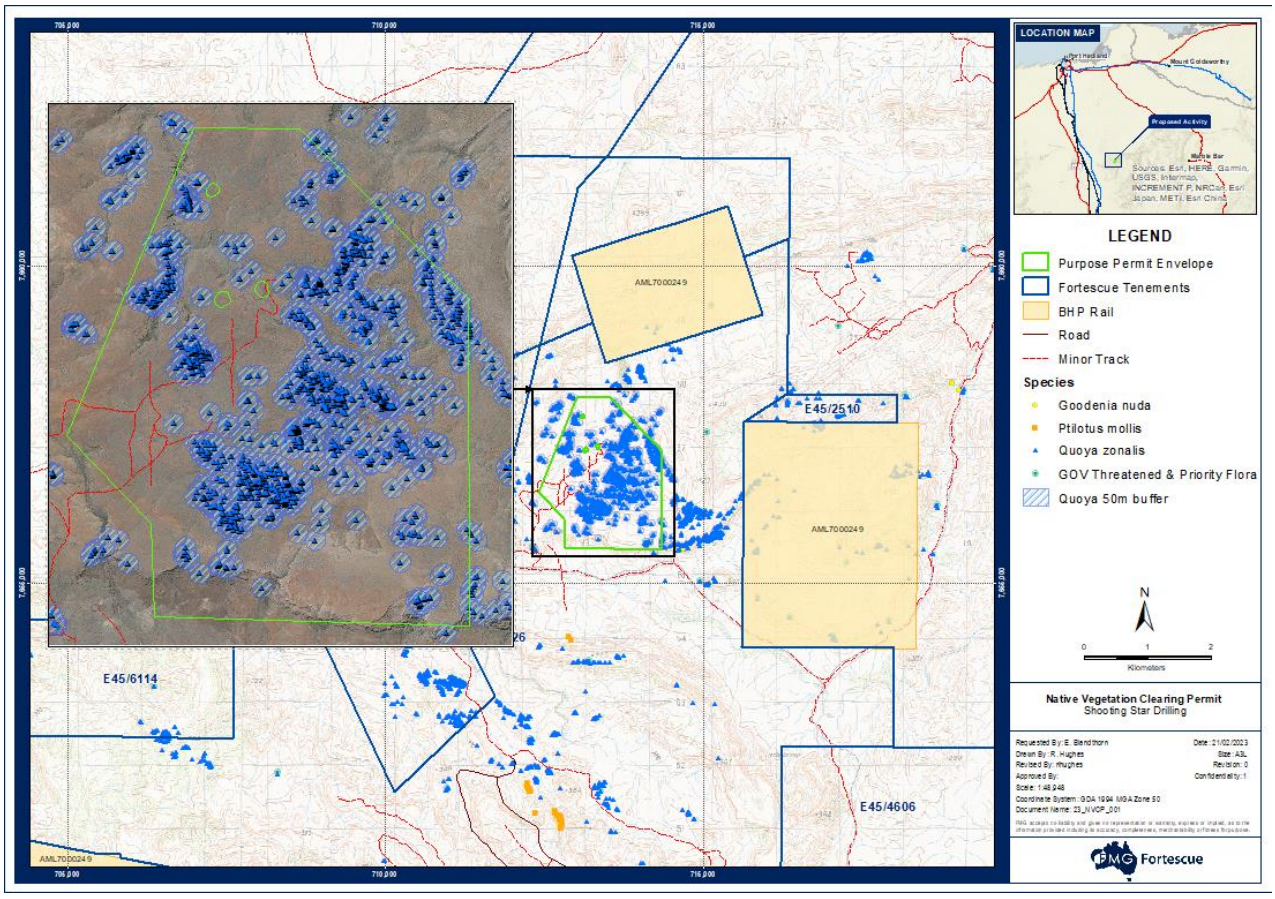

Figure 9 Conservation Reserves and Significant Vegetation Communities Map

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. Whilst vegetation communities mapped in the PPE (ecologia, 2012a) are not identified to be groundwater dependent, at least 19 stygofauna taxa have been recorded at the North Star Project area and surrounds (Subterranean Ecology, 2012). There is evidence to suggest that the surveyed area is part of a wider, continuous subterranean habitat.

Deeper sections of the Iron Bridge Banded Ironstone Formation, where minor volumes of groundwater in fractured rock systems may be encountered, do not contain cavities and therefore do not provide habitat for stygofauna (Subterranean Ecology, 2012). The alluvial aquifer associated with the Turner River provides a large area of suitable stygofauna habitat along with many other alluvial aquifers surrounding the North Star area.

As a majority of the proposed clearing activities for this PPE are not anticipated to go below 300mm of the surface, no significant impacts to the potential GDE are expected.

2.5 Vertebrate Fauna

2.5.1 Vertebrate Fauna Surveys

A desktop assessment identified two vertebrate fauna surveys that were undertaken within 10 km of the PPE, with only one survey encompassing 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).

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; Figure 11).

A majority of the PPE area (96.7%) is mapped as the Hills/Ranges/Plateau habitat. This habitat type is characterised by an open vegetation structure with small clumps of Spinifex and scattered

low and mid-sized shrubs (ecologia, 2012a). Critical habitat for conservation significant fauna species Northern Quoll, Pilbara Leaf-nosed Bat and Pilbara Olive Python within the PPE area is associated with the Rocky Escarpments habitat, which covers less than 4% of the PPE area.

The Rocky Escarpments fauna habitat was identified as being of conservation significance as it was critical habitat for the Northern Quoll and the Pilbara Leaf-nosed Bat. Where this habitat coincides with permanent or long-term pools it was also considered critical habitat for the Pilbara Olive Python (ecologia, 2012b). The Rocky Escarpments habitat provides denning habitat for the Northern Quoll, roost caves for the Pilbara Leaf-nosed Bat and the Ghost Bat, and rock faces and permanent water pools for the Pilbara Olive Python to forage, shed their skin and mate.

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 *Acacia* sp. *Senna* sp. and *Solanum lasiophyllum* over tussock grassland of *Triodia* 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.

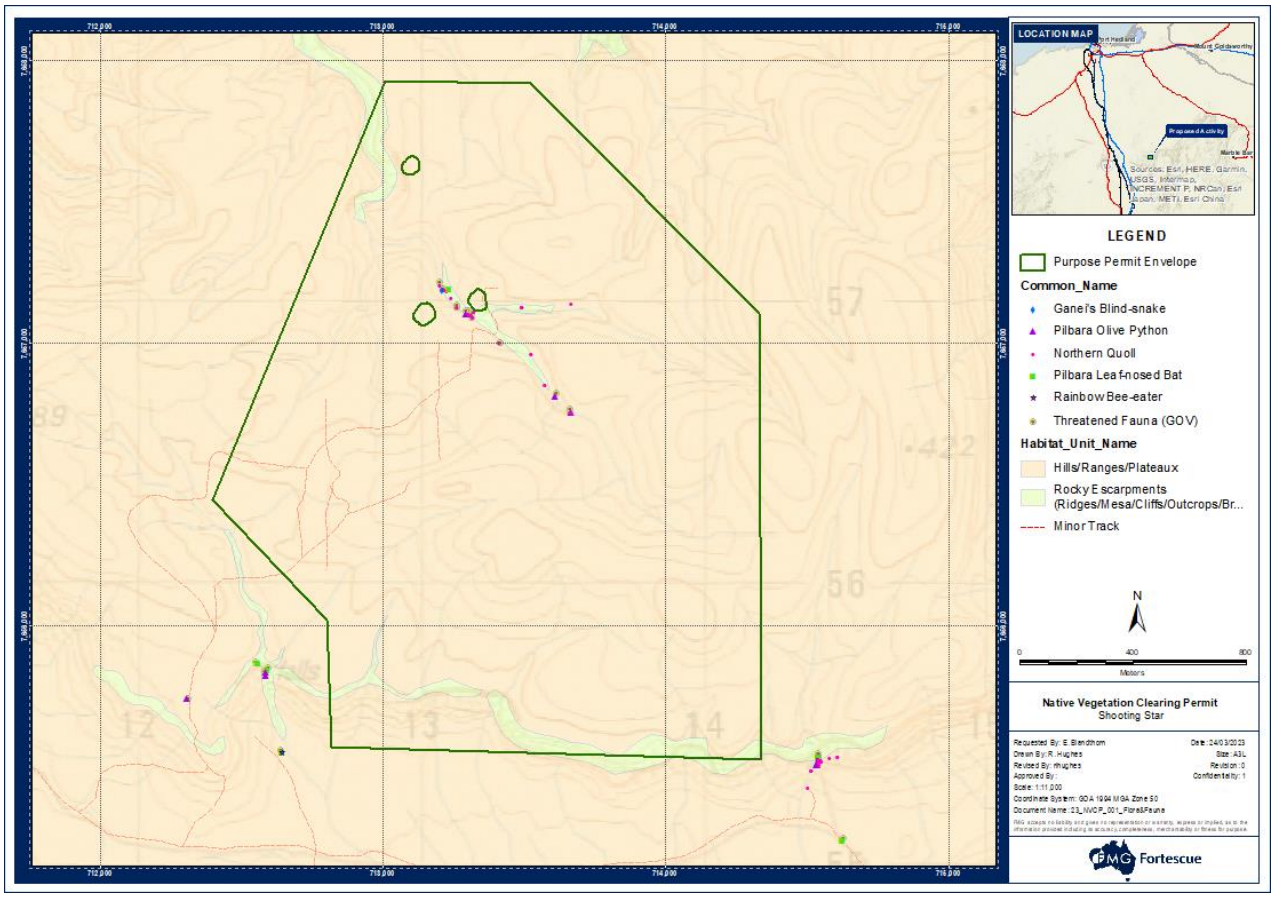

Figure 10 Fauna Habitat and Significant Fauna Mapped Across the PPE

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 11). Of the 14 conservation significant fauna species identified, only four species have been identified in the PPE during surveys and annual monitoring as required under Fortescue's *North Star Hematite Project EPBC Listed Threatened Fauna Management Plan* (NS-PL-EN- 0003).

All recordings of conservation significant fauna within the PPE were located within, or in close proximity to, the Rocky Escarpment habitat mapped by ecologia (2012b), which encompasses only a small portion (~3.3%) of the PPE. Within the PEE, a total of 23 sightings of the Northern Quoll (EPBCA Endangered) were recorded during conservation significant monitoring programmes from 2014 to 2022 and a terrestrial vertebrate fauna survey in 2012 (ecologia, 2012b). Additionally, three sightings of the Pilbara Olive Python (EPBCA Vulnerable), one sighting of Pilbara Leaf-nosed Bat (EPBCA Vulnerable) and one sighting of a Gane's Blind-snake (DBCA Priority 1) were recorded during conservation significant monitoring programmes from 2014 to 2019 and a terrestrial vertebrate fauna survey in 2012 (ecologia, 2012b).

Table 8 Conservation Significant Fauna Identified within 10km of the PPE

Species Name	Conservation Status			Recorded in Survey or Database Search
	EPBC Act	BC Act	DBCA listed	
Birds				
Calidris ferruginea (Curlew Sandpiper)	Critically Endangered Migratory	Schedule 1	-	Database Search
Pezoporus occidentalis (Night Parrot)	Endangered	Schedule 2	-	Database Search
Rostratula australis) / (Rostratula benghalensis (sensu lato)) (Australian Painted Snipe)	Endangered Migratory	Schedule 2	-	Database Search
Erythrotriorchis radiatus (Red Goshawk)	Vulnerable	Schedule 3	-	Database Search
Falco hypoleucos (Grey Falcon)	Vulnerable	Schedule 3	-	Database Search
Mammals				
Dasyurus hallucatus (Northern Quoll)	Endangered	Schedule 2	-	Database Search, Survey
Macrotis lagotis (Greater Bilby)	Vulnerable	Schedule 3	-	Database Search
Macroderma gigas (Ghost Bat)	Vulnerable	Schedule 3	-	Database Search, Survey
Rhinonicteris aurantia (Pilbara Leaf-nosed Bat)	Vulnerable	Schedule 3	-	Database Search, Survey
Pseudomys chapmani (Western Pebble-mound Mouse)	-	-	P4	Database Search, Survey
Sminthopsis longicaudata (Long-tailed Dunnart)	-	-	P4	Database Search, Survey
Dasykaluta rosamondae (Little Red Kaluta)	-	-	Other	Survey

Species Name	Conservation Status			Recorded in Survey or Database Search
	EPBC Act	BC Act	DBCA listed	
Reptiles				
Liasis olivaceus barroni (Olive Python - Pilbara subspecies)	Vulnerable	Schedule 3	-	Database Search, Survey
Liopholis kintorei (Great Desert Skink)	Vulnerable	Schedule 3	-	Database Search
Anilios ganei (Gane's blind snake - Pilbara)	-	-	P1	Database Search, 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 (DCCEEW, 2005). Surveys undertaken across the region identified potential denning habitat for the Northern Quoll among the Rocky Escarpment habitat mapped by ecologia (2012b). Vegetation communities *Acacia* Shrubland (At) and *Triodia* Hummock Grassland (Tl), mapped by ecologia (2012a) may also contain areas of potential breeding and foraging habitat, however these communities represent a small subset of the PPE.

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 host potentially suitable denning habitat and may also be utilised by the Northern Quoll, whilst foraging or transiently moving through the area. However, as the extent of the indicative disturbance footprint is minor (~1.35%) and the proposed works are temporary, 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 (*Rhinonicteris 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 Rocky ridge/breakaway/gorge and Drainage line/River/Creek (Minor/Major) habitat types mapped by ecologia (2012b). Vegetation mapping by ecologia (2012a) also identified several vegetation communities, such as *Acacia* Shrubland (At) and *Triodia* Hummock Grassland

(TI), that may also contain areas of potential breeding and foraging habitat, however these communities represent a small subset of the PPE.

A survey by ecologia Environment (ecologia, 2012b) recorded PLNBs from 18 locations within the North Star Project area, with three locations considered to be associated with roost cave locations, all outside of the PPE and consisting of the Rocky ridge/breakaway/gorge habitat.

Vegetation (NS-AS-EN-0001) and fauna (660NS-00000-RP-EN-0001) mapping by ecologia Environment (ecologia, 2012a & 2012b) across the region have indicated the potential for suitable roosting, dispersal and foraging habitat to occur within the PPE. Of this, only a small area (~3.3%) within the PPE may provide foraging and roosting habitat for PLNB. However, PLBN are unlikely to occur in the shallow 'breakaway' caves that occur along mesas due to the lack of humidity in these caves. Pilbara leaf-nosed Bats often hunt along gorges with dense vegetation, so potential foraging habitat is likely along the Rocky ridge/breakaway/gorge habitat mapped by ecologia (2012b).

Due to the lack of potential roosting caves and permanent water within the PPE, as well as the minor extent of the indicative disturbance footprint (~1.35%) and the proposed works being of temporary nature, it is unlikely that the proposed works will have a significant impact on the conservation status or distribution of both 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 <5ha 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 (2012b) recorded 3 individuals of the Long-tailed Dunnart within the *Triodia* Hummock Grassland and *Acacia* Shrubland habitats mapped across the survey area, however no recordings were located within the PPE.

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 <5ha 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 (*Anilios ganei*)

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.

One recording of the Gane's Bline Snake, located within 10 km of the PPE, was made during a monitoring survey in 2019. This recording was located on the edge of the Rocky ridge/breakaway/gorge habitat maopped by ecologia (2012b), within the *Acacia* Shrubland habitat mapped across the survey area (ecologia, 2012a). Although this species has been identified within the PPE, recordings of this species are fairly distributed through the region. Therefore, it is unlikely that the loss of <5ha 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).

Surveys undertaken across the region identified potential breeding and foraging habitat for the Pilbara Olive Python among the Rocky ridge/breakaway/gorge and Drainage line/River/Creek (Minor/Major) habitat types mapped by ecologia (2012b).

Ecologia (2012b) recorded 6 individuals of the Pilbara Olive Python within the *Triodia* Hummock Grassland and *Acacia* Shrubland habitats mapped across the survey area, however no recordings were located within the PPE. Monitoring surveys from 2014-2017 have identified 3 recorded sightings of the python within the PPE, all located along the central Rocky ridge/breakaway/gorge mapped habitat.

Due to the location of the proposed works on a mesa, there is little to no potential for areas of permanent water to occur within the PPE, although three pools have been identified just outside the PE area, two to the South (Camp and Echo pools) and one to the North (Northern Gorge 1; Figure 12). These semi-permanent waterpools are located alongside the rocky ridges and cliffs of the mesa and may provide suitable habitat for the species. 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 clearing 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*)

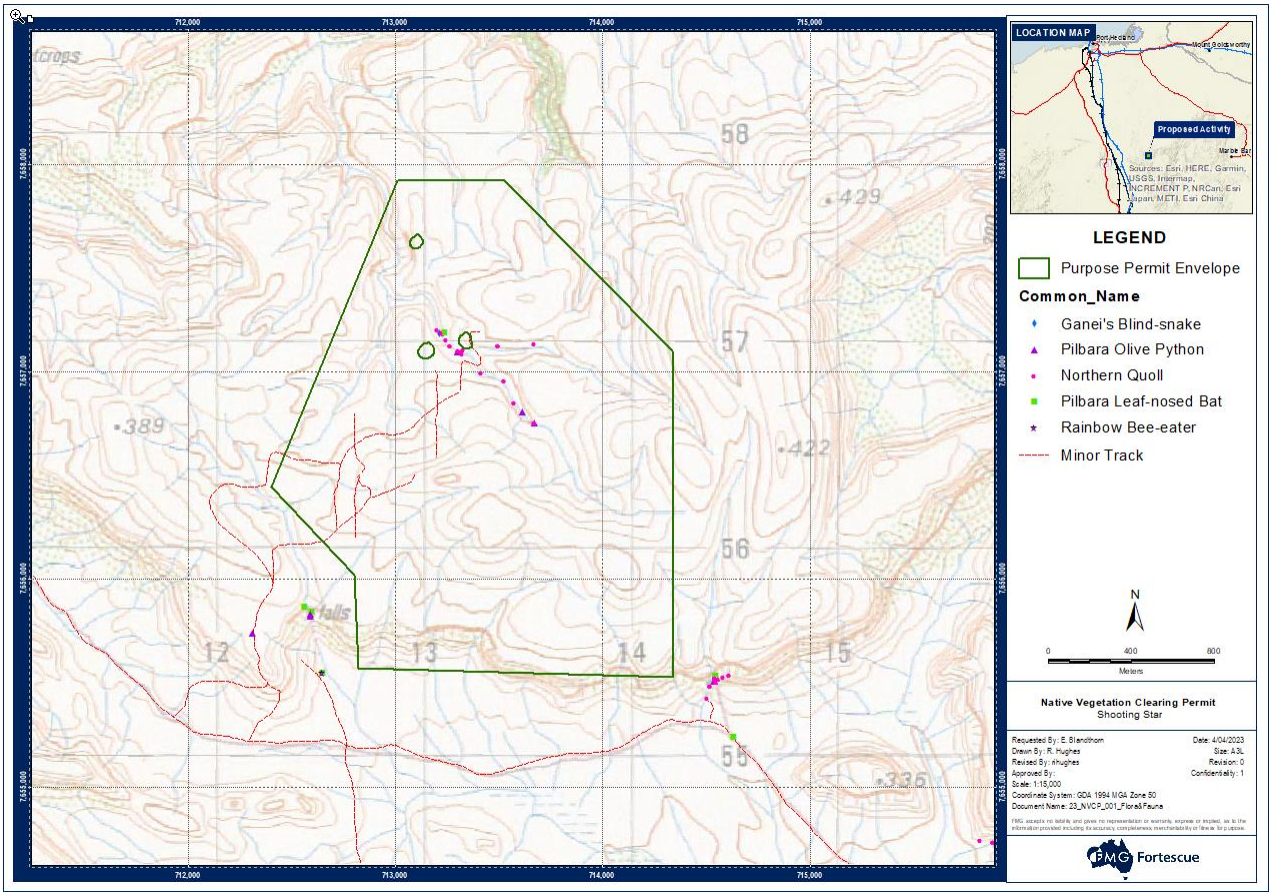

Figure 11 Conservation Significant Fauna Identified within 10 km of the PPE

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 km^2 and is a major river of the Port Hedland Coast Catchment while the Strelley River has a catchment area of 2,805 km^2 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 7 km 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.

Several semi-permanent pools have been identified during the baseline flora and fauna surveys in proximity to the PPE; Camp Pool, Echo Pool and Northern Gorge 1 (Figure 12). However, no pools were identified within the PPE area during these surveys, although pooling of water may occur within gorges and gullies during periods of heavy rainfall.

Figure 12 One of the water pools at "Northern gorge 1"

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 4.75ha which equates to <0.01% of the Georges Ranges 82. This application is for the temporary clearing for a low-disturbance exploration programme and so the proposed clearing is unlikely to pose a significant threat to the vegetation communities within the PPE.

3.1.3 Direct Loss of Flora of Conservation Significance

A total of 4240 individual plants of the endangered species *Quoya zonalis,* have been recorded within the PPE area (Figure 9) in targeted flora and vegetation surveys (ecologia, 2016; Spectrum, 2020; Spectrum, 2021). Although, the proposed disturbance footprint is only 1.35% of the total PPE area and is planned to avoid all recorded individuals, there may be inadvertent impacts as a result of the proposed works. Therefore, Fortescue has attained an 'Application for Authorisation to Take Flora' (TFL 2223-0114) under Section 40 of the *Biodiversity Conservation Act 2016* (BC Act).

Given the size of the PPE and the temporary 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 >7g/m^2/month (Doley, 2006).

Clearing and drilling activities associated with this application are 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
• Unauthorised or over clearing resulting in unwanted direct loss of flora and vegetation • Unauthorised or over clearing resulting in direct loss of conservation significant flora	• 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. • Review the proposed ground disturbance and clearing against flora and vegetation data to avoid/minimise clearing of significant flora and vegetation. • 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 *Land Use Certificate Procedure* 100-PR-TA-0001. Internal Land Use Certificates (LUC) will be required prior to commencement of activities, which may include: ○ 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. • Any plants that may be impacted will be flagged prior to clearing works, as per the requirements of the S40 permit.
• Unauthorised vehicle movement resulting in direct loss of flora and vegetation • Unauthorised vehicle movement resulting direct loss of conservation significant flora	• 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.
• Introduction of weed species via increased vehicle movement resulting in degradation of vegetation	• Vehicles will be confined to defined roads and access tracks. • Weed Hygiene Management will be implemented as per *Weed Management Plan* 100-PL-EN-1017.
• Vehicle movements, ground disturbance and clearing activities leading to increased dust emissions/deposition resulting in degradation of vegetation	• 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 fauna, including:

- Unauthorised or over clearing;
- Unauthorised vehicle movement;
- Entrapment of fauna in holes or sumps;
- 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 carcases 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 4.75ha 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 11.8ha of rocky ridges/breakaway/rocky gorges habitat within the PPE equates to less than 0.03% of the habitat area mapped during the survey. This application is for the temporary clearing for a small exploration drilling programme and so this disturbance is considered to be minimal 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.

Critical habitat for several conservation significant fauna has been identified within the PPE, however it only constitutes 3.3% of the area. The indicative footprint makes up only 4.75ha (1.1%) of the PPE, therefore, 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.

The proposed programme will use the LUC Procedure (100-PR-TA-0001) and Weed Management Plan (100-PL-EN-1017) to reduce the risk of introduction of weeds. Key management measures will include:

- Implement vehicle hygiene procedures to ensure vehicles are free of soil and vegetative matter on arrival to site.
- Undertake targeted weed surveys to determine the presence and distribution of weeds;
- Maintain data for the location of recorded weeds;
- LUC assessments will include desktop assessment of weed presence in proposed disturbance areas;
- Provide information and training to staff and contractors on potential weed impacts and weed management;

The Vehicle Hygiene Procedure (E-EN-PP-1134) will be implemented to control the risk of introduction and spread of weeds from vehicle movements. This document outlines the procedures to manage weeds and obtain a weed hygiene certificate. It also states the requirement to establish weed quarantine areas where vehicles can move freely within the area, but incoming vehicles must have weed certification.

The *Weed Hygiene Certificate* (E-EN-ET-0001) will be required for each item of plant and equipment, including vehicles entering site. This process will outline inspection and certification requirements to ensure that vehicles and plant are clean of soil or vegetative material that potentially carries weed seeds, prior to entering site.

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) and conditions imposed under Ministerial Statement (MS) 993 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
• Unauthorised or over clearing resulting in direct loss of fauna habitat • Unauthorised or over clearing resulting in habitat fragmentation	• 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.

Risk Pathway and Impacts	Management Actions

	• 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 *Land Use Certificate Procedure* 100-PR-TA-0001. Internal Land Use Certificates (LUC) will be required prior to commencement of activities, which may include:
	  ○ 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.
	• **MS993 – Condition 10:** A Pilbara Leaf-nosed Bat Habitat Survey and Research Plan will be prepared and implemented in accordance with Condition 10-6 of MS 993.
	• **MS993 – Condition 11:** Iron Bridge will implement the Northern Quoll Management Plan (662MI-5500-PL-EN-0001) as required under Condition 11 of MS 993 which outlines actions such as:
	  ○ equipment design will be specified to be within Australian standard noise limits;
	  ○ vehicle speed limits will be enforced for all Project roads and tracks;
	  ○ Noise emissions will comply with the *Environmental Protection (Noise) Regulations 1997*.

• Unauthorised vehicle movement resulting in resulting in direct loss of fauna habitat	• Vehicles will be confined to defined roads, access tracks and drill lines.
• Unauthorised vehicle movement resulting fauna strike	• Vehicles will be confined to defined roads, access tracks and drill lines. • 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 temporary 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
• Hydrocarbon spills resulting in the degradation of surface water and groundwater quality	• Hydrocarbons and chemicals will be transported, stored and handled in accordance with the applicable legislation and Australian Standards. • Spill response equipment to be available nearby areas where hydrocarbons are used and stored.
• Increased risk of flooding and erosion cause by unauthorised or over clearing, resulting in changes to surface water flows	• 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
a. Native vegetation should not be cleared if it comprises a high level of biological diversity.	**Not likely to be at Variance** Vegetation communities mapped within the PPE have also been identified outside of the PPE and are not considered to be comprised of a high biological diversity compared to the surrounding area.
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	**Not likely to be at Variance** The rocky escarpment habitat comprises of only 3.3.% of the PPE. The clearing and exploration activities associated with this application are temporary and unlikely to have a significant impact of the conservation of the species.
c. Native vegetation should not be cleared if it includes or is necessary for the continued existence of rare flora.	**Not likely to be at Variance** A targeted flora surveys by ecologia (2016) and Spectrum (2020) identified the presence of *Quoya zonalis* (EPBC endangered) within the survey area. The PPE intersects the buffer zone of approximately 4240 individual plants, however, no direct loss is expected from the proposed clearing. Fortescue has attained an '*Application for Authorisation to Take Flora*' (TFL 2223-0114) under Section 40 of the *Biodiversity Conservation Act 2016* (BC Act) for any inadvertent impacts to the species.
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.	**Not at Variance** The vegetation within the PPE is not representative of a Threatened Ecological Community.
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.	**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.
f. Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	**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.

Principle	Assessment
g. Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Not likely to be 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 management measures include surface water and weed management measures and progressive rehabilitation to reduce the amount of cleared land potentially at risk of erosion.
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.	**Not at Variance** There are no nearby conservation areas. The nearest conservation area to the PPE is Mungaroona Range Nature Reserve approximately 80km south-west of the PPE.
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.	**Not at Variance** Majority of clearing is on top of a hill, and therefore not likely to impact surface or groundwater. No groundwater dependent vegetation communities were identified within the PPE. Appropriate stormwater, vegetation clearing and materials handling management measures will be put in place to minimise the potential impact on water quality.
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.	**Not at Variance** Given the proposed disturbance is temporary and majority is situated on an elevated landscape, changes to surface water flows will be negligible.

5. CONCLUSION

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

- The area to be cleared is located in common vegetation types, which are not representative of threatened ecological communities.
- This permit is for the temporary clearing of an exploration programme, and a small DRF (4.75ha) 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.

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Appendix 1: Protected Matters Search Tool Results

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: 24-Mar-2023

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:

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-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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