Attachment 6

Report No. J020996

Flora and Vertebrate Fauna Assessment of the Big Schist Pipeline Corridor

Prepared for: Calidus Resources Limited
Date: 27 June 2021

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Revision	Date	Prepared	Reviewed	Approved
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Table of Contents

Tables

Figures

Appendices

Executive Summary

Calidus Resources Limited (Calidus) commissioned Rapallo Environmental (Rapallo) to conduct a combined flora and fauna assessment for the Big Schist Pipeline corridor associated with the Warrawoona Gold Project.

The survey area for the project, covers approximately 269 hectares (ha) and, traverses approximately 27 kilometres (km) beginning at the Warrawoona Gold Project and terminating at the Marble Bar road approximately 5 km south west of Marble Bar within the Pilbara region of Western Australia.

The objective of the survey was to provide a baseline assessment that identifies conservation significant vertebrate fauna species, conservation significant flora species and vegetation types that may potentially be impacted by clearing for a pipeline corridor linking the Big Schist bore field to the Warrawoona Gold Project.

A combined reconnaissance flora and vegetation survey and basic vertebrate fauna survey was completed over six days, from 16 to 21 March 2021, by a team of two ecologists. A total of 34 non-permanent relevés were sampled to record the broad vegetation types and their condition, as well as collecting an inventory of flora species present. Fauna habitat data was recorded at 39 locations, as well as at many opportunistic locations.

Flora desktop results

A review of all available literature and database relevant to the survey area was conducted to compile a list of conservation significant flora species with the potential to occur with the Big Schist pipeline corridor. A total of 14 survey reports were reviewed and four databases searched. The literature review and database searches identified a total of 46 taxa of conservation significant flora that could potentially occur on the survey area (one Threatened taxon, 16 Priority 1 taxa, three Priority 2 taxa, 21 Priority 3 taxa and five Priority 4 taxa).

These flora taxa were ranked between highly likely and unlikely to occur based on habitat specificity and the occurrence of records proximal to the survey area.

Four species were assessed to be “Highly Likely” to occur on the survey area.

- *Eragrostis crateriformis* (DBCA Priority 3)
- *Euphorbia clementii* (DBCA Priority 3)
- *Heliotropium murinum* (DBCA Priority 3)
- *Ptilotus mollis* (DBCA Priority 3)

Two species were assessed to be “Likely” to occur on the survey area.

- *Josephinia* sp. Woodstock (A.A. Mitchell PRP 989) (DBCA Priority 1)
- *Heliotropium muticum* (DBCA Priority 3)

Forty taxa were assessed to be “Possible to Unlikely” to occur on the survey area. Threatened flora was considered unlikely to occur on the survey area.

Flora survey results

The survey recorded 125 flora taxa from 30 different families. These included 120 native taxa and five introduced taxa (weeds: section 4.2.3). No conservation significant flora taxa were recorded during the

survey. One of the weeds recorded (**Calotropis procera*) was a Declared Pests, it was recorded from a single location within vegetation type A. The most well-represented families were Fabaceae (32 taxa), Poaceae (23 taxa) and Malvaceae (9 taxa). Of the 125 flora taxa recorded, 16 taxa (13%) were annuals, 7 (6%) were annual or short-lived perennial, 90 (72%) were perennials. Twelve taxa did not have life cycle information available.

Broad vegetation types recorded in the survey area

The vegetation of the survey area has been heavily affected by recent fire, which has created a mosaic of burnt areas with low regrowth vegetation and often high density of the fire-responder *Arivela viscosa*, and unburnt areas with the original vegetation still remaining.

Seven broad vegetation types were described and mapped across the survey area, as listed below, while small sections (2 ha, <1% of the survey area) were cleared.

- Vegetation type A – *Acacia inaequilatera* over *Triodia epactia* and *T. wiseana* on stony plain. The most extensive vegetation type, covering 113 ha (42%) of the survey area.
- Vegetation type B – *Grevillea pyramidalis* and *Acacia* species over *Triodia* species or **Cenchrus ciliaris* on sandy loam plain. This was the next most dominant vegetation type, covering 63 ha (23%) of the survey area.
- Vegetation type C – *Acacia inaequilatera* and *Grevillea wickhamii* over *Indigofera monophylla* over *Triodia wiseana* and *Triodia brizoides* and *Arivela viscosa* on hills and rises. It covered 47 ha (18%) of the survey area.
- Vegetation type D - *Eucalyptus victrix* and *Corymbia hamersleyana* with *Melaleuca* species over **Cenchrus ciliaris* and *Triodia longiceps* on major drainage. Covered 9 ha (3%) of the survey area.
- Vegetation type E – *Corymbia hamersleyana* and *Acacia pyrifolia* with occasional *Melaleuca argentea* over **Cenchrus ciliaris* and *Triodia epactia* on medium drainage. It covered 19 ha (7%).
- Vegetation type F – *Indigofera monophylla* over *Arivela viscosa* and *Triodia epactia* on minor drainage. This vegetation type covered 12 ha (5%) of the survey area.
- Vegetation type G – Acacia inaequilatera and Corymbia hamersleyana over Triodia wiseana on hill crests and slopes. It covered 2 ha (<1%) of the survey area.

Vegetation condition across the survey area varied from Excellent to Good in the unburnt areas, to Poor to Degraded in the recently burnt areas. The only exception was vegetation type D growing in major drainage lines, which appeared to have been relatively unaffected by the fires. Conversely, vegetation type F growing in minor creeklines, and vegetation type G on hill crest and slopes was strongly affected by fire, making it very hard to describe the original vegetation.

Of the seven vegetation types identified in the survey aera, three were identified as being of local significance. Vegetation types D and E contained groundwater dependent taxa associated with drainage habitats were considered locally significant as was vegetation type G (hill crest and hill slope) due to the small size (2 ha, <1%) within the survey area.

Fauna desktop results

A review of all available literature and database relevant to the survey area was conducted to compile a list of vertebrate fauna species with the potential to occur within the survey area. A total of 12 reports were reviewed and four databases searched.

The literature review and database searches identified a total of 329 vertebrate fauna species which have the potential to occur within the survey area. This comprises 37 native and 10 introduced mammal

species, 162 bird species, 106 reptile species, 10 amphibian species and four fish species. Not all species are likely to occur in the survey area due to the large search extent of the desktop assessment. Additionally, many species tend to be patchily distributed even where appropriate habitats are present, and many species of birds can occur as regular migrants, occasional visitors, or vagrants.

A total of 32 fauna species of conservation significance were identified in the literature review and database searches as potentially occurring within the survey area, including nine mammals, 19 birds and four reptiles. This comprised eight species listed as Threatened (five mammals, two birds and one reptile), one species listed as Other Specially Protected under the *Biodiversity Conservation Act* 2016 (BC Act) and seven species listed as Priority by the DBCA (four mammals and three reptiles). Nineteen bird species are listed as Migratory (all birds) under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and/or BC Act.

Excluding migratory birds, of the species of conservation significance identified as potentially occurring within the survey area, four species were "Confirmed", four species assessed as "Highly Likely", four species as "Likely" and the remainder were listed as "Possible" (four species) or "Unlikely" (one species) due to lack of suitable habitat and/or based on species distribution and lack of contemporary records.

Migratory birds were assessed as "Possible (infrequent visitor)" (four species) to "Unlikely" to occur (12 species), dependent on the species distribution and contemporary records primarily due to the presence of some suitable habitat within the major and medium drainage lines and the absence of extensive permanent pools or large artificial water bodies. One migratory bird was confirmed on the survey area (Common sandpiper). Two of the Migratory bird species assessed as "Unlikely" to occur in the survey area (based on habitat and species distribution) were also listed as threatened species under the EPBC and BC Act. These were the Australian painted-snipe (Endangered: EPBC and BC Act), and the Curlew sandpiper (Critically Endangered: EPBC and BC Act).

Vertebrate fauna species recorded during the survey

The survey recorded 54 vertebrate fauna species, comprising 34 birds, 12 mammals (of which two introduced), and eight reptiles. No amphibians (frogs) were recorded. Of the vertebrate species identified, four are listed as conservation significant. These were the Pilbara leaf nosed bat (Vulnerable), Ghost bat (Vulnerable), Northern quoll (Endangered), and Grey falcon (Vulnerable). Both bat species were recorded as foraging calls on ultrasonic devices. Both species are unlikely to be permanent residents within the survey area as there is no suitable roosting habitat. One Northern quoll was detected in the northern section of the survey area where there is considerable suitable habitat (rocky breakaways within ridgelines). Two Grey falcons were also observed in the survey area. Whilst they may forage in the survey area, they have substantial home ranges and are not likely to be restricted to the survey area.

Fauna habitats recorded in the survey area

Stony Plain was the dominant broad fauna habitats within the survey area, covering approximately 113 ha (42%), followed by Sandy/Loam Plain (63 ha, 23%), Hills and rises (47 ha, 18%), Medium drainage (19 ha, 7%) and Minor drainage (12 ha, 5%). The remaining two broad fauna habitats each covered less than five percent of the survey area. These were Major drainage (9 hectares, 3%) and Hill crest/ hill slope (4 ha, 1%). A small section of the survey area (2 ha, <1%) was cleared and/or contained roads; these areas are not further discussed.

Of the seven broad fauna habitats recorded within the corridor, the Major Drainage habitat and Sandy Loam Plain habitat were assessed as high significance for vertebrate fauna due to the potential to provide core habitat for species of conservation significance. The remainder were deemed to be of moderate

significance, either due to foraging/dispersal habitats, or habitats known to support priority or migratory species.

Sandy/Loam Plain Habitat

Sandy Loam Plain habitat was ranked as High significance due to the potential for Greater bilby and Brush-tailed mulgara breeding, foraging and dispersal habitat. The Greater bilby is listed as Vulnerable under the EPBC Act and BC Act . The Brush-tailed mulgara is listed as Priority 4 by DBCA. Both species are rated as "Highly Likely" to occur on the survey area.

There are Greater bilby records proximal to the corridor from 2014 in the DBCA threatened species database. No evidence of Greater bilby was recorded during the current survey; nor was the species detected via targeted searches for the Warrawoona Gold Project (Biologic 2019a).

Greater bilbies are recorded as having low site fidelity and high mobility (Southgate *et al.* 2007); males regularly move three to five kilometres between burrows on consecutive days; and have been recorded moving up to 15 km in a few weeks (Southgate & Possingham 1995).

Brush-tailed mulgara has been recorded from the Sand Plain habitat of the Warrawoona Gold Project (Biologic 2019a). Mulgara can use multiple burrow systems within a home-range and changing these frequently (Körtner *et al.* 2008).

Sandy/Loam Plain habitat provides breeding, shelter, foraging, dispersal habitat for the Spectacled hare-wallaby DBCA Priority 4) and supporting habitat (dispersal and foraging habitat) for Grey falcon (Vulnerable under the BC Act and EPBC Act), Pilbara leaf-nosed bat, and Ghost bat (both listed as vulnerable under the EPBC Act and BC Act). Sandy Loam/ Plain habitat contains some suitable areas of habitat for the Night parrot listed as Endangered under the BC Act and EPBC Act. Night parrot was not recorded on the corridor via acoustic recorder) and much of the survey area has been recently burnt.

A total of 63 ha of the corridor (23.3%) comprises Sandy/Loam Plain habitat and a substantial amount of Sandy Plain is known to occur outside the corridor to the south of the Warrawoona Gold Project and within the Granite land system. The habitat type is widespread in the broader landscape, and not restricted to the corridor (Biologic 2019a). Fauna occurring on the Sandy/Loam Plain Habitat are therefore unlikely to be substantially impacted by clearing for a pipeline, from a regional perspective.

Local populations of Greater bilby and Brush-tailed mulgara may be temporarily impacted by clearing of any active burrows. Clearing activities should be managed to avoid burrows to minimise impacts to such species. Neither Greater bilby , Brush-tailed mulgara or species known to use the Sandy/Loam Plain habitat would be restricted to the Sandy/Loam habitat of the survey area.

Major Drainage Habitat

The Major Drainage habitat provides a range of microhabitats and a stable source of food and water, within vast landscape of relatively resource-poor spinifex plains (How *et al.* 1991). More specifically, nectivorous avifauna benefit from the flowering plants and hollow-nesting species make use of the large eucalypts that line the banks (Burbidge *et al.* 2010). Mammal, reptile and amphibian fauna may also congregate around permanent water pools (How *et al.* 1991).

Due to the widespread availability of microhabitats, such as leaf litter accumulations, large trees, hollows, and semi-permanent water sources, the Major Drainage habitat provides foraging and dispersal habitat for Northern quoll, Pilbara leaf-nosed bat, Pilbara olive python and Peregrine Falcon and Northern

Brushtail Possum and where there is sufficient moisture Gane's blind snake. Grey falcon may utilise the Major Drainage habitat for nesting and foraging.

Until habitat preferences are further defined for Ghost bat it is assumed that the Major Drainage habitat is also utilised in some capacity by Ghost bat.

Local populations of Northern quoll, Pilbara leaf-nosed bat, Pilbara olive python, Peregrine falcon, Northern Brushtail Possum, Gane's blind snake and migratory birds are not anticipated to be impacted by the clearing of a narrow corridor of Major Drainage habitat beyond temporary displacement and direct short-term impact from machinery because this habitat does not contain critical or preferred breeding habitat for the majority of these species. Northern quoll, Pilbara olive python and Peregrine Falcon breeding habitat is located within the Rocky breakaway habitat of the Warrawoona Gold Project and also within the ridgeline to the north west of the northern extent of the corridor and will not be impacted by the proposal. The Rocky breakaway habitat is extensive and predominately intact (only 0.8 ha of this habitat has been approved for clearance within the Warrawoona Gold Project).

Both Gane's blind snake and the Northern Brushtail Possum have a patchy distribution and are infrequently recorded. The migratory birds are all infrequent visitors to the area.

The Pilbara leaf-nosed bat will potentially forage over most habitats within the corridor with Major Drainage containing most significant foraging habitats due to the small creek line pool and turkeys nest dam at the northern extent of the corridor. However, it is noted that there are other more extensive permanent pools and much larger artificial water bodies within the creek lines of the region such as those on the tributaries of the Talga River (Rapallo 2021b). Ghost bat will potentially forage over most habitats of the corridor.

The Grey Falcon does use the Major Drainage habitats for breeding. However, it is noted that this habitat is not restricted and the species has not been recorded nesting on the corridor.

A total of 9 ha of the corridor (3.4%) comprises of Major Drainage habitat. The habitat type is widespread in the broader landscape, and the affected areas are contiguous with surrounding occurrences of Major Drainage habitat. Fauna occurring within this habitat type are therefore unlikely to be substantially impacted by clearing for a pipeline, from a regional perspective.

Stony Plain, the dominant habitat within the corridor covering 176 hectares (42.1%) provides breeding, shelter, foraging, dispersal habitat for the priority listed Western Pebble-mound mouse and Spectacled hare-wallaby and supporting habitat (dispersal and foraging habitat) for Grey falcon, Pilbara leaf-nosed bat, and Ghost bat. Stony Plain provides potential *Ctenotus nigrilineatus* habitat. Stony Plain habitat contains some suitable areas of habitat for the Night parrot listed as Endangered under the BC Act and EPBC Act. Night parrot was not recorded on the corridor via acoustic recorder.

Minor Drainage, Medium Drainage provides potential dispersal and foraging habitat for Pilbara olive python , Ghost bat, Pilbara Leaf-nosed bat, Peregrine falcon, Grey Falcon , Oriental plover and where there is sufficient moisture, Gane's blind snake. As these habitats are primarily dispersal and foraging habitat for conservation significant species, fauna occurring within this habitat type are unlikely to be substantially impacted by clearing for a pipeline, from a regional perspective.

Hillcrest/ Hillslope and Hills and Rises habitat provides supporting habitat (dispersal and foraging habitat) for Ghost bat, Pilbara Leaf-nosed bat, Northern quoll and breeding, shelter, foraging, dispersal habitat for the Western Pebble-mound mouse (DBCA Priority 4) and Long-tailed dunnart (DBCA Priority 4). Hillcrest/ Hillslope and Hills and Rises habitat contains potential habitat for *Ctenotus uber johnstonei*

(DBCA Priority 2). These habitats are primarily dispersal and foraging habitat for listed threatened species, fauna occurring within this habitat type and are unlikely to be substantially impacted by clearing for a pipeline, from a regional perspective.

Given the habitats are represented outside of the survey area, throughout the region and in conservation estate and primarily represent foraging and dispersal habitat of listed threatened species rather than breeding habitat, with management (clearing protocols and preclearance surveys), clearing within the survey area is unlikely to impact local populations beyond temporary displacement.

Note Pilbara leaf-nosed bat and Ghost bat breeding habitat is located within the old workings proximal to the Warrawoona Gold project and breeding habitat will not be impacted by clearing in pipeline corridor. No additional roosts were located during the survey.

1 Introduction

1.1 Project overview

Calidus Resources Limited (Calidus) commissioned Rapallo Environmental (Rapallo) to conduct a combined flora and fauna assessment for the Big Schist Pipeline corridor associated with the Warrawoona Gold Project.

The Big Schist bore field is located around 16 kilometres (km) to the north west of the Warrawoona Gold Project adjacent to an un-named tributary of the Coongan River. The Big Schist bore field will connect to the Warrawoona Gold Project via the Big Schist pipeline corridor. The proposed pipeline corridor is approximately 27 km in length and 100 meters (m) wide. The pipeline corridor will hereafter be referred to as the survey area (Figure 1).

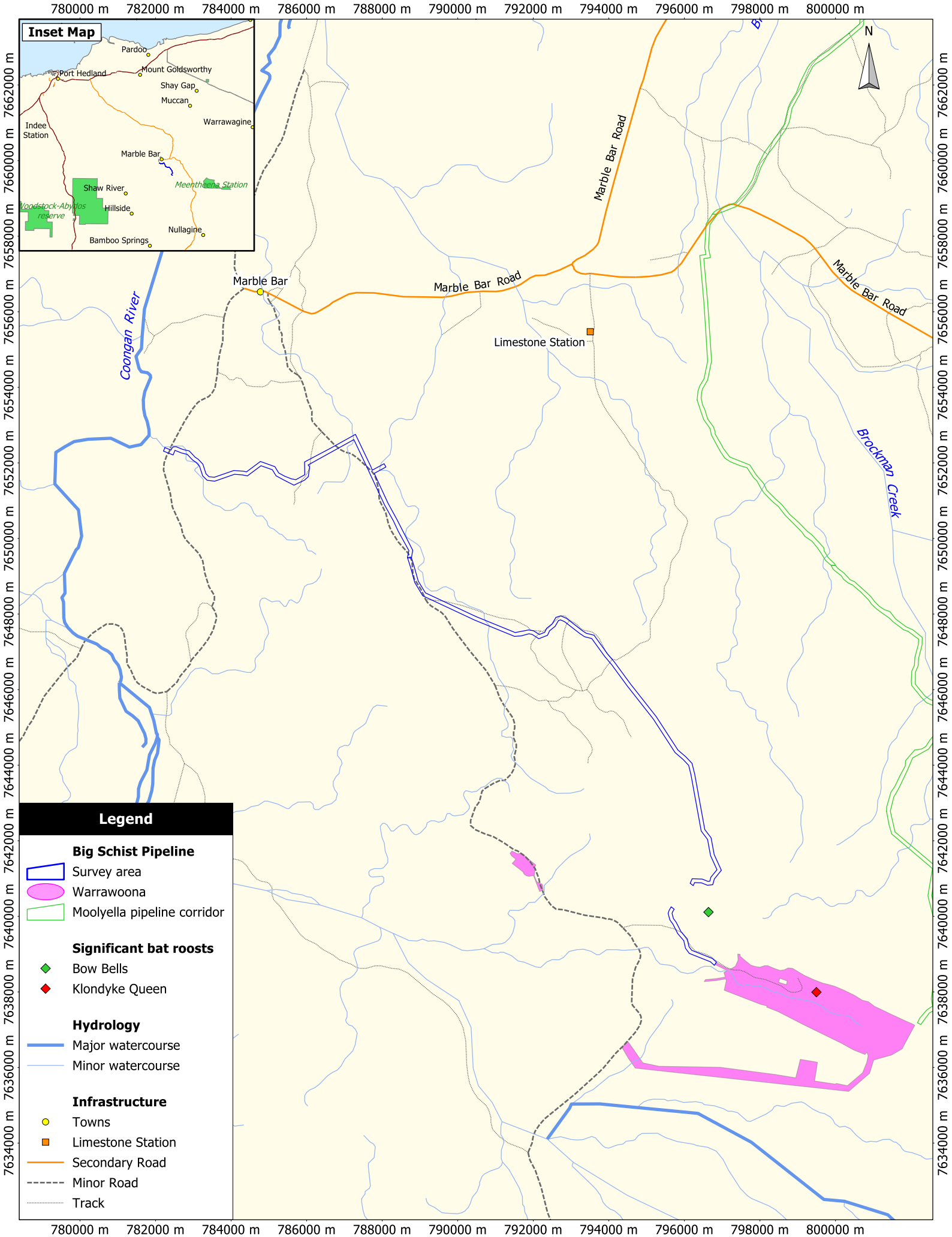
1.2 Scope and objectives

The objectives of the reconnaissance flora and vegetation survey were to:

- Complete a desktop study to document the regional flora and vegetation and to identify conservation significant flora and ecological communities that may occur in the survey area.
- Conduct a reconnaissance field survey of the proposed corridor to map broad-scale vegetation communities and describe the floristic diversity of the survey area, verify desktop information, and determine if the habitats of the survey area contain conservation significant flora and vegetation.

The objectives of the basic vertebrate fauna survey were to:

- Complete a desktop study to understand the regional fauna assemblage and habitats.
- Conduct a basic fauna survey of the proposed corridor to identify and map broad-scale fauna habitats, verify desktop information, and determine if conservation significant vertebrate habitats occur within the survey area.



Legend

Big Schist Pipeline
- Survey area
- Warrawoona
- Moolyella pipeline corridor

Significant bat roosts
- Bow Bells
- Klondyke Queen

Hydrology
- Major watercourse
- Minor watercourse

Infrastructure
- Towns
- Limestone Station
- Secondary Road
- Minor Road
- Track

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Original Size: A4
Scale: 1:120,000
Datum: MGA94 Zone 50

0 4 km

Figure 1

Location and extent of the survey area

2 Regional context

2.1 Climate and weather

The Pilbara bioregion has a semi-desert to tropical climate, with rainfall occurring sporadically throughout the year, mostly during summer (Thackway & Cresswell 1995). Summer rainfall is usually the result of tropical storms in the north or tropical cyclones that impact upon the coast and move inland. Winter rainfall is generally lighter and is the result of cold fronts moving north easterly across the state (Leighton 2004). The average annual rainfall ranges from 200-350 mm, although there are significant fluctuations between years (BoM, 2021), with up to 1,200 mm falling in some locations in some years (McKenzie *et al.* 2009).

Long-term climatic data is not available for the Warrawoona Gold Project; however, long term climatic data is available from the Bureau of Meteorology (BoM) weather station at Marble Bar, proximal to the survey area and the Warrawoona Gold Project (BoM 2021) (Figure 2).

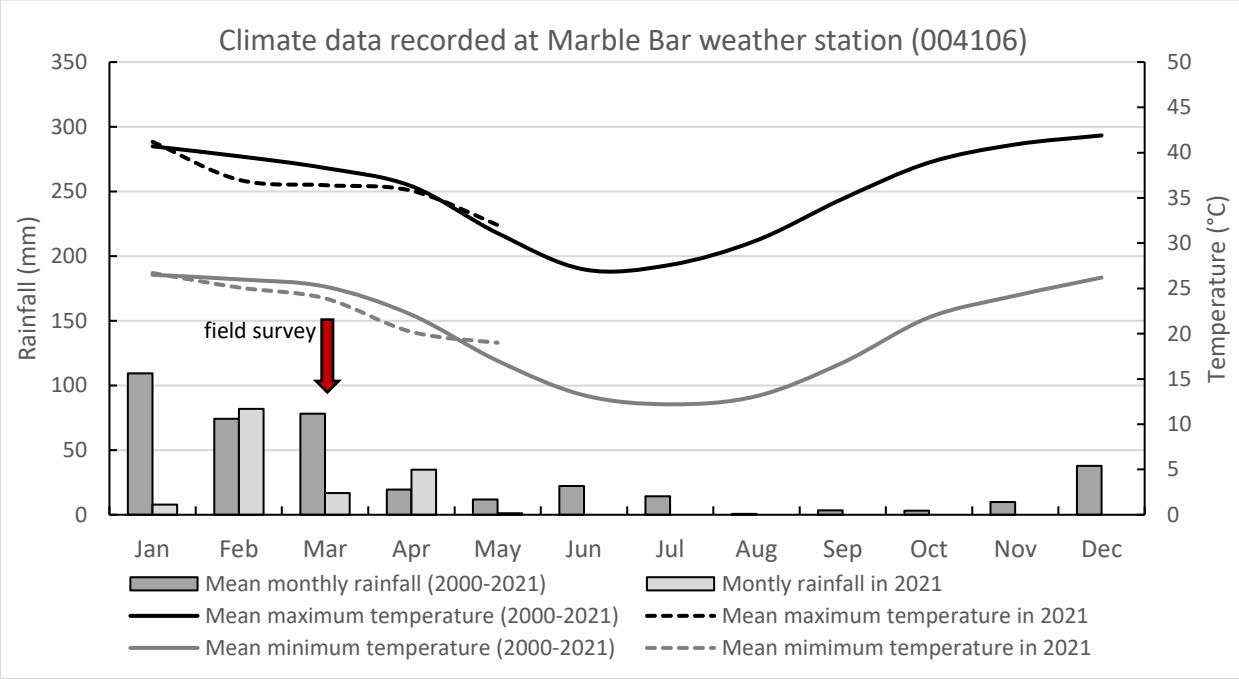


Figure 2 Climate Graph

Rainfall over the three months preceding the survey was lower than average in January but slightly above average in February 2021. A small amount of rain (total of 0.6 mm) was recorded at Marble Bar during the survey. Daily maximum temperatures during the survey ranged from 33.4 °C to 36.7 °C. Daily minimum temperatures ranged from 20.1 °C to 24.9 °C at night.

2.2 Biogeography

2.2.1 IBRA bioregions

The bioregions of Australia are described in the Interim Biogeographic Regionalisation for Australia (IBRA) (Thackway & Cresswell 1995). Bioregions are large, geographically distinct areas of land with common characteristics such as geology, landform patterns, climate, ecological features and plant and animal

communities. The latest version, IBRA7, classifies Australia's landscapes into 89 large geographically distinct bioregions and 419 subregions (DoE 2012).

The survey area is located within the Pilbara bioregion (Figure 1), as defined by the Interim Biogeographic Regionalisation of Australia (IBRA). The Pilbara bioregion is characterised by vast coastal plains and inland mountain ranges with cliffs and deep gorges (Thackway & Cresswell 1995). Vegetation is predominantly mulga low woodlands or snappy gum over bunch and hummock grasses (Bastin 2008).

The survey area is located within the Chichester (PIL 1) IBRA subregion, comprised of undulating archaean granite and basalt plains with areas of basaltic ranges (Kendrick & Mckenzie 2001). The plains support a shrub steppe characterised by *Acacia inaequilatera* over *Triodia wiseana* hummock grasslands, while *Eucalyptus leucophloia* tree steppes occur through the ranges (Kendrick & Mckenzie 2001).

2.2.2 Land System

The land systems of the Pilbara region are classified according to similarities in landform, soil, vegetation, geology and geomorphology, following van Vreeswyk *et al.* (2004). Six land systems occur on the survey area, as listed in Table 1 below and displayed in Figure 3.

Table 1 Land Systems of the survey area

Land system	Description	Dominant Surface Geology	Area (ha)
Talga Land System	Hills and ridges of greenstone and chert and stony plains supporting hard and soft spinifex grasslands.	Greenstone and chert	109.85
Macroy Land System	Stony plains and occasional tor fields based on granite supporting hard and soft spinifex grasslands.	Granite, colluvium	55.52
Rocklea Land System	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands	Basalt	47.75
Boolgeeda Land System	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands.	Colluvium	40.97
Capricorn Land System	Hills and ridges of sandstone and dolomite supporting shrubby hard and soft spinifex grasslands.	Sandstone, greywacke	13.46
Granitic Land System	Rugged granitic hills supporting shrubby hard and soft spinifex grasslands.	Granite	2.27

The dominant land system within the Big Schist pipeline survey area is the Talga land system, characterised by hills and ridges and stony plain. The survey skims the edge of the Granitic land system in several places (Figure 3) and avoids the major floodplains characterised by the River land system.

2.2.3 Geology

The survey area is situated in the Eastern Pilbara Domain of the Archean Pilbara Craton within the Abydos Plains and Hills Zone, north of the Warrawoona Klondyke deposit. The area is dominated by granite-greenstone terrain and subdivided into two major stratigraphic units, the Warrawoona Group and the George Creek Group (Mine Earth 2019). Dominant surface geology varies per land system (Table 1).

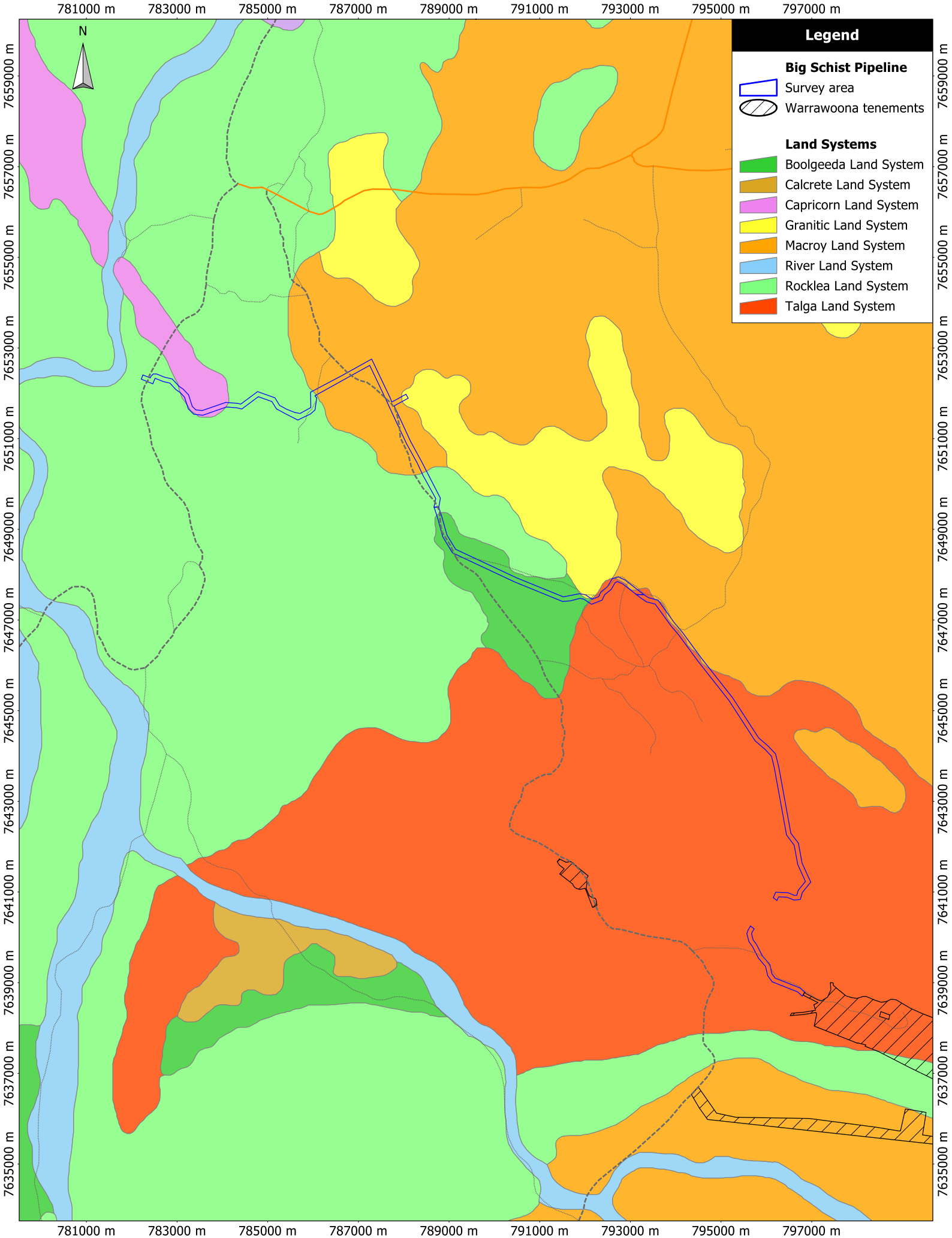
2.2.4 Soils

Approximately two-thirds (172 ha) of the Big Schist survey area is influenced by the Warrawoona Group as per soil unit Gf1, described as steep ranges on basic lavas along with dolomites, tuff, banded iron formations, and dolerite dykes, with some narrow valley plains and high-level gently undulating areas of limited extent. Soils are generally shallow and stony and there are large areas without soil cover: chief soils are brown loams (Um6.23) along with significant areas of earthy loams (Um5.51). (Dr2.33) soils occur on lower slopes, with (Uf6.71) and (Ug5.37) on valley floors (CSIRO Australia 2018).

One third of the survey area (97 ha) falls within the soil unit Fa12 described as gently undulating plain with frequent low granite tors and coalescing pediplains. Chief soils are earthy loams (Um5.51), and coarse sands (Uc5.21) overlying granite. There are considerable areas of red earths (Gn2.12), which may assume dominance in some places; some hard red soils (Dr2) together with coarse (Uc1) soils along creek lines; and minor areas of calcareous loams (Um1) associated with calcrete (kunkar) (CSIRO Australia 2018).

2.2.5 Hydrology

The Warrawoona Range which intersects the survey area is a major feature that impacts hydrology within the local surrounds, forming a local and regional surface water divide (Groundwater Resource Management 2019a). The northwest striking Warrawoona Range forms a local surface water and groundwater divide. Runoff from the range proceeds to the Brockman Creek catchment to the north, which discharges to the Talga River or alternatively to the Camel Creek catchment, which discharges to the Coongan River in a southerly direction (Groundwater Resource Management 2019b). The flowlines proximal to the survey area are tributaries of the Coongan River.



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(J020996)

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Original Size: A4
Scale: 1:100,000
Datum: MGA94 Zone 50

0 3 km

Figure 3

Land Systems of the survey area

2.3 Regional vegetation

2.3.1 Botanical district

The Big Schist pipeline survey area is situated in the Pilbara Botanical District in the Eremaean Botanical Province of Western Australia (Beard 1975).

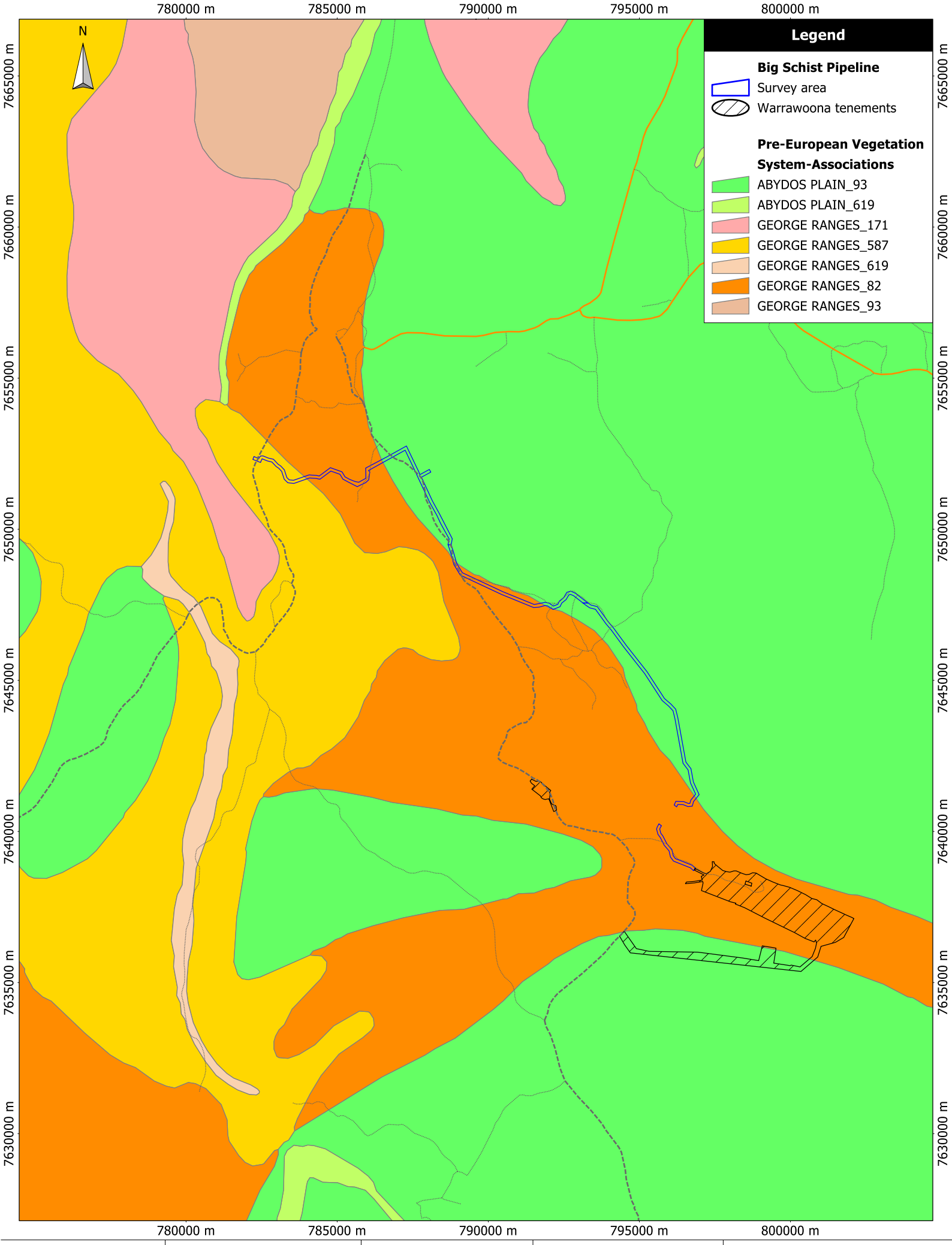
2.3.2 Vegetation system association

Digital maps (spatial data) of pre-European vegetation communities, based on state-wide mapping by J.S. Beard at 1:250,000 scale, are published by the Department of Primary Industries and Regional Development (DPIRD) (Beard 2018). The survey area is situated within association 93 of the Abydos Plain vegetation system, and associations 82 and 587 of the George Ranges system (Table 2, Figure 4).

Three broad vegetation associations are described from the survey area; Abydos Plain (93; Hummock grasslands, shrub steppe; kanji over soft spinifex), George Ranges (82; Hummock grasslands with low tree steppe of snappy gum over *Triodia wiseana*) and George Ranges 587 (Mosaic of Hummock grasslands, open low tree-steppe of snappy gum over *Triodia wiseana* and kanji over *Triodia pungens*). This vegetation association is common at the subregional and regional level and widespread through both the Chichester and Hamersley IBRA subregion (Shepherd *et al.* 2002).

Table 2 Pre-European vegetation within the survey area

System-Association	Structural description	Floristic description	Area (ha)
Abydos Plain 93	Shrub-steppe	Hummock grassland with scattered shrubs or mallee *Triodia* spp. *Acacia* spp., *Grevillea* spp. *Eucalyptus* spp	149
George Ranges 82	Low tree-steppe	Hummock grassland with scattered bloodwoods & snappy gum. *Triodia* spp., *Corymbia dichromophloia*, *Eucalyptus leucophloia* (snappy gum)	99
George ranges 587	Sparse low tree steppe/ Sparse shrub-steppe	Mosaic: Hummock grasslands, open low tree-steppe; snappy gum over Triodia wiseana/ Hummock grasslands, shrub-steppe; kanji over Triodia pungens.	22



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Original Size: A4
Scale: 1:150,000
Datum: MGA94 Zone 50

0 5 km

Figure 4

Beard Pre-European Vegetation System-Associations of the Survey Area

3 Methods

3.1 Desktop study

3.1.1 Flora desktop study

The flora desktop study comprised a search of paid and free databases, and a review of available literature relevant to the survey area. The desktop review served to compile a list of conservation significant flora taxa and vegetation communities with the potential to occur within the survey area. The conservation significant taxa identified in the desktop where then reviewed for likelihood of occurrence within the survey area, based on the likelihood categories outlined in Table 3 below. Database search parameters are outlined in Table 4 and the literature review is summarised in Table 5.

Table 3 Likelihood assessment criteria

Likelihood	Criteria
Highly likely	The taxon has been recorded previously within the survey area, or there are (recent) previous records within 5 km of the survey area, and suitable habitat is present in the survey area.
Likely	Suitable habitat is present in the survey area and there are previous (recent) records within 5-10 km of the survey area.
Possible	The habitat specificity of the taxon is not well defined and/or the survey area contains suitable habitat and nearest records are within 10-50 km of the survey area.
Unlikely	The habitat specificity of the taxon is well defined from previous records and the survey area does not contain suitable habitat for the taxon.

Table 4 Flora database search parameters

Source of information	Search area
DBCA (2020a) Threatened and Priority Flora Database	100 km radius surrounding the pipeline corridor
DBCA (2020b) Threatened and Priority Ecological Communities (TEC-PEC) database	50 km radius surrounding the pipeline corridor
DBCA (2020c) NatureMap online database	40 km radius around three point locations along the pipeline corridor
Department of Agriculture Water and the Environment (AWE) (2020) Protected Matters search tool	50 km radius around three point locations along the pipeline corridor

Table 5 Summary of available regional flora surveys

Survey report	Survey type and level	Distance from Warrawoona Gold Project*
Woodman (2020a) Warrawoona Gold Project Groundwater Dependent Vegetation Assessment	Groundwater Dependent Vegetation Assessment	Addresses portions of the survey area: Big Schist
Woodman (2019) Warrawoona Gold Project Flora and Vegetation Survey.	Targeted and Level 2	Warrawoona
Woodman (2020b) Warrawoona Gold Project. Detailed Flora and Vegetation Assessment	Targeted and Level 2	Warrawoona

Survey report	Survey type and level	Distance from Warrawoona Gold Project*
Mattiske (2007) Flora and Vegetation and Assessment of Groundwater Dependent Ecosystems in the Panorama Project survey area.	Summary of Trudgen *et al.* (2002), Trudgen (2006, 2007) Level 2 and Targeted	60 km west north-west
Woodman (2012a) Abydos Direct Shipping Ore Project – Flora and Vegetation Studies	Level 2	70 km west north-west
Woodman (2012b) Abydos East Project Camp and Haul Road Corridor – Flora and Vegetation Studies	Level 1	70 km west north-west
Woodman (2013a) Mt Webber DSO Project – Flora and Vegetation Assessment	Level 2	50 km south- west
Woodman (2013b) McPhee Creek Project – Flora and Vegetation Assessment	Level 2	
Woodman (2013c) McPhee Creek Iron Ore Project – Conservation Significant Flora Assessment.	Targeted	30 km south- east
Woodman (2014a) McPhee Creek Iron Ore Project – Riparian Vegetation Mapping (Discharge Options 1, 2 and 3).	Level 2	30 km south- east
Woodman (2014b) McPhee Creek Rail Project (Eastern Corridor Yandeyarra to Mt Webber and McPhee Creek) – Flora and Vegetation Assessment	Level 2	30 km south
Woodman (2014c) McPhee Creek Rail Spur Project – Flora and Vegetation Assessment.	Level 2	50 km south- west
Woodman (2016) Corunna Downs Project, Level 2 Flora and Vegetation Assessment	Level 2	25 km south- west
GHD (2017) Coongan Gorge Realignment Environmental Impact Assessment and Environmental Management Plan	Level 2	60 km north-west (M030 Pit) and 45 km north (Coongan Gorge) of Warrawoona Gold Project
* The survey area originates from the Warrawoona Gold Project Area, north-west for approximately 27 km		

3.1.2 Fauna desktop study

The fauna desktop study comprised a search of paid and free databases and a review of available literature relevant to the survey area. The fauna desktop served to place the fauna assemblage of the survey area in a regional context and to compile a list of vertebrate fauna species with the potential to occur within the survey area. This list was then filtered for conservation significant fauna species and likelihood to occur within the survey area was assessed using the fauna decision matrix located in Appendix I.

Four fauna databases were searched (Table 6), two to obtain information on all species previously recorded (NatureMap and Birdlife Birdata), one to identify species of conservation significance previously recorded in the region (DBCA threatened and priority fauna database) and one to identify EPBC listed species of conservation significance known or likely to occur within the region (Protected matters database). Fauna Database search parameters are outlined in Table 6 and the literature review is summarised in Table 7.

Table 6 Fauna Database search parameters

Source of information	Search area
DBCA (2020d) Threatened and Priority Fauna Database (TPFA)	20 km radius surrounding the pipeline corridor
DBCA (2020c) NatureMap online database	40 km radius around three point locations along the pipeline
DAWE (2020) Protected Matters search tool	50 km radius around three point locations along the pipeline
Birdlife Australia (2020) Birdata database	50 km radius around the pipeline corridor

Table 7 Summary of available regional fauna surveys

Survey report	Survey Type	Distance from Warrawoona Gold Project*
MWH (2016) Corunna Downs Iron Ore Project Terrestrial Vertebrate Fauna Survey	Level 2	25 km to the south west
Ecologia (2010) Giralia Resources NL Mount Webber Iron Ore Project Vertebrate Fauna Assessment	Level 2	80 km to the south west
Biota (2007) Panorama Project Mine Site and Haul Road Corridor Targeted Fauna Survey	Level1 – Plains Access Road and Level 2 - Valley Access Road	76km to the north west
Bamford (2001) Panorama Project Area Baseline Fauna Study	Level 2	76 km to the north west
Bamford (2009a) Fauna Assessment of the BC Iron Nullagine Iron Ore Project	Level 2	77 km to the south
Bamford (2009b) Fauna Assessment of the Abydos DSO Project	Level 2	80km to the north west
How *et al.* (1991) Ecological Survey of Abydos-Woodstock Reserve, Pilbara Region, Western Australia	Multiple years scientific survey	102 km to the south west
Ecologia (2012a) North Star Project North Star Project Level 2 Terrestrial Vertebrate Fauna Assessment	Level 2	100 km to the north west
Biologic (2020) McPhee Creek Consolidated Terrestrial Fauna Report McPhee Creek Project	Summary of vertebrate fauna surveys (two x level 2 surveys 7 x targeted survey)	36 km to the south west
Biologic (2019b) Warrawoona Gold Project Level 1 Vertebrate Fauna Survey, and Desktop SRE and Subterranean Assessment	Level 1	Warrawoona Gold Project
Biologic (2019c) Warrawoona Gold Project: Habitat Assessment and Targeted Vertebrate Fauna Survey.	Level 1 and Targeted	Warrawoona Gold Project
Biologic (2018) Warrawoona Targeted Bat Assessment September 2017	Targeted – including assessment of underground workings within the Warrawoona Gold Project in terms of providing roosting habitat for Pilbara Leaf-nosed Bat and Ghost Bat	Warrawoona Gold Project
* The survey area originates from the Warrawoona Gold Project Area, north-west for approximately 27 km		

3.2 Field Survey

A combined basic vertebrate fauna survey and reconnaissance flora survey was completed by a team of one botanist and one zoologist. The field survey was completed between 16 and 21st of March 2021. The survey area was accessed by four-wheel drive vehicle using existing tracks and surveyed on foot.

The survey was carried out in a manner consistent with the following documents developed by the Western Australian Environmental Protection Authority (EPA):

- Environmental Protection Authority (EPA) *Technical Guidance - Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020)
- Environmental Protection Authority (EPA) *Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a)

3.2.1 Reconnaissance flora survey

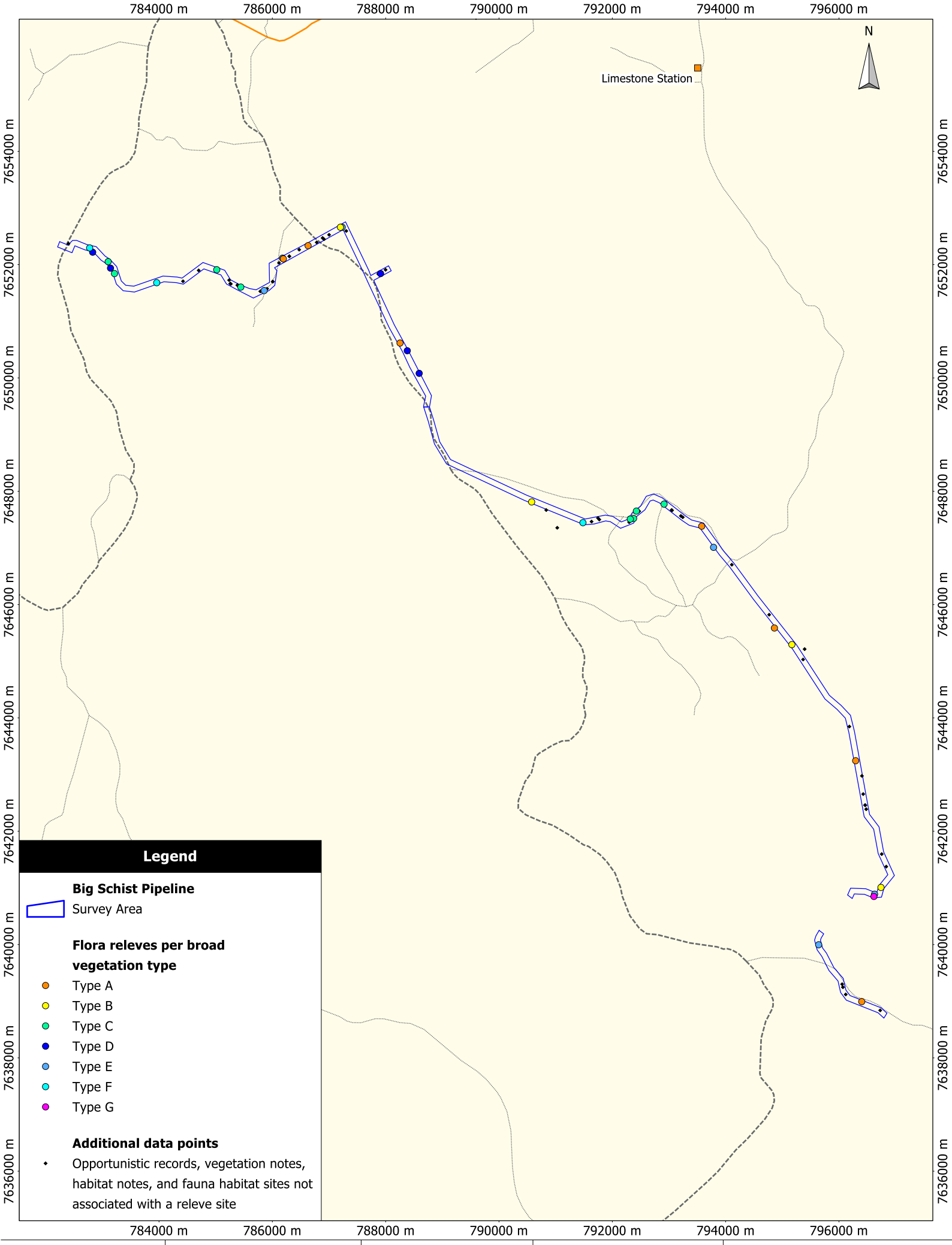
A total of 34 non-permanent relevés were surveyed throughout the pipeline corridor (Figure 5). Relevés were located in all vegetation types discernible through aerial photography interpretation, in combination with on-ground inspection.

The following information was recorded at each relevé:

- Site name, date, photographs, central GPS coordinate
- Topography;
- Soils (type and colour);
- Condition (vegetation condition scale)
- Disturbance factors in the area; and
- Vascular plant species – including height and approximate foliage cover.

Additional flora taxa were recorded opportunistically in the survey area via a search around the general vicinity of each relevé, and during traverses on foot between relevés. This included searches for conservation significant species as identified prior to the field survey. Vegetation boundaries were mapped in the field using aerial photographs and GPS waypoints. Vegetation condition was described at each relevé using the vegetation condition scale presented in EPA (2016a).

Following the survey, the broad vegetation types of the survey area were manually classified based on landform, floristic composition, and vegetation structure. Vegetation boundaries were mapped using aerial photographs, field maps, relevé classification, mapping points, photos and notes taken at opportunistic flora sites.



Rapallo environmental

Calidus Resources
Big Schist Pipeline Corridor
Flora and Fauna Assessment
(J020996)

CALIDUS RESOURCES LIMITED

Original Size: A4
Scale: 1:80,000
Datum: MGA94 Zone 50

0 2 km

Figure 5

Flora survey effort

3.2.2 Basic fauna survey

The broad fauna habitats of the survey area were mapped and described with the aim of identifying habitats that may support species of conservation significance. Habitat data was recorded at 39 point locations throughout the survey area.

Additional fauna records and habitat data was recorded opportunistically in the survey area via a search around the general vicinity of habitat sites, and during traverses on foot between sites.

Information recorded at fauna habitat sites included:

- Site name, date, photographs, central GPS coordinate
- Landform, slope, and aspect
- Notes on soil and rock cover
- Leaf litter cover and depth, presence of coarse woody debris and dead trees
- Broad description of habitat

Preliminary habitat boundaries were mapped in the field while traversing the survey area by drawing vegetation boundary shapefiles on an aerial photograph loaded onto an Apple iPad Pro using the ArcGIS collector app.

Following the survey, broad fauna habitats were manually classified using field data aligned with land system mapping, surface geology and topography data, and final boundaries were drawn using GIS.

Fauna habitats were assessed for the likelihood that they may support fauna of conservation significance. All major fauna habitats present within the survey area were scored for significance (High, Moderate or Low) according to the criteria in Appendix II.

Active searching (foraging) was conducted at opportunistic foraging sites throughout the survey area. Foraging included turning rocks, logs, peeling bark, raking leaf litter, and searching under vegetation. All vertebrate fauna captured during foraging was identified in the field and released on site.

Opportunistic records and mapping points were collected throughout the survey area. Opportunistic records included direct sightings and calls, as well as secondary signs of presence such as tracks, scats, diggings, burrows, mounds, feathers, bones, sloughed reptile skins. All records were accompanied by a GPS waypoint and/or fauna habitat notes, in order to link species records to fauna habitats. Fauna survey effort is presented in Figure 6.

Thirteen Swift Enduro cameras were deployed across the survey area. Cameras were operational for a minimum of four days (Appendix X). Each camera was baited with peanut butter and oats.

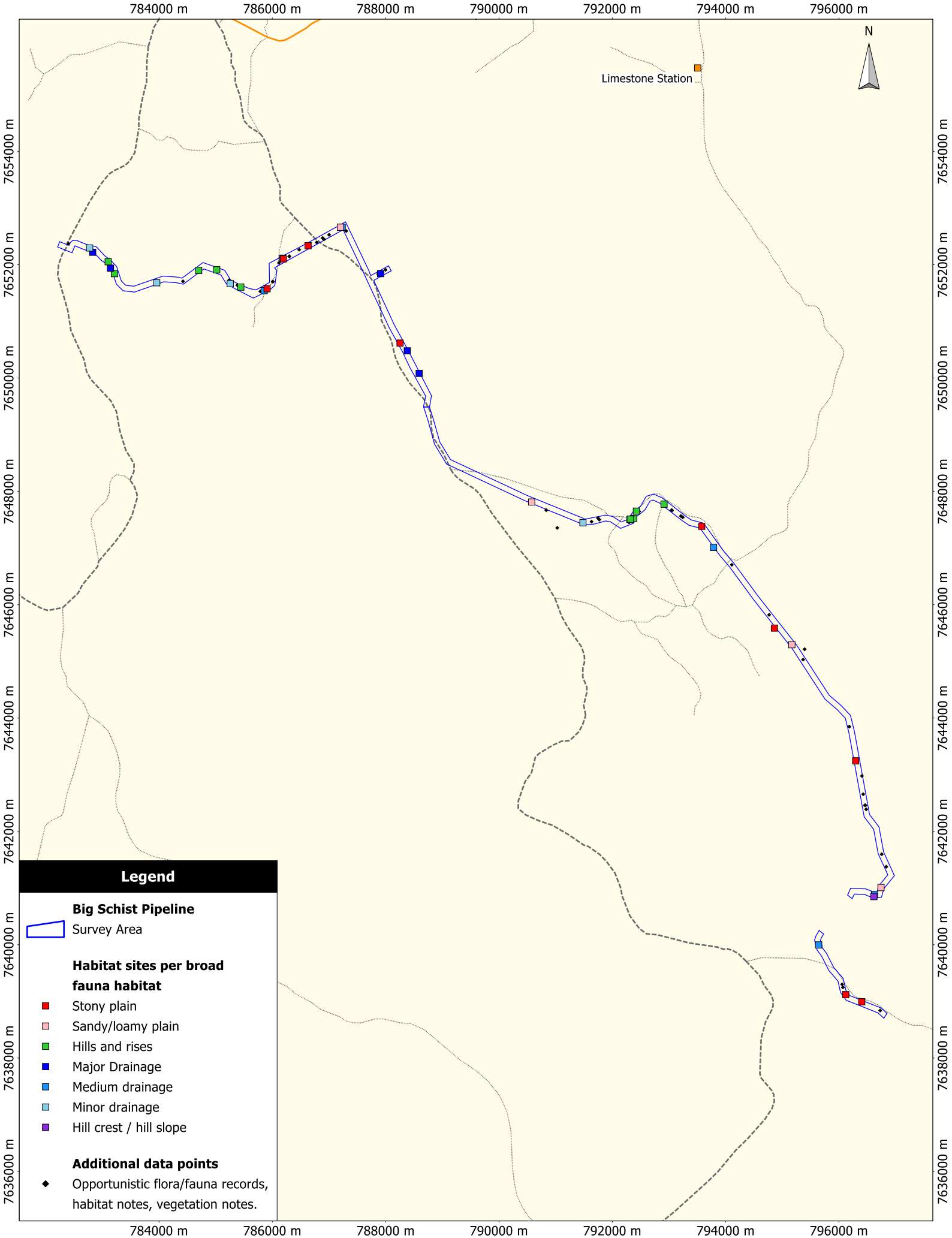
Microbats were surveyed using two SM4 ultrasonic recorders. The ultrasonic recorders were deployed at each site for 2 – 4 nights to maximise spread across the survey area.

The bat survey consisted of completing a total of 12 overnight ultrasonic bat sound recordings, at four locations beginning at twilight. A total of four acoustic survey nights were completed at two sites for Night parrot. The recordings were “continuous” made using ultrasonic SM4BAT-FS and acoustic SM4A SongMeter (both by Wildlife Acoustics Inc., USA) detectors. The audio settings used followed the manufacturer’s recommendations contained in the user manuals (Bat Call 2021b) .

Recordings were sent to Bat Call for analysis and identification. For the ultrasonic recordings, call analysis details are provided in Table 2 of (Bat Call 2021b) as recommended by Australasian Bat Society

(Australasian Bat Society 2006). Reference data for the species identified are available in (Bullen & McKenzie 2002, McKenzie & Bullen 2003, 2009). For the acoustic recordings, Bat Call reviewed recordings both manually and using an automatic scan technique for Night parrot calls. Candidate calls were compared Bat Call's confirmed reference calls from two Western Australian arid zone locations.

Location, habitat data and survey effort corresponding to acoustic recorder and cameras are located in Appendix X.



Rapallo environmental

Calidus Resources
Big Schist Pipeline Corridor
Flora and Fauna Assessment
(J020996)

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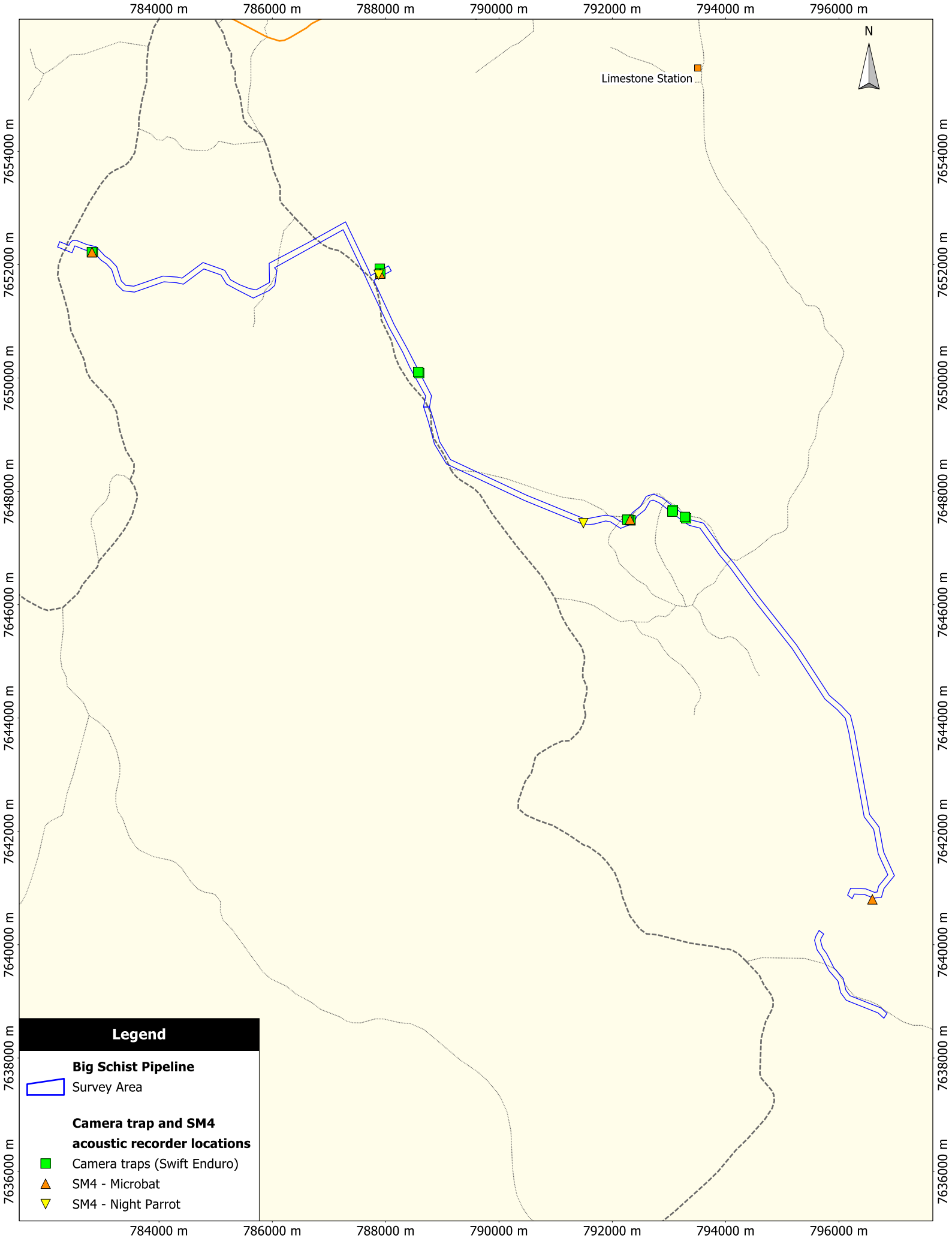
Original Size: A4
Scale: 1:80,000
Datum: MGA94 Zone 50

0 2 km

Figure 6

Fauna survey effort



Rapallo environmental

Calidus Resources
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(J020996)

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Original Size: A4
Scale: 1:80,000
Datum: MGA94 Zone 50

0 2 km

Figure 7

Camera trap and SM4 acoustic recorder locations

3.3 Personnel and licensing

The personnel involved in the field survey, data entry and analysis, and the preparation of this report are listed in Table 8. The field survey was conducted under Fauna Taking (Biological Assessment) Licence BA27000314-2 issued under Regulation 17 of the *Biodiversity Conservation Regulations 2018* and the flora sampling was conducted under Flora Taking (Biological Assessment) Licences pursuant to Regulation 62 of the *Biodiversity Conservation Regulations 2018.* As part of the license conditions, a list of flora and fauna species recorded in the survey will be forwarded to the DBCA.

Table 8 Personnel

Name	Position	Survey	Analysis	Reporting
Kate George	Principal Environmental Scientist			•
Marieke Weerheim	Senior Environmental Scientist		•	•
Jeremy Ringma	Senior Zoologist	•		•
Daniel Marsh	Senior Botanist	•	•	
Jon-Paul Emery	Zoologist		•	•
Molly George	Ecologist		•	

3.4 Nomenclature and conservation listing

In this report, names for birds follow the Birdlife Australia (2019) Working List of Australian Birds (version 3, August 2019), names for mammals, reptiles, and amphibians follow the Western Australian Museum (WAM 2020) Checklist of Terrestrial Vertebrate Fauna (November 2020). Names for fish species follow the Fishes of Australia website (Bray & Gomon 2021).

Distribution maps and recent records of vertebrate fauna species were verified using the Atlas of Living Australia (ALA 2021), and Birdata online databases, the Species Profile and Threats Database (SPRAT) (AWE 2021), Van Dyck and Strahan (2008), Johnstone and Storr (1998, 2004), Wilson and Swan (2017), Cogger (2018), and other relevant publications as cited within this report.

Flora taxonomy and nomenclature follows FloraBase (Western Australian Herbarium 1998). FloraBase was also accessed to verify conservation codes, distribution records, habitat requirements, and flowering times. Conservation codes cited in this report are as per Appendix III. Note that the conservation codes on FloraBase are the most up to date, whereas the DBCA Threatened (Declared Rare) and Priority Flora List (DBCA 2018a) was last updated on 5 December 2018.

4 Results and Discussion

4.1 Flora desktop results

4.1.1 Conservation significant flora

The flora desktop review identified 566 flora taxa from 67 families recorded from within 100 km of the survey area. The list included 46 conservation significant taxa from 22 families, and 28 introduced taxa (weeds) from 15 families. Conservation significant taxon counts are summarised in Table 9.

Table 9 Summary statistics of flora taxa identified in the desktop

Taxonomic level	All taxa	Conservation significant	EN	P1	P2	P3	P4	Weeds
Families	**67**	22	1	10	3	13	5	15
Taxa	**566**	46	1	16	3	21	5	28

The list of significant flora taxa that are known from within or in the vicinity of the survey area is presented in Table 10. This list has been compiled from the results of database searches and the results of regional surveys as outlined in section 3.1. The 46 conservation significant flora taxa identified in the desktop included one Threatened taxon, 16 Priority 1 taxa, three Priority 2 taxa, 1 Priority 3 taxa and five Priority 4 taxa.

A likelihood assessment was completed as per Table 3 in section 3.1.1 to estimate the potential of occurrence within the survey area for each of the conservation significant taxa. The full likelihood assessment table is provided in Appendix V. Descriptions of the taxa considered highly likely or likely to occur in the survey area are provided below in Table 10.

Table 10 Conservation significant flora taxa recorded in the desktop

Scientific Name	Status	Total records	Flowering period	Likelihood
Acacia aphanoclada	P1	41	August to October	Possible
Acacia cyperophylla var. omearana	P1	19	March, April, August, October	Possible
Acacia fecunda	P1	10	April, May, August, October	Unlikely
Acacia leeuweniana	P1	19	No info	Possible
Acacia levata	P3	17	May and October	Possible
Acacia sp. Marble Bar (J.G. & M.H. Simmons 3499)	P1	1	September	Possible
Acacia sp. Nullagine (B.R. Maslin 4955)	P1	2	No info	Possible
Atriplex spinulosa	P1	15	No info	Unlikely
Bulbostylis burbidgeae	P4	12	March, June to August	Unlikely
Cochlospermum macnamarae	P1	10	No info	Possible
Corchorus sp. Yarrie (J. Bull & D. Roberts CAL 01.05)	P1	6	May, June	Possible

Scientific Name	Status	Total records	Flowering period	Likelihood
Croton aridus	P3	1	August	Unlikely
Cucumis sp. Barrow Island (D.W. Goodall 1264)	P2	1	May	Unlikely
Dolichocarpa sp. Hamersley Station (A.A. Mitchell PRP 1479) [2]	P3	1	No info	Possible
Eragrostis crateriformis	P3	23	May or July	**Highly likely**
Eremophila maculata subsp. filifolia	P1	3	July	Unlikely
Eucalyptus rowleyi	P3	7	June to July	Unlikely
Euphorbia clementii	P3	17	April	**Highly likely**
Euphorbia inappendiculata var. inappendiculata	P2	3	May	Unlikely
Fimbristylis sieberiana	P3	1	May to June	Unlikely
Fimbristylis sp. Shay Gap (K.R. Newbey 10293)	P1	3	June to July	Possible
Gomphrena leptophylla	P3	6	March to September	Possible
Goodenia nuda	P4	2	April to August	Possible
Gymnanthera cunninghamii	P3	8	January to December	Unlikely
Heliotropium murinum	P3	12	May or September	**Highly likely**
Heliotropium muticum	P3	28	April to June, September	**Likely**
Heliotropium parviantrum	P1	1	February to June	Unlikely
Indigofera ammobia	P3	2	No info	Possible
Indigofera ixocarpa	P2	4	March, May	Unlikely
Josephinia sp. Woodstock (A.A. Mitchell PRP 989)	P1	1	No info	**Likely**
Lepidium catapycnon	P4	2	February to June	Unlikely
Nicotiana umbratica	P3	15	April to June	Possible
Phyllanthus hebecarpus	P3	3	No info	Unlikely
Ptilotus mollis	P4	28	May or September	**Highly likely**
Ptilotus wilsonii	P1	2	October	Unlikely
Quoya zonalis K.A.Sheph. & Hislop [1]	EN	84	June-September	Possible
Rhynchosia bungarensis	P4	2	May, July, November	Unlikely
Rostellularia adscendens var. latifolia	P3	11	April to May	Unlikely
Rothia indica subsp. australis	P3	8	April to August	Possible
Schoenus coultasii [3]	P1	4	No info	Unlikely
Solanum sp. Mosquito Creek (A.A. Mitchell et al. AAM 10795)	P1	9	March, June, October	Unlikely

Scientific Name	Status	Total records	Flowering period	Likelihood
Stylidium weeliwolli	P3	4	August to September	Possible
Swainsona thompsoniana	P3	1	April, June, August	Possible
Themeda sp. Hamersley Station (M.E. Trudgen 11431)	P3	1	August	Possible
Triodia basitricha	P3	4	May	Possible
Triodia chichesterensis	P3	1	May	Possible

Footnotes:
1 = Name change from Pityrodia sp. Marble Bar
2 = Name change from Oldenlandia sp. Hamersley Station
3 = Name change from Schoenus sp. Marble Bar

Eragrostis crateriformis (DBCA - Priority 3) is an annual, grass-like or herb. It flowers May or July growing on creek banks, depressions, clay pans, and red-brown clay loams (Western Australian Herbarium 1998). The species has been recorded by Woodman (2020b) from multiple locations within the Warrawoona Gold Project and in association with other projects reviewed for the desktop. The species was also recorded during a recent survey of the Moolyella pipeline (Rapallo 2021), from a location 19 km north-east of the Big Schist survey area from the survey a single location within vegetation type A (*Acacia inaequilatera* shrubland over *Triodia epactia* and *T. wiseana* on stony plain). Very similar vegetation exists in the Big Schist pipeline and the taxon is considered "Highly Likely" to occur in the Big Schist survey area, especially on stony plain and around creek lines.

Euphorbia clementii (DBCA Priority 3) is an erect herb, 0.6 m high. It flowers in April, growing on gravelly hillsides, stony grounds, and along drainage lines on red, orange sandy loams, or stony areas (Western Australian Herbarium 1998). It was recorded from the Warrawoona Project Area by Woodman (2020) and from other surveys reviewed for the desktop. It is considered "Highly Likely" to occur within the Big Schist survey area, with suitable habitat in nearly all of the vegetation communities present. *Euphorbia clementii* was recorded from a long unburnt stony undulating plain of red-brown sandy clay loam on the Warrawoona Gold Project. (Woodman (2020b) found this habitat to be atypical for the species as this taxon is typically a fire-responder (and relatively short-lived) but may germinate in response to physical disturbance. Woodman (2020b) hypothesised that the plant on the Warrawoona Gold Project may have been transported, given the nearby historical disturbance evident in aerial photography and long unburnt nature of the vegetation. The taxon was not observed in more recently burnt areas of typical habitat (sandy or stony plains) (Woodman 2020b). *Euphorbia clementii* was not recorded on the burnt or disturbed areas of the Warrawoona survey area where if present it would have been readily identifiable as typically the species occurs in large numbers (Woodman 2020b).

Heliotropium murinum (DBCA Priority 3), grows on red sand, plains, or brown light clay or sand over ironstone. DBCA threatened and priority flora database records show the species was recorded in flower in March, May, June and September. *Heliotropium murinum* occurs within the Warrawoona Gold Project and has been recorded from other nearby localities identified in the desktop. The species occurs over a range of approximately 150 km from Woodstock Reserve in the west to DBCA managed Ex Meentheena Station in the east. There are 17 location records of this taxon in Western Australia representing approximately 12 populations (including the records from the Warrawoona Gold Project (Western Australian Herbarium 1998, Woodman Environmental 2020b, ALA 2021),DBCA 2020b). Heliotropium murinum is locally common with 890 plants recorded from 160 point locations within the Warrawoona Gold Project (Woodman 2020b). It is considered "Highly Likely" to occur in the Big Schist survey area, on the sandy/loam plains and stony plains that make up the majority of the survey area.

Heliotropium muticum (DBCA Priority 3) is a small herb (up to 30 cm) that grows on flat terrain, low in the landscape, flood plains and sand plains. No flowering information is available for this species. Soil types where this species has been recorded included (very gritty) skeletal red brown granitic soil, clay loams, and sand. The species is endemic to the Pilbara and occurs between Port Hedland/Wickham south to Coonarrie Creek and west to Marble Bar (Western Australian Herbarium 1998, Woodman Environmental 2020b, Atlas of Living Australia 2021),DBCA 2020b). *Heliotropium muticum* growth is triggered by fire with an estimated population of approximately 1,300 to 2,500 individuals at Pilgangoora (MMWC 2016) and 20 individuals located at North Star (Ecologia 2012). The nearest DBCA record for this species is 14 km north east of the survey area, from Abydos Plain 93, which is the main vegetation system-association intersecting the survey area (section 2.3.2), and from the Macroy Land System which also intersect the survey area. Because of its cryptic nature, response to fire, and availability of extensive habitat, this taxon was assessed as "Likely" to occur on the plains and flood plains of the Big Schist survey area.

Josephinia sp. Woodstock (DBCA Priority 1) grows on sheet flow or drainage lines, on red sandy (granitic) plains. This taxon is known from seven records across four localities (Ashburton, Chichester, Fortescue and Hamersley IBRA sub-regions) and is not currently known from any DBCA-managed conservation reserves ALA 2021),DBCA 2020b). The species has been recorded from the Warrawoona Gold Project from a loamy minor drainage line and despite a comprehensive targeted survey of all potential habitat on the Warrawoona Gold Project, no additional locations were recorded and the original plant recorded in 2019 has not been relocated despite intensive grid searching of the known location at 5 metre intervals (Woodman 2020b). The taxon is considered "Likely" to occur on the Big Schist survey area within the many drainage lines that cross the pipeline corridor.

Ptilotus mollis (DBCA Priority 4) grows on stony hills and screes. The species occurs within the Warrawoona Gold Project on rocky hill tops and slopes of the main range (consisting of granite, chert and mafic schist) or smaller outcroppings of mafic schist immediately adjacent to the main range (to the south) and has been recorded from other nearby localities identified in the desktop. *Ptilotus mollis* is endemic to Western Australia occurring over a range of approximately 640 km from Cane River Conservation Park in the west (65 km south-west of Pannawonica) to near Karlamilyi National Park in the east (270 km south-east of Marble Bar). There are 39 location records of this taxon in Western Australia, representing approximately 28 populations (including the records from the Warrawoona Gold Project). Three of these populations occur within DBCA conservation estate, Cane River Conservation Park and Karijini National Park ALA 2021),DBCA 2020b). *Ptilotus mollis* is locally common (2534 plants have been recorded from 350 locations within the Warrawoona Gold Project) (Woodman 2020b) and recorded from locations proximal to the Warrawoona Range (Rapallo 2021) and is considered "Highly Likely" to occur within the survey area, especially in the hill crest / hill slope and stony and rocky hill crests and slopes proximal to the Warrawoona Gold Project where the corridor commences in the south, and also on the stony hills and rises in the north and central part of Big Schist.

4.1.2 Introduced flora (weeds)

The Biosecurity and Agriculture Management Act 2007 (BAM Act) categorises the weeds of Western Australia into four main classifications:

- Declared Pests (under Section 22 of the Act);
- Permitted (under Section 11 of the Act);
- Prohibited (under Section 12 of the Act); and
- Permitted requiring a permit (Section 73, BAM Regulations 2013).

Under the BAM Act all declared plant pests are placed in one of three categories:

- C1 (Exclusion) — Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State;
- C2 (Eradication) — Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still feasible; and
- C3 (Management) — Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size.

Fifteen introduced taxa have been identified by DBCA as 'Priority Alerts' for the Pilbara region, including **Azadirachta indica, *Calotropis procera, *Chloris gayana, *Clitoria ternatea, *Cryptostegia grandiflora, *Cylindropuntia spp., *Euphorbia tirucalli, *Jatropha gossypifolia, *Lantana camara, *Moringa oleifera, *Ricinus communis, *Schinus molle var. areira, *Vachellia nilotica, *Washingtonia robusta and *Xanthium strumarium* (DPaW 2014). **Calotropis procera* (a shrub or small tree) was recorded in the survey area, as indicated in Table 11 and further discussed in section 4.2.3.

Twenty-eight introduced flora taxa have been recorded from the vicinity of the survey area, as presented in below. The status of each of these weeds was assessed against the Western Australian Organism List (WAOL) as available from the Department of Agriculture and Food (DAFWA) website (DAFWA 2018). Most weeds recorded in the desktop were listed as Permitted – s11, and two were listed as Declared Pest – s22(2). Weeds recorded in the survey area are indicated in Table 11 and further discussed in section 4.2.3.

Table 11 Weeds recorded in the desktop study

Family	Scientific Name	WAOL status	Total records
Aizoaceae	**Trianthema portulacastrum*	Permitted - s11	2
Amaranthaceae	****Aerva javanica*** [R]	Permitted - s11	13
Amaranthaceae	**Amaranthus viridis*	Permitted - s11	1
Apocynaceae	****Calotropis procera*** [R]	Declared Pest - s22(2) (Exempt)	3
Asphodelaceae	**Aloe vera var. officinalis*	Permitted - s11	3
Asteraceae	**Bidens bipinnata*	Permitted - s11	2
Asteraceae	**Flaveria trinervia*	Permitted - s11	11
Asteraceae	**Sonchus oleraceus*	Permitted - s11	3
Cucurbitaceae	**Citrullus colocynthis*	Permitted - s11	2
Cucurbitaceae	**Citrullus lanatus*	Permitted - s11	3
Euphorbiaceae	**Ricinus communis*	Permitted - s11	1
Fabaceae	**Parkinsonia aculeata*	Declared Pest - s22(2) (C3 Exempt)	1
Fabaceae	****Vachellia farnesiana***[R]	Permitted - s11	11
Malvaceae	**Malvastrum americanum*	Permitted - s11	10
Papaveraceae	**Argemone ochroleuca*	Permitted - s11	10
Passifloraceae	**Passiflora foetida var. hispida*	Permitted - s11	1
Poaceae	****Cenchrus ciliaris*** [R]	Permitted - s11	18
Poaceae	**Cenchrus setiger*	Permitted - s11	6

Family	Scientific Name	WAOL status	Total records
Poaceae	**Chloris barbata* [R]	Permitted - s11	3
Poaceae	**Chloris virgata*	Permitted - s11	2
Poaceae	****Cynodon dactylon*** [R]	Permitted - s11	5
Poaceae	**Digitaria ciliaris*	Permitted - s11	1
Poaceae	**Echinochloa colona*	Permitted - s11	4
Poaceae	**Eragrostis minor*	Permitted - s11	1
Poaceae	**Setaria verticillata*	Permitted - s11	7
Portulacaceae	**Portulaca pilosa*	Permitted - s11	1
Solanaceae	**Solanum nigrum*	Permitted - s11	3
Zygophyllaceae	**Tribulus terrestris*	Permitted - s11	3

Footnotes: R = Recorded during the Big Schist Pipeline Corridor Survey.

4.1.3 Threatened Ecological Communities and Environmentally Sensitive Areas

The search of the DBCA TEC and PEC database found no known occurrences of listed significant vegetation types within the survey area or within a 50 km radius of the survey area (DBCA 2020b).

The search of the Commonwealth Protected Matters database with regard to MNES listed under the EPBC Act did not return any TECs as likely or known to occur within the search area (AWE 2020).

A search of the Ramsar Database and Nationally Important Wetlands Database using the Protected Matters Search Tool's Interactive Map did not return occurrences within or proximal to the survey area. The closest significant wetland or riparian vegetation is the De Grey River, a Nationally Important Wetland, located approximately 75 km to the north of the survey area (AWE 2020).

4.2 Flora and vegetation survey results

4.2.1 Flora taxa recorded during the survey

The survey recorded 125 flora taxa from 30 different families as presented in Appendix XI. These included 120 native taxa and five introduced taxa (weeds: section 4.2.3). No conservation significant flora taxa were recorded during the survey. The most well-represented families were Fabaceae (32 taxa), Poaceae (23 taxa) and Malvaceae (9 taxa). Of the 125 flora taxa recorded, 16 taxa (13%) were annuals, 7 (6%) were annual or short-lived perennial, 90 (72%) were perennials. Twelve taxa did not have life cycle information available. The full list of taxa is presented in Appendix XI, with relevé data presented in Appendix XIV.

4.2.2 Conservation significant flora

No conservation significant flora taxa were recorded during the survey. The desktop identified six conservation significant flora taxa that were considered likely or highly likely to occur in the survey area, based on proximity of records and 4.1.1. The broad vegetation types of the survey area (described in section 0 below) were assessed for potential to support these six conservation significant flora taxa. Flowering period, growth form, and life cycle (annual or perennial) were also taken into account to assess

the likelihood of the survey team to have recorded these taxa in the field. The recent fire history of the survey area was also taken into account. The results are summarised in the Table 12 below.

Table 12 Potential for the broad vegetation types to support the conservation significant taxa identified as likely or highly likely to occur in the survey area

Taxon	Growth form and life cycle	Flowering period	Broad vegetation types						
			A	B	C	D	E	F	G
Eragrostis crateriformis (P3)	Annual grass to 0.4 m	May or July	Y	p		Y	Y	p	
Euphorbia clementii (P3)	Herb to 0.6 m	April	Y		Y	Y	Y	p	
Heliotropium murinum (P3)	Short-lived perennial herb to 0.4 m	May or September	p	Y					
Heliotropium muticum (P3)	Perennial herb to 0.3 m high	April to June, September	Y	Y					
Josephinia sp. Woodstock (P1)	Shrub to 0.4 m	No info		Y		Y	Y		
Ptilotus mollis (P4)	Shrub to 5 m	May or September			Y				Y

Footnotes: Y = Suitable habitat; p = potentially suitable habitat.

The assessment indicated that all the broad vegetation types in the survey area have potential to support one or more conservation significant flora taxa. No conservation significant taxa were recorded during the survey in March 2021. Five of the six taxa were small annual or short-lived perennial herbs or grasses, and the survey overlapped with the flowering period of only one of these taxa. *Ptilotus mollis* can grow to quite a tall shrub and would have been identifiable year-round, however the recent fires affecting large parts of the survey area would have affected the visibility of many of the native taxa across the survey area. This means that despite not being recorded during the survey, the possibility of these taxa occurring in the survey area cannot be discounted. The survey was not a targeted survey as per EPA (2016a), however the narrow corridor did focus effort, maximizing the likelihood of recording conservation significant species provided they were extant at the time of survey.

4.2.3 Introduced flora taxa (weeds)

Five introduced flora taxa (weeds) were recorded during the survey, these are listed in Table 13 below. The weeds were recorded in six of the seven vegetation types, with the majority of weeds recorded along the major, medium, or minor creeklines (types D, E and F).

Table 13 Weeds recorded during the survey

Scientific Name	WAOL status	A	B	C	D	E	F	Total
**Calotropis procera*	Declared Pest - s22(2) (Exempt)	1						1
**Aerva javanica*	Permitted - s11			1		3		4
**Vachellia farnesiana*	Permitted - s11		2	1	5	6	1	15
**Cenchrus ciliaris*	Permitted - s11						1	1
**Cynodon dactylon*	Permitted - s11				2			2

The most frequently recorded weed was *_Cenchrus ciliaris_* (buffel grass) which was recorded from fifteen flora relevé sites as well as opportunistically across the survey area from five different vegetation types. One weed, *_Calotropis procera_*, is a Declared Pest under the *Biosecurity and Agriculture Management Act 2007* (DAFWA 2018). It was recorded from a single opportunistic location in vegetation type A.

4.2.4 Flora of other Significance

Flora species, subspecies, varieties, hybrids, and ecotypes may be considered significant for reasons other than listing as a Threatened or Priority Flora taxa. This may include, but is not limited to, range extensions, keystone species, relic status, local endemism and anomalous features (EPA 2004). Based on these features, no taxa recorded from the survey area during the current survey are considered to be flora of "other" significance.

4.2.5 Broad vegetation types recorded in the survey area

The vegetation of the survey area has been heavily affected by recent fire, which has created a mosaic of burnt areas with low regrowth vegetation and often high density of the fire-responder *Arivela viscosa*, and unburnt areas with the original vegetation still remaining. Relevés were positioned where possible in the unburnt areas to capture the original vegetation composition and structure, but this was not possible for all broad vegetation types. Due to the fires being recent, no aerial photography was available to assist with mapping of the often complex burn mosaic, and vegetation maps reflect the original vegetation boundaries as visible on aerial photographs.

Vegetation condition across the survey area varied from Excellent to Good in the unburnt areas, to Poor to Degraded in the recently burnt areas. The only exception was vegetation type D growing in major drainage lines, which appeared to have been relatively unaffected by the fires. Conversely, vegetation type F growing in minor creeklines, and vegetation type G on hill crest and slopes was strongly affected by fire, making it very hard to describe the original vegetation.

The vegetation across most of the unburnt areas comprised a variation of spinifex (*Triodia* spp. four different species recorded) grasslands, mostly on stony or sandy/loam plains or on stony hills and rises, with an overstorey of mixed shrubs and low trees dominated by *Acacia inaequilatera*, *Grevillea wickhamii*, *Grevillea pyramidalis*, and *Corymbia hamersleyana*.

Major, medium, and minor creek lines bisect the plains and stony hills and rises. The major creeklines supported vegetation type D which included four groundwater dependent flora species (phreatophytes): *Eucalyptus victrix*, *Atalaya hemiglauca*, *Melaleuca argentea* and *M. glomerata*. Shrubs and trees found in the medium and minor drainage lines (types E and F) reflected those recorded in the surrounding vegetation types, but growing at higher densities. The medium drainage lines (Type E) also contained *Melaleuca argentea*, which is an obligate phreatophyte. The lower stratum of vegetation types D and E (major and medium drainage lines) also contained a variety of sedges including *Bulbostylis barbata*, *Cyperus vaginatus*, and *Schoenoplectus subulatus*. Especially the major creeklines (Type D) but also the medium creeklines (Type E) were affected by heavy infestations of the introduced grass *_Cenchrus ciliaris_* (Buffel grass).

The vegetation in the burnt areas comprised regrowth of the original vegetation, but often with a dense ground cover of *Arivela viscosa*, a native herb naturally occurring in the vegetation that responds strongly to fire, and/or the introduced *_Cenchrus ciliaris_*. This meant that vegetation composition as well as structure were altered in the burnt areas relative to the original vegetation.

Seven broad vegetation types were mapped across the survey area, as summarised in Table 14. The most extensive was vegetation type A – *Acacia inaequilatera* over *Triodia epactia* and *T. wiseana* on stony plain, covering 113 ha (42%) of the survey area. Vegetation type B – *Grevillea pyramidalis* and *Acacia* species over *Triodia* species or **Cenchrus ciliaris* on sandy loam plain was the next most dominant vegetation type, covering 63 ha (23%) of the survey area. The third dominant was vegetation type C – *Acacia inaequilatera* and *Grevillea wickhamii* over *Indigofera monophylla* over *Triodia wiseana* and *Triodia brizoides* and *Arivela viscosa* on hills and rises, covering 47 ha (18%) of the survey area. Small sections of the survey aera (2 ha <1%) were cleared. The broad vegetation types of the survey area are described in Table 15, and are mapped in Figure 8 and Figure 9.

Table 14 Summary of broad vegetation types and corresponding fauna habitats

Code	Broad vegetation type	Fauna habitat	Area (ha)
A	*Acacia inaequilatera* over *Triodia epactia* and *T. wiseana* on stony plain	Stony plain	113
B	*Grevillea pyramidalis* and *Acacia species* over *Triodia* species or **Cenchrus ciliaris* on sandy loam plain	Sandy/loam plain	63
C	*Acacia inaequilatera* and *Grevillea wickhamii* over *Indigofera monophylla* over *Triodia wiseana* and *Triodia brizoides* and *Arivela viscosa* on hills and rises	Hills and rises	47
D	*Eucalyptus victrix* and *Corymbia hamersleyana* with *Melaleuca* species over **Cenchrus ciliaris* and *Triodia longiceps* on major drainage	Major drainage	9
E	*Corymbia hamersleyana* and *Acacia pyrifolia* with occasional *Melaleuca argentea* over **Cenchrus ciliaris* and *Triodia epactia* on medium drainage	Medium drainage	19
F	*Indigofera monophylla* over *Arivela viscosa* and *Triodia epactia* on minor drainage	Minor drainage	12
G	*Acacia inaequilatera* and *Corymbia hamersleyana* over *Triodia wiseana* on hill crests and slopes	Hill crest / hill slope	4
X	Cleared areas: Not a vegetation type.	Disturbed / cleared / road	2

4.2.6 Conservation significant vegetation

There are no known locations of listed significant vegetation, as listed by AWE (EPBC Act) or otherwise listed by the DBCA, occurring within 50 km of the survey area (see section 4.1.1) (DBCA 2020b; AWE 2020).A review of the published TEC and PEC listings for Western Australia (DBCA 2018c; DBCA 2021) against the descriptions of the vegetation types in Table 15 identified no vegetation types in the survey area representing listed TECs or PECs. .

Vegetation may be of significance for reasons other than a listing as a TEC or a PEC. This may include, although is not limited to, scarcity, combination of species, role as a refuge, restricted distribution and vegetation extent being below a threshold level (EPA 2004). No vegetation considered to provide refugia for flora taxa (for example, vegetation associated with gorges or seepage areas), or otherwise providing an important function required to maintain ecological integrity of a significant ecosystem (as defined by EPA 2016a) was recorded in the survey area.

Vegetation that is not a Threatened or Priority Ecological Community may still be considered significant if it has a restricted distribution, or has experienced a degree of historical impact from threatening processes (EPA 2016b). Vegetation types retaining less than 30% of their pre-European extent generally experience accelerated species loss at an ecosystem level (EPA 2000) and are regarded as being 'vulnerable', while vegetation types retaining less than 10% of their original extent are regarded as being 'endangered' (EPA 2000, 2016b, Shepherd *et al.* 2002, DER 2014). Review of the DBCA State-Wide Vegetation Statistics data (DBCA 2018c) showed that all three vegetation system-associations intersected by the survey area (Abydos Plain 93, George Ranges 82, and George Ranges 587) still have more than 99% of their original extent remaining (DBCA 2018c) and would be considered 'least concern' (DER 2014).

Local significance can be determined where a vegetation association is confined to a specialised habitat or landform that is not common in the local area or where vegetation types support conservation significant species.

Vegetation type D (on major drainage lines) containing groundwater dependent taxa associated with drainage habitats was considered locally significant.

4.2.7 Watercourses and Groundwater Dependent Vegetation

Four groundwater dependent taxa were recorded during the survey. These were the obligate phreatophyte *Melaleuca argentea*, and the facultative phreatophytes *Eucalyptus victrix*, *Melaleuca glomerata*, and *Atalaya hemiglauca*. All of these taxa were only recorded in the Major Drainage lines of the survey area (vegetation type D).

Groundwater Dependent Vegetation (GVD) proximal to the Big Schist borefield has been assessed by (Woodman 2020a) where a GDV classification system categorises the vegetation to Level 1 (presence of *Melaleuca argentea*), Level 2 (presence of *E. camaldulensis* subsp. *refulgens*, without *M. argentea*) and Level 3 (presence of only A*. hemiglauca* and/or E*. victrix*) where level 1 represents the most sensitive obligate phreatophytic vegetation, and Level 3, presumed facultative phreatophytic vegetation.

The drainage proximal to Big Schist Borefield was classified as Level 3 Groundwater Dependent Vegetation: shallow flowlines with facultative phreatophytic taxa (A*. hemiglauca* and E*. victrix*) dominant within the major northern and north-eastern flowlines and scattered along southern minor flowlines (Woodman 2020a).

Table 15 Broad vegetation types of the survey area

Type	Vegetation description	Photo
A	***Acacia inaequilatera* over *Triodia epactia* and *T. wiseana* on stony plain** Description: Low woodland to medium shrubland of *Acacia inaequilatera* with *Grevillea wickhamii, Grevillea pyramidalis*; over mixed shrubs including *Corchorus parviflorus, Acacia ptychophylla and Acacia orthocarpa*; over *Triodia epactia* and/or *T. wiseana* hummock grassland occasionally dominated by *Triodia longiceps*. Occasional emergent *Corymbia hamersleyana* isolated low trees. Extent and landform: The dominant vegetation type within the Big Schist survey area, covering 113 ha (42%) of the survey area. It is synonymous with the Stony Plain fauna habitat. Vegetation type A falls primarily within the Macroy and Talga Land Systems, with minor sections in the Rocklea Land System. It occurs on flat to lightly undulating terrain. Soils range from dark orange to orange-brown clay-loam and sand. Rock cover is generally high, average of 70% up to 80-100% at some relevés. Vegetation condition: Good to very good in areas not recently burnt. Poor in recently burnt areas. Disturbances: Tracks, recent and historic fire. Conservation significant flora: None recorded GDV indicator species: None Weeds: **Calotropis procera* (single record) Significance: Local, Very Low	 **Site S26-ET10** (Condition: Good)  **Site S37-GAP03** (Condition: Very Good)

Type	Vegetation description	Photo
B	***Grevillea pyramidalis* and *Acacia* species over *Triodia* species or **Cenchrus ciliaris* on sandy loam plain** Description: Tall open to sparse shrubland of *Grevillea pyramidalis*, with *Acacia inaequilatera* and *Acacia pyrifolia*; over mixed shrubs including *Corchorus parviflorus, Acacia bivenosa and Acacia trachycarpa*; over either hummock grassland dominated by *Triodia epactia* , *T. wiseana*, or *T. longiceps* in areas with Good to Very Good vegetation condition, or grassland dominated by **Cenchrus ciliaris* in areas rated Poor to Degraded. Occasional *Corymbia hamersleyana* isolated low trees. Extent and landform: The second most dominant vegetation type, covering 63 ha (23%) of the survey area. It occurs on flat terrain including both plains and alluvial drainage. It is synonymous with the Sandy/Loam Plain fauna habitat. Vegetation type B occurs across all land systems of the survey area, with the greatest extent in the Boolgeeda Land System. Soils are orange to brown sand or loam, with low to no rock cover. Vegetation condition: Good to very good where no recent fire. Poor to Degraded in recently burnt areas. Disturbances: Tracks, feral animals (cattle), weeds, recent fire. Conservation significant flora: None GDV indicator species: None Weeds: **Cenchrus ciliaris* Significance: Nil, Negligible	 **Site S25-ET09** (Condition: Very Good)  **Site S27-ET11** (Condition: Degraded)

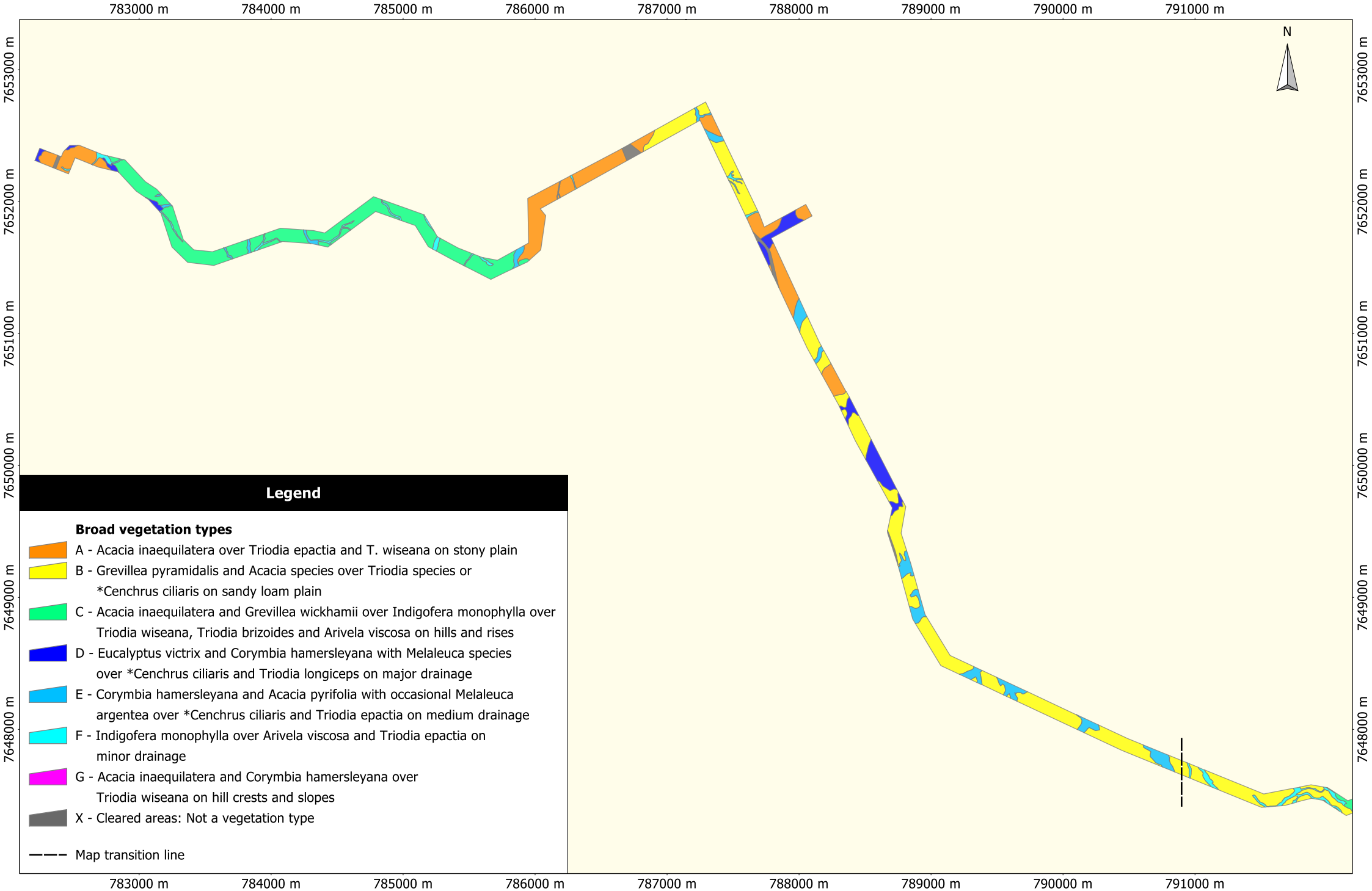
Type	Vegetation description	Photo
C	***Acacia inaequilatera* and *Grevillea wickhamii* over *Indigofera monophylla* over *Triodia wiseana*, *Triodia brizoides* and *Arivela viscosa* on hills and rises** Description: Tall open to sparse shrubland of *Acacia inaequilatera*, *Grevillea wickhamii*, and *Acacia pyrifolia*; over *Indigofera monophylla* shrubland with *Corchorus parviflorus*; over *Triodia wiseana and Triodia brizoides* hummock grassland in areas with Good to Very Good vegetation condition, or herbland of *Arivela viscosa* in areas affected by recent fire. Occasional *Corymbia hamersleyana* isolated low trees. Extent and landform: This vegetation type occurs primarily in the Rocklea and Talga Land Systems in two extended areas in the northern and central part of the survey area on moderate to steep slopes with high (often 80-100%) rock cover (scree). It is intersected by drainage lines. Vegetation type C covers an area of 47 ha of the survey area (18%). It is synonymous with the Hills and Rises fauna habitat. Soils are almost 100% rock with occasional places of sandy soil covered in dense surface rocks. Vegetation condition: Excellent to Good where no recent fire. Poor in recently burnt areas. Disturbances: Recent fire. Conservation significant flora: None GDV indicator species: None Weeds: **Cenchrus ciliaris* Significance: Nil, Negligible	 **Site S01-Hab** (Condition: Excellent)  **Site S09-TN05** (Condition: Poor)

Type	Vegetation description	Photo
D	***Eucalyptus victrix* and *Corymbia hamersleyana* with *Melaleuca* species over **Cenchrus ciliaris* and *Triodia longiceps* on major drainage** Description: *Eucalyptus victrix* open woodland; over open low woodland of *Corymbia hamersleyana*, *Acacia pyrifolia* and *Atalaya hemiglauca* with occasional *Melaleuca argentea* or *Melaleuca glomerata*; over sparse low to medium shrubs dominated by *Gossypium australe*, over **Cenchrus ciliaris* grassland, with *Cyperus vaginatus* sedgeland and occasional *Triodia longiceps* hummock grassland. Extent and landform: This vegetation type occurs on the major drainage lines intersecting the survey area and is synonymous with the Major Drainage fauna habitat. It occurs in all the land systems of the survey area except Boolgeeda, covering 9 ha (3%). Soils range from grey, orange to dark brown sand or loam with no to medium rock cover. Vegetation condition: Good to very good (this vegetation type barely affected by fires) Disturbances: Feral animals and weeds Conservation significant flora: None GDV indicator species: *Eucalyptus. victrix* [F], *Melaleuca argentea* [O], M. glomerata [F], *Atalaya hemiglauca* [F] Weeds: **Cenchrus ciliaris*, **Vachellia farnesiana* Significance: Local, Low (presence of groundwater dependent taxa)	 **Site S29-BG01** (Condition: Good)  **Site S37-GAP05** (Condition: Good)

Type	Vegetation description	Photo
E	***Corymbia hamersleyana* and *Acacia pyrifolia* with occasional *Melaleuca argentea* over **Cenchrus ciliaris* and *Triodia epactia* on medium drainage** Description: Mixed open woodland dominated by *Corymbia hamersleyana*, with *Acacia pyrifolia*, *Grevillea wickhamii* and *Melaleuca argentea*; over tall to medium shrubland dominated by *Acacia trachycarpa*; over **Cenchrus ciliaris* grassland or *Triodia epactia* and/or *Triodia wiseana* hummock grassland, with *Arivela viscosa* herbland in areas affected by recent fire. Extent and landform: This vegetation type occurs on the medium drainage lines intersecting the survey area and is synonymous with the Medium Drainage fauna habitat. It occurs in all the land systems of the survey area, covering except Boolgeeda, covering 19 ha (7%). Soils range from loamy to gravelly or stony, with an average rock cover of 60%. Vegetation condition: Very Good to Good. Poor in areas affected by recent fire. Disturbances: Recent fire, weeds. Conservation significant flora: None GDV indicator species: *Melaleuca argentea* [O] Weeds: **Cenchrus ciliaris*, **Aerva javanica* Significance: Local, Low (presence of groundwater dependent taxa)	 **Site S31-ET14** (Condition: Good)  **Site S28-ET12** (Condition: Poor)

Type	Vegetation description	Photo
F	***Indigofera monophylla* over *Arivela viscosa* and *Triodia epactia* on minor drainage** Description: *Acacia inaequilatera* sparse woodland or emergent low trees (unburnt areas); over shrubland dominated by *Indigofera monophylla* with *Acacia inaequilatera* low shrubs; over *Arivela viscosa* herbland in recently burnt areas or *Triodia epactia* and Triodia wiseana open hummock grassland; over sedges. Occasional *Corymbia hamersleyana* isolated low trees. Vegetation structure and composition was strongly affected by fire history, with *Arivela viscosa* dominating areas affected by recent fires. Extent and landform: Occurs across the pipeline corridor in the many minor drainage lines intersecting the survey area, within all the land systems of the survey area. Vegetation type F is synonymous with the Minor Drainage fauna habitat, covering 12 ha (5%) within the survey area. Soils are orange-brown sand or loam with rock cover ranging from to 0-19% to 80-100%. Vegetation condition: Poor (rarely Good). This vegetation type was heavily affected by recent fires. Disturbances: Recent fire, cattle. Conservation significant flora: None GDV indicator species: None Weeds: **Cenchrus ciliaris*, **Cynodon dactylon* Significance: Nil, Very Low	 **Site OPP-30** (Condition: Poor)  **Site S13-TN07** (Condition: Poor)

Type	Vegetation description	Photo
G	***Acacia inaequilatera* and *Corymbia hamersleyana* over *Triodia wiseana* on hill crests and slopes** Description: *Acacia inaequilatera* and *Corymbia hamersleyana* sparse low woodland; over isolated dwarf shrubs; over *Triodia wiseana* open hummock grassland. This vegetation type covered a small area only which was entirely affected by recent fire. Extent and landform: Southern part of the survey area, in the Talga land system. Synonymous with the Hill crest / hill slope fauna habitat. Vegetation type G continues into the Warrawoona project area. It covers 4 ha (1%) of the survey area. The terrain is very steep (40-50 degrees) and soils are almost 100% rock. Vegetation condition: Poor. Affected by recent fire. Disturbances: Recent fire. Conservation significant flora: None GDV indicator species: None Weeds: None Significance: Local, Very Low (small extent in survey area)	 **Site S30-ET13** (Condition: Poor)
X	***Disturbed / cleared / road*** Description: this is not a vegetation type. Areas are cleared with occasional regrowth of native species or weeds. It covers 2 ha (<1%) of the survey area.	**(no photo)**
Vegetation Types were ranked for significance (High, Moderate, Low or Very Low) according to the criteria in Appendix II.		



Rapallo environmental

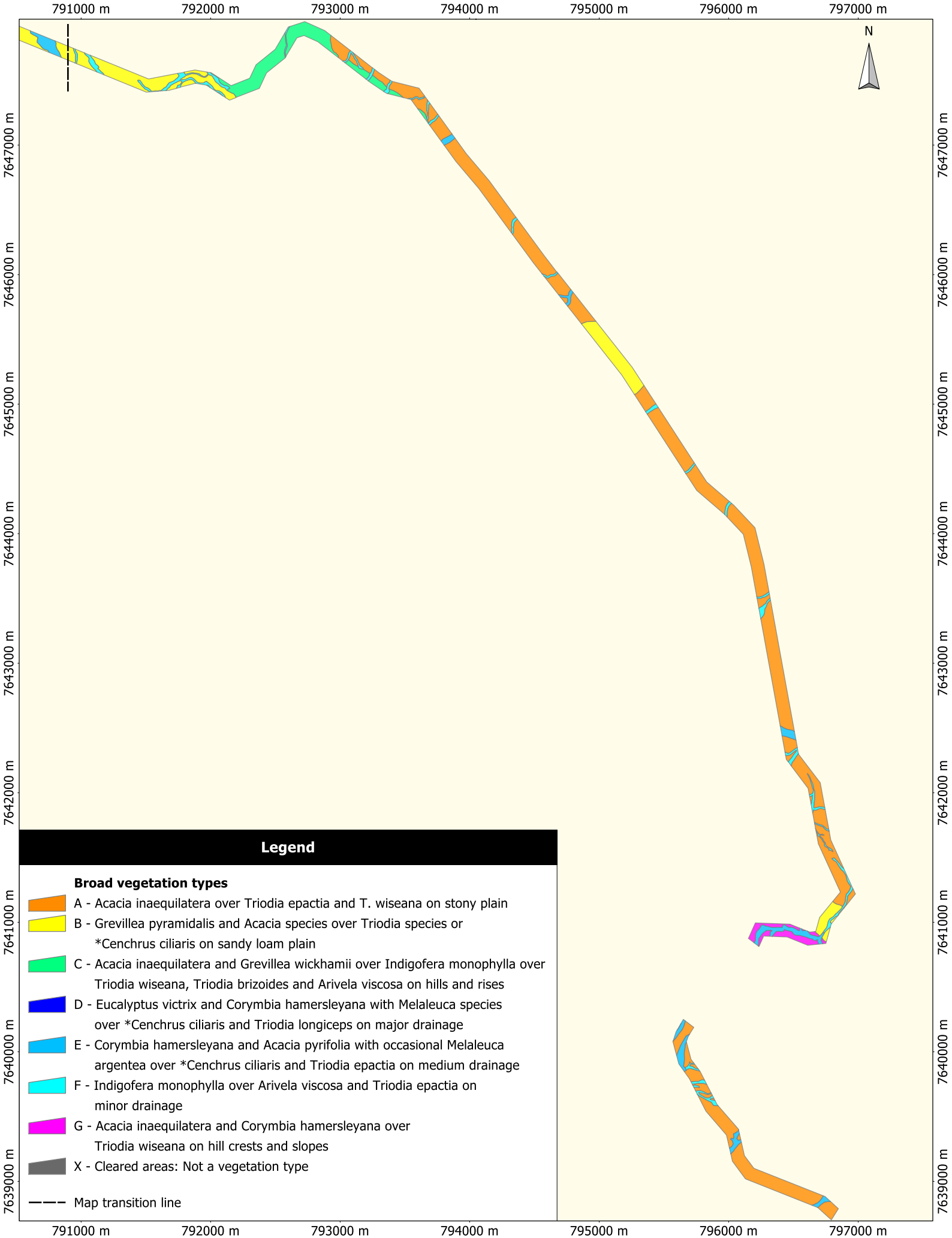
Calidus Resources
Big Schist Pipeline Corridor
Flora and Fauna Assessment
(J020996)

CALIDUS RESOURCES LIMITED

Original Size: A4 Scale: 1:35,000
Datum: MGA94 Zone 50
0 1 km

Figure 8

Broad vegetation types of the Big Schist survey area (west)



Rapallo environmental

Calidus Resources
Big Schist Pipeline Corridor
Flora and Fauna Assessment
(J020996)

CALIDUS RESOURCES LIMITED

Original Size: A4
Scale: 1:35,000
Datum: MGA94 Zone 50
0 1 km

Figure 9

Broad vegetation types of the Big Schist survey area (east)

4.3 Vertebrate fauna desktop results

4.3.1 Assemblage

A total of 329 vertebrate fauna species were identified as having the potential to occur within the survey area in the desktop assessment (Appendix XII). This comprised 37 native and 10 introduced mammal species, 162 bird species, 106 reptile species, 10 amphibian species and 4 fish. Not all species are likely to occur in the survey area due to the large search extent of the desktop assessment. Additionally, many species tend to be patchily distributed even where appropriate habitats are present, and many species of birds can occur as regular migrants, occasional visitors or vagrants.

4.3.2 Introduced (feral) vertebrate fauna

The desktop study identified 10 species of introduced (feral) fauna which have been recorded previously within 100 km of the survey area (Appendix XII). These were all mammals. Based on distribution, database records and habitat preferences, all species were likely to occur in the survey area. These were dromedary camel (*Camelus dromedarius*), cat (*Felix catus*), house mouse (*Mus musculus*), rabbit (*Oryctolagus cuniculus*), pig (*Sus scrofa*), red fox (*Vulpes vulpes*), cow (*Bos taurus*), donkey (*Equus asinus*), horse (*Equus caballus*) and dog (*Canis familiaris*).

4.3.3 Conservation Significant Vertebrate Fauna

A total of 32 species of conservation significance were identified in the desktop assessment as potentially occurring within the survey area, including nine mammals, 19 birds and 4 reptiles (Appendix VII). This comprised eight species listed as Threatened (5 mammals, 2 bird and 1 reptile), 1 species as Other Specially Protected under the BC Act and seven species listed as Priority by the DBCA (4 mammals and 3 reptiles). 19 bird species are listed as Migratory (all birds) under the EPBC Act and/or BC Act and 28 are listed as marine under the EPBC Act. Note, marine species are not discussed further in this report because although they are listed under s248 of the EPBC Act, marine species are not considered Matters of National Environmental Significance (MNES).

Excluding migratory birds, of the species of conservation significance identified as potentially occurring within the survey area, four species were "Confirmed", four species assessed as "Highly Likely", four species as "Likely" and the remainder were listed as "Possible" (4 species) or "Unlikely" (1 species) due to lack of suitable habitat and/or based on species distribution and lack of contemporary records (Table 16).

Migratory birds were assessed as "Possible (infrequent visitor)" (four species) to "Unlikely" to occur (12 species), dependent on the species distribution and contemporary records primarily due to the presence of some suitable habitat within the major and medium drainage lines and the absence of extensive permanent pools or large artificial water bodies. One migratory bird was confirmed on the survey area (Common sandpiper). Two of the Migratory bird species assessed as "Unlikely" to occur in the survey area (based on habitat and species distribution) were also listed as threatened species under the EPBC and BC Act. These were the Australian painted-snipe (Endangered: EPBC and BC Act), and the Curlew sandpiper (Critically Endangered: EPBC and BC Act).

Table 16 Desktop results: Conservation significant fauna recorded within 100 km of the survey area

Species	Likelihood	Recorded on survey area	Details
Northern quoll *Dasyurus hallucatus* BCA: EN EPBC: EN	Confirmed	Yes There is also a known population located on Warrawoona Gold Project within the Rocky Breakaway habitat	One Northern quoll was recorded on a motion detection camera in the very northern section of the survey area in a drainage line that contained small granite boulders. Drainage habitats are known foraging and dispersal pathways for Northern quoll, and they are likely to be denning in the Rocky Breakaway habitat of the ridge (approximately 400 metres to the north east of the survey area). The Rocky Breakaway habitat within the higher elevations of the Warrawoona range fits the definition of critical Northern quoll habitat (Moore *et al.* 2021), defined by large areas of condensed, complex rocky habitat, with intact vegetation occurring within and in the areas surrounding. The Rocky Breakaway habitat is extensive and predominately intact (only 0.8 ha of this habitat has been approved for clearance within the Warrawoona Gold Project). Habitat complexity within-patch scale (Moore *et al.* 2021) is present for denning via the deep cracks and crevices of the extensive outcropping, The closest DBCA (2020) records are 16 km to the south west of the Warrawoona Gold Project and approximately 10 km to the northwest of the northern extent of the survey area . Potential foraging/dispersal: Hillcrest/Hillslope habitat, Hills and rises, and the drainage habitats
Night parrot *Pezoporus occidentalis* BCA: CR EPBC: EN	Unlikely	No	Based on accepted records, Night parrot habitat comprises long-unburnt mature Triodia grasslands forming mosaics with samphire and chenopod shrublands (Jackett *et al.* 2017, McDougall *et al.* 2009, Murphy *et al.* 2017) including genera such as *Atriplex, Bassia* and *Maireana,* on floodplains and claypans, and on the margins of salt lakes, creeks or other sources of water (McGilp 1931, Wilson 1937). Contemporary Western Australian Pilbara/Murchison records include records north east of Wiluna) (Hamilton *et al.* 2017, Jackett *et al.* 2017), Lake Disappointment (Great Sandy Desert) (Harewood 2018), Great Sandy Desert (Caccetta 2018) , south of Newman (Ison 2017), salt lake systems on Martu County (Michelmore & Birch 2020) and near the Fortescue Marsh (Davis & Metcalf 2008). The current interim guidelines for preliminary surveys of Night parrot in Western Australia suggest the species requires large, dense Triodia hummocks primarily old-growth (often more than 50 years unburnt) for roosting and nesting (DPaW 2017). Local records of the Night parrot are scarce, there are historical records for Night parrot from the Marble Bar area (ALA 2021), with the nearest contemporary record of the species observed at Minga Well, a station bore and

Species	Likelihood	Recorded on survey area	Details
			livestock watering point with large pools of water near Fortescue Marsh (Davis & Metcalf 2008). Suitable habitat occurs within long unburnt patches of the Triodia dominated Stony Plain and Sandy/Loam Plain, however Night parrot was not detected via SM4 and habitats of the survey area do not include mosaics with samphire and chenopod shrublands or salt lake margin. Possible foraging/dispersal habitat: Stony Plain, Sandy/Loam Plain
Ghost bat *Macroderma gigas* BCA: VU EPBC: VU	Confirmed	Yes, but no roosts located. Known roosts located on and proximal to Warrawoona Gold Project	The Warrawoona Gold Project is proximal to two significant roosts, the Klondyke Queen (permanent diurnal and maternity roost) and Bow Bells South (occasional diurnal roost). Additionally, the Comet mine (nocturnal refuge) is located 7 kilometres south of Marble Bar (Biologic 2019d). Bat Call (2021b) confirmed that the timing of the Ghost bat calls recorded during the survey were consistent with late night foraging visits and none indicated nearby diurnal roosting sites. This result is consistent with the known diurnal population and dispersal of ghost bats in the district. Known diurnal roosts are at the Klondyke Queen and Bow Bells South historical underground mines. Additionally, the Comet mine (nocturnal refuge) is located 7 kilometres south of Marble Bar (Biologic 2019d). The Ghost bat will often forage more broadly across habitats, often utilising drainage lines and other habitats where prey species are likely to be most abundant (Richards *et al.* 2008, Tidemann *et al.* 1985). No caves or old workings were recorded on the survey are. Until the habitat requirement for Ghost bat in the Pilbara is refined it is assumed that suitable foraging habitat exists across all habitats of the survey area. Potential Foraging/ dispersal: Drainage Lines, Hillcrest/ Hillslope, Stony Plain, Hills and Rises.
Pilbara leaf-nosed bat *Rhinonicteris aurantia (Pilbara)* BCA: VU EPBC: VU	Confirmed	Yes but no known roosts. Known roosts located on and proximal to Warrawoona Gold Project	Pilbara leaf-nosed bat forages in caves and along waterbodies with fringing vegetation (DoEE 2016). Bat Call (2021b) confirmed that the timing of the Pilbara leaf-nosed Bat calls recorded during the survey from drainage habitat were consistent with late night foraging visits and none indicated nearby diurnal roosting sites. This result is consistent with the known diurnal population and dispersal of Pilbara leaf-nosed bats in the district. Known diurnal roosts are at the Klondyke Queen and Bow Bells South historical underground mines. Potential Foraging/ dispersal habitat includes: Drainage Lines (TSSC Priority 4), Hillcrest/ Hillslope (TSSC Priority 5), Stony Plain (TSSC Priority 5), Hills and Rises (TSSC Priority 5) and Sandy Loam/ Plain (TSSC Priority 5).

Species	Likelihood	Recorded on survey area	Details
Greater bilby *Macrotis lagotis* BCA: VU EPBC: VU	Highly Likely	No	Within the Pilbara region the species is often sparsely distributed and occurs in relatively low abundance, making detection difficult (Southgate *et al.* 2019). The nearest DBCA record to the corridor is 200m west of the survey area in the northern section of the corridor. This record however does not indicate the type of presence (sighting, diggings etc) (DBCA 2020). No evidence of Greater bilby was recorded during the current survey; nor was the species detected via targeted searches for the Warrawoona Gold Project (Biologic 2019a). Habitat within the survey area considered most suitable to support the species is the Sandy/Loam Plain habitat. Habitat within the survey area considered most suitable to support the species is the Sandy/Loam Plain habitat.
Grey falcon *Falco hypoleucos* BCA: VU EPBC: VU	Likely	Confirmed	Grey Falcon were observed within the survey area hunting in drainage lines. Grey falcon commonly nests in timbered areas, particularly tall trees along watercourses, and forages in open or more sparsely vegetated habitats (Garnett *et al.* 2011). Medium and Major Drainage habitats are likely to provide suitable nesting habitat for the species. Grey falcon is likely to forage more broadly across all habitats within the survey area particularly Stony Plain and Sandy/Loam Plain and Minor Drainage habitats. The Grey falcon was also recorded in 2006 approximately 30 km to the north northwest of the northern extent of the survey area at Doolena Gorge (DBCA 2020).
Pilbara olive python *Liasis olivaceus barroni* BCA: VU EPBC: VU	Highly Likely	No but one individual recorded from the Warrawoona Gold Project	Within inland Pilbara the species is most often encountered near permanent waterholes in rocky ranges or among riverine vegetation (Pearson 1993). The nearest record of Pilbara olive python is located within the Klondyke Queen historic underground proximal to the Warrawoona Gold Project (Biologic 2019a). Additional records are approximately 20 km north-west of the Warrawoona Gold Project (DBCA 2020) and the species was recorded from within the Corunna Downs project area (MWH, Australia 2016). Habitat suitable for the species within the survey area includes the drainage habitats used for foraging and dispersal.
Northern brushtail possum *Trichosurus vulpecula arnhemensis* BCA: VU	Possible	No	Little ecological information is known about the Pilbara population of the species, it has a patchy distribution and is infrequently recorded. The species is omnivorous but often feeds on flowers and insects (Cruz *et al.* 2012). Northern brushtail possum has been recorded approximately 45 km southwest of the Warrawoona Gold Project (Biologic 2020). The species is most often recorded from major drainage lines that contain large hollow-bearing eucalypts and rocky

Species	Likelihood	Recorded on survey area	Details
			habitats (i.e. gorge/ gully habitat) where suitable shelter sites are present throughout its arid distribution (Kerle *et al.* 1992); Van Dyck & Strahan 2008).
Peregrine falcon *Falco peregrinus* BCA: OS	Likely	No	In arid areas, the Peregrine falcon is most often encountered along cliffs above rivers, ranges and wooded watercourses where it hunts birds (Johnstone & Storr 1998) . It typically nests on rocky ledges occurring on tall, vertical cliff faces between 25 m and 50 m high (Olsen & Olsen 1989). The Peregrine falcon was recorded in 2001, approximately 10 km west of the Warrawoona Gold Project (DBCA 2020). The Peregrine falcon is considered rare over much of its range (Johnstone & Storr 1998), however, the drainage habitats are likely to provide suitable foraging habitat for the species.
Ctenotus nigrilineatus DBCA: P1	Possible	No	Records have been collected from spinifex plains at the base of granite outcrops (How *et al.* 1991, How & Dell 2004) and sand and stony soils often associated with *Acacia trachycarpa* over *Triodia pungens* near drainage (Rapallo 2006). Potential habitats within the survey area may include the Stony Plain and Sandy/Loam Plain. The closest record of *Ctenotus nigrilineatus* is located ~57 km east of the Warrawoona Gold Project from 2000 (DBCA 2017 TPF records cited in Biologic 2019b).
Gane's blind snake (*Anilios ganei*) DBCA: P1	Possible	No	Little is known of the species' ecology, but this species is often associated with moist soils and leaf litter within gorges and gullies (Wilson & Swan 2017) and potentially within a wide range of other stony habitats. The species has been recorded from numerous habitats but is most likely to be present in rocky terrain and along drainage lines (Biologic 2020). The closest record is a 2014 record from McPhee's Creek, 36 km to the south west of the Warrawoona Gold Project (Biologic 2020). Habitat suitable for the species within the survey area includes Major Drainage and Medium Drainage.
Ctenotus uber johnstonei DBCA: P2	Possible	No	Little is known about the habitat preferences of this species, but within the Pilbara the taxon is known from stony hillslopes and plains habitats with variable vegetation cover, often dominated by open Acacia shrubland (*Acacia xiphophylla*) and *Triodia* hummock grassland (Cogger 2014). Records for this species are few, *Ctenotus uber johnstonei* has been previously recorded approximately 68 km south of the Warrawoona Gold Project (Biologic 2020). Habitat suitable for the species within the survey area includes Hillcrest/ Hillslope, Stony Plain and the Hills and Rises habitat within the survey area.
Brush-tailed mulgara *Dasycercus blythi*	Highly Likely	No but recorded from the Warrawoona Gold Project	The Brush-tailed mulgara occurs in *Triodia* sand plain and gibber plain habitats (Pavey *et al.* 2012). Mulgara are renowned for using multiple burrow systems within a home-range and

Species	Likelihood	Recorded on survey area	Details
DBCA: P4			changing these frequently (Körtner *et al.* 2007). Habitat within the survey area considered most suitable to support the species is the Sandy/Loam Plain habitat. Brush-tailed mulgara has been recorded from the Sandy Plain habitat of the Warrawoona Gold Project (Biologic 2019a) and the nearest DBCA record is 18 km south of the survey area from the northern section of the corridor (DBCA 2020).
Long-tailed Dunnart *Sminthopsis longicaudata* DBCA: P4	Likely	No	The Long-tailed dunnart has a relatively widespread distribution but is sparsely distributed and can be locally uncommon within the Pilbara region. The species typically occurs on plateaus near breakaways and scree slopes, and on rugged boulder-strewn scree slopes (Gibson & McKenzie 2012). Its core habitat includes rocky scree slopes with hummock grass and shrubs, and tall open *Acacia* shrubland and woodlands (Burbidge *et al.* 2008). The nearest DBCA (2020) records of this species are located approximately 17 km south-east of the Warrawoona Gold Project from 2003 and approximately six km north of the survey area (just outside Marble Bar) from 1999. Habitat within the survey area considered most suitable to support the species is the Hillcrest/ Hillslope habitat and Hills and Rises habitat.
Spectacled hare-wallaby *Lagorchestes* conspicillatus *leichhardti* DBCA: P4	Likely	No	The Spectacled Hare-wallaby is patchily distributed throughout the Pilbara region with few records of the species. The nearest record of this species is 1.1 km north-east of the Warrawoona Gold Project from an unknown date (DBCA 2020). The Sandy/Loam and Stony Plain habitat which comprises patches of Triodia hummock grasslands provides suitable habitat for the species.
Western pebble-mound mouse *Pseudomys chapmani* DBCA: P4	Likely	No but one individual recorded from the Warrawoona Gold Project	The Western pebble-mound mouse occurs on the gentler slopes of rocky ranges where the ground is covered with a stony mantle and vegetated by hard spinifex, often with a sparse overstorey of eucalypts and scattered shrubs (Anstee & Armstrong 2001). Mounds (active and inactive) have been recorded within the Warrawoona Gold Project in (Biologic 2019c). The closest DBCA (2020) records are 20km to the west of the Warrawoona Gold Project. The Hillcrest/Hillslope, Hills and Rises and Stony Plain habitat provides suitable habitat for the species.

Species	Likelihood	Recorded on survey area	Details
Fork-tailed swift Apus pacificus BCA: MI EPBC:MI	Unlikely - Aerial Species	No	This species is migratory, and would forage above the survey area during summer (Johnstone & Storr 1998). The species is predominantly aerial so may be observed, but would not typically utilise the habitats of the survey area (Higgins 1999).
Oriental plover *Charadrius veredus* BCA: MI EPBC:MI	Possible - infrequent visitor	No	This migratory species utilises a variety of habitats, including coastal habitats, such as estuarine mudflats and sandbanks, on sandy or rocky ocean beaches as well as open inland environments such as, semi-arid or arid grasslands, where the grass is short and sparse (Johnstone & Storr 2004). There is a DBCA (2020) Bird Atlas 2 record, from 15 km east of the survey area (2005) and suitable habitat may occur within the Sandy /Loam Plain, Major Drainage and Medium Drainage habitats. Despite the 2005 record, the likelihood of occurrence is ranked as possible because the Oriental plover are regarded as casual in the Pilbara interior, occurring mainly on coastal plains south to Cardabia but also Barrow Island on southward passage (Johnstone *et al.* 2013).
Common sandpiper *Actitis hypoleucos* BCA: MI EPBC:MI	Unlikely	No	Common sandpiper favours tidal and reef flats, beaches, saltwork ponds, river pools, flooded claypans, freshwater soaks and ephemeral waters. Usually in ones or twos, occasionally in small parties (Johnstone *et al.* 2013). There are DBCA (2020) Bird Atlas records from the early 2000s from Marble Bar: Chinaman Pool and Dooleana Gorge and the species was recorded on the large dam at the Moolyella tin mine, 20 km to the north east (Rapallo 2021). Given the small size of the turkeys nest and the lack of large permanent pools within the survey area the Common sandpiper is regarded as "Unlikely" to occur.
Sharp-tailed sandpiper *Calidris acuminata* BCA: MI EPBC:MI	Unlikely	No	Sharp-tailed sandpiper favours flooded samphire flats and grasslands, mangrove creeks mudflats, beaches, river pools, saltwork ponds, sewage ponds and freshwater soaks (Johnstone *et al.* 2013). There are DBCA (2020) Bird Atlas records from 2005 within 15 km of the survey area. Given the small size of the turkeys nest and the lack of large permanent pools within the survey area the Sharp-tailed sandpiper is regarded as "Unlikely" to occur.
Common greenshank *Tringa nebularia* BCA: MI	Possible - infrequent visitor	No	Inhabits tidal mudflats, mangrove creeks, flooded samphire flats, beaches, river pools, and saltwork and sewage ponds (Johnstone *et al.* 2013). There is a Bird Atlas record from 2005 within 6 km of the survey area (DBCA 2020). Suitable habitat may occur within the Major Drainage and artificial water bodies located on the survey area. The species is ranked as

Species	Likelihood	Recorded on survey area	Details
EPBC:MI			'possible' as it is uncommon south of Dampier and interior, occurring generally in ones, twos or small parties, compared to Eighty Mile Beach and Roebuck Bay where at arrival have recorded a population in excess of 3,000 birds (Johnstone *et al.* 2013). This species may appear anywhere where there is a small amount of water even for a short while.
Wood sandpiper *Tringa glareola* BCA: MI EPBC:MI	Possible - infrequent visitor	No	Mainly river pools, sewage ponds, flooded claypans, freshwater lagoons and bore overflows (Johnstone *et al.* 2013). There are Bird Atlas records from early 2000s within 6 km of the survey area (DBCA 2020) . Suitable habitat may occur within the Major Drainage and turkeys nest dam within the survey area. The species is ranked as 'possible' as the species is likely a passage migrant with peak numbers along Port Hedland-Shay Gap area in September after which several locations in that area are less commonly utilised (Johnstone *et al.* 2013).
Osprey *Pandion haliaetus* BCA: MI EPBC:MI	Unlikely	No	Occurs mainly in sheltered seas around islands, tidal creeks, estuaries and saltwork ponds, also large river pools (Johnstone *et al.* 2013). There are Bird Atlas records from the early 2000s within 20km of the survey area from the Coongan River and Doolena Gorge (DBCA 2020) . Given the small size of the turkeys nest and the lack of large permanent pools within the survey area the Osprey is regarded as "Unlikely" to occur.
Glossy ibis *Plegadis falcinellus* EPBC:MI	Possible - infrequent visitor	No	Occurs in freshwater wetlands, irrigated areas, margins of dams, floodplains, brackish and saline wetlands, tidal mudflats, pastures, lawns and public gardens (Johnstone *et al.* 2013). There is a 2018 Birdata record for Marble Bar (Birdlife Australia 2020b). The species is ranked as 'possible' as the species is nomadic. Rare to very common visitor or drought refugee (Johnstone *et al.* 2013).
Yellow wagtail *Motacilla flava* BCA: MI EPBC:MI	Unlikely	No	An uncommon but regular visitor to the Pilbara region (Johnstone *et al.* 2013). Occupies a range of damp or wet habitats with low vegetation, although favours edges of fresh water, especially sewage ponds. There is a 2010 Birdata record for Marble Bar (Birdlife Australia 2020b). Given the small size of the turkeys nest and the lack of large permanent pools within the survey area and few records for the Pilbara, the Yellow wagtail is regarded as "Unlikely" to occur.
Australian painted-snipe *Rostratula australis* BCA: EN	Unlikely	No	Generally, occupies shallow terrestrial freshwater wetlands (i.e. temporary and permanent lakes, swamps and claypans) with emergent tussocks of grass, sedges, rushes or reeds, or samphire (Johnstone & Storr 1998). The closest published record is from at Coondiner Pool, located on Roy Hill Pastoral station ~160 km south (Knuckey *et al.* 2013).

Species	Likelihood	Recorded on survey area	Details
EPBC:EN			Given the small size of the turkeys nest and the lack of large permanent pools within the survey area and few records for the Pilbara, the Australian painted-snipe is regarded as "Unlikely" to occur.
Eastern curlew *Numenius madagascariensis* BCA: MI/CR EPBC:MI/CR	Unlikely	No	Mainly tidal mudflats, also reef flats, sandy beaches and rarely near-coastal lakes including saltwork ponds (Johnstone & Storr 1998). The closest records are from Port Hedland ~158 km north west (Birdlife Australia 2020b). Given the small size of the turkeys nest and the lack of large permanent pools within the survey area, the Eastern curlew is regarded as "Unlikely" to occur . The species is rarely recorded and has not been recorded within 100km of the survey area.
Pectoral sandpiper *Calidris melanotos* BCA: MI EPBC:MI	Unlikely	No	Coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands (Johnstone & Storr 2004, Johnstone *et al.* 2013) . It prefers wetlands with open fringing mudflats and low, emergent or fringing vegetation (Geering *et al.* 2007). Given the small size of the turkeys nest and the lack of large permanent pools within the survey area, the Pectoral sandpiper is regarded as "Unlikely" to occur . The species is rarely recorded and has not been recorded within 100km of the survey area.
Oriental pratincole *Glareola maldivarum* BCA: MI EPBC:MI	Unlikely	No	Prefers open plains, floodplains or short grasslands, often with extensive bare areas. They often occur near terrestrial wetlands (such as billabongs, lakes or creeks), and artificial wetlands (such as reservoirs, saltworks and sewage farms) (Johnstone & Storr 1998). This species is considered due to the protected matters search and is not record based. Closest record is ~100 km (NNW) – 1980 (DBCA 2017 TPF records cited in Biologic 2019b). Given the small size of the turkeys nest and the lack of large permanent pools within the survey area, the Oriental pratincole is regarded as "Unlikely" to occur . The species is rarely recorded and has not been recorded within 100km of the survey area
Grey wagtail *Motacilla cinerea* BCA: MI EPBC:MI	Unlikely	No	A rare vagrant to Western Australia where it has been recorded within various habitats with open waterbodies (Johnstone & Storr 2004). This species is considered due to the protected matters search and is not record based. Closest record is ~539 km (NE) – 2013 (DBCA 2017 TPF records cited in Biologic 2019b). Given the small size of the turkeys nest and the lack of large permanent pools within the survey area, the Grey wagtail is regarded as "Unlikely" to occur . The species is rarely recorded and has not been recorded within 500km of the survey area.
Barn swallow *Hirundo rustica*	Unlikely	No	The Barn Swallow is recorded in open country in coastal lowlands, often near water, towns and cities. Found near freshwater wetlands, paperbark *Melaleuca* woodland, mesophyll shrub

Species	Likelihood	Recorded on survey area	Details
BCA: MI EPBC:MI			thickets and tussock grassland (Schodde & Mason 1999). (The Barn Swallow is a non-breeding summer visitor to the Pilbara. The Barn swallow favours areas near water (Johnstone *et al.* 2013). This species is considered due to the protected matters search and is not record based. Closest record is ~133 km (NW) – 2013 (DBCA 2017 TPF records cited in Biologic 2019b). Given the small size of the turkeys nest and the lack of large permanent pools within the survey area, the Oriental pratincole is regarded as "Unlikely" to occur . The species is rarely recorded and has not been recorded within 100km of the survey area.
Curlew sandpiper *Calidris ferruginea* BCA: CR EPBC:CR/MIG	Unlikely	No	Inhabits intertidal mudflats in sheltered coastal areas (i.e. estuaries, bays, inlets and lagoons) (Geering *et al.* 2007). This rare species generally roosts on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands (Geering *et al.* 2007). Given the small size of the turkeys nest and the lack of large permanent pools within the survey area, the Oriental pratincole is regarded as "Unlikely" to occur . The species is rarely recorded and has not been recorded within 100km of the survey area.
Status: BCA = Western Australian Biodiversity Conservation Act 2016. DBCA refers to the priority list maintained by the Department of Biodiversity, Conservation and Attractions. EPBC = Commonwealth Environment Protection and Biodiversity Conservation Act 1999. See Appendix III for conservation codes.			

4.4 Vertebrate fauna survey results

4.4.1 Assemblage

The survey recorded 54 vertebrate fauna species from the Big Schist pipeline corridor (Appendix XII). These comprised 34 birds, 12 mammals, and 8 reptiles. No amphibians (frogs) were recorded. Two introduced species, the cattle or cow (**Bos taurus*) and the feral cat (*Felis catus*) were recorded during the survey. Most fauna records came from opportunistic sightings while traversing the survey area, while additional records of mammals and reptiles were recorded via camera trap. Over half the mammal species recorded were bats (seven species) which were all recorded from SM4 ultrasonic recorders.

Four conservation significant species were recorded during the survey (Appendix XII). These were the Pilbara leaf-nosed bat (VU), Ghost bat (VU), Northern quoll (EN), and the Grey falcon (VU). These species are discussed in more detail below.

Northern quoll (*Dasyurus hallucatus*)

The Northern quoll is listed as Endangered under the EPBC act and the BC Act. The species, once widely distributed across northern Australia, is now restricted to three isolated populations; the Pilbara, the Kimberley and Northern Territory, and Queensland, in addition to a number of islands along the north coast (DoEE 2016). Such declines are primarily due to the western expansion of the cane toad which is highly toxic to predators when consumed (Woinarski *et al.* 2008). Other threats include predation from feral predators such as foxes and cats, inappropriate fire regimes, disease, habitat degradation through grazing as well as habitat destruction through mining and agriculture (Woinarski *et al.* 2011). Northern quoll are relatively common in the northern Pilbara region (generally within 150 km of the coast) but are much less common in southern and south-eastern parts of the region (Cramer *et al.* 2016). The Northern quoll is both arboreal and terrestrial, inhabiting ironstone and sandstone ridges, scree slopes, granite boulders and outcrops, drainage lines and riverine habitats (Braithwaite & Griffiths 1994, Oakwood 2002). Rocky habitats tend to support higher densities, as they offer protection from predators and are generally more productive in terms of availability of resources (Braithwaite & Griffiths 1994, Oakwood 2002). Other microhabitat features important to the species include: rock cover; proximity to permanent water and time-since last fire (Woinarski *et al.* 2008). Dens occur in a wide range of situations including: rock overhangs, tree hollows, hollow logs, termite mounds, goanna burrows and human dwellings/infrastructure, where individuals usually den alone (Oakwood 2002, Woinarski *et al.* 2008).

The Northern quoll is moderately common through part of the Pilbara (within 150 km of the coast) and therefore usually present where suitable rocky habitat is present. Northern quoll are present in the hard rocky habitats of the Pilbara that provide denning habitat and safety from predators and fire (Hill & Ward 2010, Turpin & Bamford 2014). Northern quoll have been recorded denning from the Rocky Breakaway habitat of the Warrawoona Gold Project (Biologic 2019a) and the closest DBCA (2020) records are 16km to the south west of the Warrawoona Gold Project from and approximately 10 km to the northwest of the northern extent of the survey area .

One Northern quoll was recorded on a camera trap in the very northern section of the corridor in a drainage line that contained granite boulders adjacent to a large rocky ridge. Drainage habitats are known foraging and dispersal pathways for Northern quoll and they are likely to be denning in the Rocky Breakaway habitat of the ridge (approximately 400 metres to the north east of the survey area).

The Rocky Breakaway habitat within the higher elevations of the Warrawoona range fits the definition of critical Northern quoll habitat (Moore *et al.* 2021) defined by large areas of condensed, complex rocky habitat, with intact vegetation occurring within and in the areas surrounding. The Rocky Breakaway habitat is extensive and predominately intact (only 0.8 ha of this habitat has been approved for clearance within the Warrawoona Gold Project). Habitat complexity within-patch scale (Moore *et al.* 2021) is present for denning via the deep cracks and crevices of the extensive outcropping (Table 16). The ridge to the north east of the survey area is the north-western extent of the Warrawoona Range and although not visited during the survey, inspection of imagery found it appears to contain Rocky Breakaway habitat.

Night parrot (*Pezoporus occidentalis*)

The Night parrot (Endangered (EPBC/BC Act) is a small, elusive ground dwelling parrot endemic to Australia (DPaW 2017). This cryptic nocturnal parrot inhabits arid and semi-arid areas that comprise dense, low vegetation. The distribution, ecology and habitat preferences of the night Parrot is very poorly understood.

Based on accepted records, Night parrot habitat comprises long-unburnt mature *Triodia* grasslands forming mosaics with samphire and chenopod shrublands (Jackett *et al.* 2017, McDougall *et al.* 2009, Murphy *et al.* 2017) including genera such as *Atriplex, Bassia* and *Maireana*, on floodplains and claypans, and on the margins of salt lakes, creeks or other sources of water (McGilp 1931, Wilson 1937).

Contemporary Western Australian Pilbara/Murchison records include records from north east of Wiluna (Hamilton *et al.* 2017, Jackett *et al.* 2017), Lake Disappointment (Great Sandy Desert) (Harewood 2018), Great Sandy Desert (Caccetta 2018) south of Newman (Ison 2017), salt lake systems on Martu County (Michelmore & Birch 2020) and near to the Fortescue Marsh (Davis & Metcalf 2008).

The current interim guidelines for preliminary surveys of Night parrot in Western Australia suggest the species require large, dense *Triodia* hummocks primarily old-growth (often more than 50 years unburnt) for roosting and nesting (DPaW 2017). Local records of the Night parrot are scarce, there are historical records for Night parrot from the Marble Bar area (Birds Australia Atlas 1 ALA 2021), with the nearest contemporary record of the species observed at Minga Well, a station bore proximal to the Fortescue Marsh located approximately 250 km to the south west of the Warrawoona Gold Project (Davis & Metcalf 2008). Possible foraging habitat occurs within long unburnt patches of the *Triodia* dominated Stony Plain and Sandy/Loam Plain, however Night parrot was not detected via SM4 recorder and habitats of the survey area do not include mosaics with samphire and chenopod shrublands or salt lake margin. The species is rated as "Unlikely" to occur on the survey area (Table 16).

Ghost bat (*Macroderma gigas*)

This species is listed as Vulnerable under the EPBC Act and the BC Act. The Ghost bat formerly occurred over a wide area of central, northern and southern Australia but has declined significantly in the southern parts of its' range in the last 200 years (Armstrong & Anstee 2000). The species now occurs in only a few highly disjunct sites across northern Australia, confined to the Kimberley and Pilbara regions in Western Australia (Van Dyck & Strahan 2008). In the Pilbara region, the species roosts in deep, complex caves beneath bluffs of low rounded hills, often composed of Marra Mamba or banded iron formation, granite rock piles and abandoned mines (Armstrong & Anstee 2000). They roost either individually or in colonies (Churchill 2008) and move between a number of caves, both seasonally and as dictated by weather changes (Van Dyck & Strahan 2008).

Ghost bat will often forage more broadly across habitats, often utilising drainage lines and other habitats where prey species are likely to be most abundant (Richards *et al.* 2008, Tidemann *et al.* 1985). However,

until habitat requirements for Ghost bat in the Pilbara are refined it is assumed that suitable foraging habitat exists across all habitats of the survey area: Drainage Lines, Hillcrest/ Hillslope, Stony Plain, Sandy/Loam Plain, Hills and Rises.

Ghost bat was recorded from a Hillcrest/Hillslope habitat (SM4-4_B) proximal to the Warrawoona Gold Project and major Drainage (SM4-3_B) at the northern end of the survey area (Table 16). All call times were consistent with late night foraging visits and none indicated nearby diurnal roosting sites. This result is consistent with the known population and dispersal of Ghost bat in the district. Known diurnal roosts are at the Klondyke Queen and Bow Bells historical underground mines (both proximal to the Warrawoona Gold Project) (Bat Call 2021b).

No additional natural caves were recorded within the survey area and none are likely to occur based on the habitats and landforms present.

Pilbara leaf-nosed bat (*Rhinonicteris aurantia*)

This species is listed as Vulnerable under the EPBC Act and the BC Act. The Pilbara leaf-nosed bat is restricted to the Pilbara region and is thought to have been separated from populations of the Orange Leaf-nosed Bat in the Kimberley, Northern Territory and western Queensland for at least 30,000 years (Churchill 1991). The species is heavily reliant on warm (28-32 °C), humid (85 to 100 %) sites for roosting (Anstee & Armstrong 2001) which enable individuals to reduce water loss and energy expenditure (Baudinette *et al.* 2000). The distribution of the species is therefore limited by the scarcity of caves that possess the required microclimates (Anstee & Armstrong 2001, Churchill 1991).

Foraging habitat for the Pilbara leaf-nosed bat is diverse. The species generally hunts with a manoeuvrable flight through riparian vegetation in gorges, and over hummock grassland and sparse tree and shrub savannah (Churchill 1994). In the Pilbara, Pilbara leaf-nosed bat has been observed in Triodia hummock grasslands covering low rolling hills and shallow gullies, with scattered *Eucalyptus camaldulensis* along the creeks (TSSC, 2016) , and has also been recorded over small watercourses, amongst granite boulder terrain, over pools and low shrubs in ironstone gorges, above low shrubs and around pools in gravely watercourses with *Melaleuca leucadendron*, such as within the Barlee Range Nature Reserve (Armstrong 2001).

Five priority foraging categories exist for the Pilbara leaf-nosed bat, these are 'Gorges with pools (Priority 1)'; 'Gullies (Priority 2)'; 'Rocky Outcrop (Priority 3)'; 'Major watercourses (Priority 4)' and 'Open grassland and woodland (Priority 5)' (TSSC, 2016).

The Pilbara leaf-nosed bat will potentially forage over most habitats within the survey area. Significant foraging habitats within the survey area are Major Drainage (classified as Priority 4 foraging habitat - TSSC, 2016). Additional foraging habitat is considered to include Hillcrest/ Hillslope, Stony Plain, Sandy/Loam Plain , Hills and Rises, all classified as low significance, Priority 5 foraging habitat TSSC, 2016). Hills and Rises are not regarded as Priority 3 Habitat as these habitats lack the rocky complexity of the Rocky Breakaway habitat.

Pilbara leaf-nosed bat was recorded via SM4 on the survey area (SM4-2B) from the Major Drainage habitat. The single late-night call was consistent with foraging visits and did not indicate a nearby diurnal roosting site. This result is consistent with the known population and dispersal of Pilbara leaf-nosed bat in the district. Known diurnal roosts are at the Klondyke Queen and Bow Bells historical underground mines (both proximal to the Warrawoona Gold Project) (Bat Call 2021b) Appendix XIII). No caves or old workings were located on the survey area.

Greater bilby (*Macrotis lagotis*)

The Greater bilby is listed as Vulnerable under the EPBC Act, BC Act, and by the IUCN. Extant population of the Greater bilby occur in a variety of habitats, usually on landforms with level to low slope topography and light to medium soils. Within the Pilbara region the species is recorded within spinifex sandplains associated with paleo-drainage lines and perched drainage lines where the substrate of sand, soil, sandy clay, or sandy gravel is suitable for burrowing (Dziminski & Carpenter 2017).

Greater bilbies are recorded as having low site fidelity and high mobility (Southgate *et al.* 2007); males regularly move three to five kilometres between burrows on consecutive days; and have been recorded moving up to 15 km in a few weeks (Southgate & Possingham 1995).

The nearest DBCA record to the corridor is 200m west of the survey area in the northern section of the corridor. This record however does not indicate the type of presence (sighting, diggings etc) (DBCA 2020).

No evidence of Greater bilby was recorded during the current survey; nor was the species detected via targeted searches for the Warrawoona Gold Project (Biologic 2019a). Habitat within the survey area considered most suitable to support the species is the Sandy/Loam Plain habitat.

The species is rated as "Highly Likely" to occur on the survey area (Table 16).

Preclearance surveys will determine presence of Greater bilby burrows at the time of clearing and allow for avoidance.

Grey Falcon (*Falco hypoleucos*)

The Grey falcon is currently listed as Vulnerable under the EPBC and BC Act. This species appears to have a distribution centred on ephemeral or permanent creek lines (Garnett & Crowley 2000), with numerous records from the Fortescue Marsh region (DBCA 2017 TPF records cited in Biologic 2019b).

Grey Falcons prefer sparsely-treed, open plains and creek lines for hunting. They typically nest in the abandoned nest of a raptor or corvid (Olsen & Olsen 1986) in trees or man-made structures, most notably repeater towers.

The species commonly nests in timbered areas, particularly tall trees along watercourses, and forages in open or more sparsely vegetated habitats (Garnett *et al.* 2011). Medium and Major Drainage habitats are likely to provide suitable nesting habitat for the species. Grey falcon is likely to forage more broadly across all habitats within the survey area, particularly Stony Plain and Sandy/Loam Plain habitats and Minor Drainage.

The Grey falcon was "confirmed" on the survey area (Table 16). Two individuals were observed hunting midway along the survey area in minor Drainage. This habitat is consistent with the literature. The nearest confirmed record in the DBCA database was 35 km north of these records DBCA (2020).

Pilbara olive python (*Liasis olivaceus barroni*)

The Pilbara olive python is listed as Vulnerable under the EPBC Act and the BC Act. It is moderately common through the ranges of the Pilbara and Mt Augustus, where it inhabits water courses and pools in rocky gorges and gullies. This species is primarily nocturnal and tends to shelter in small caves or under vegetation during the day, although it is occasionally active after sunrise, particularly in the warmer summer months (Pearson 1993). The Pilbara olive python is known from a number of sites throughout

the Pilbara and is associated with drainage systems, including areas with localised drainage and watercourses (Pearson 1993).

The nearest record of Pilbara olive python is from the historical Klondyke Queen underground proximal to the Warawoona Gold Project (Biologic 2019a). Additional records are from approximately 20 km north-west of the Warrawoona Gold Project DBCA (2020) and from within the Corunna Downs project area (MWH, Australia 2016). Habitat suitable for the species within the survey area includes the drainage habitats used for foraging and dispersal. The species is rated as "Highly Likely" to occur on the survey area (Table 16) however it is noted that core habitat of Rocky Breakaway (Biologic 2019a)) does not occur on the survey area, rather the high elevation areas of the Warrawoona Ranges that contain high complexity habitat (deep cracks and crevices).

Northern brushtail possum (*Trichosurus vulpecula arnhemensis*)

The Northern brushtail possum (*Trichosurus vulpecula arnhemensis*) is listed as Vulnerable under the BC Act. The species occurs from the northwest Pilbara, through the Kimberley and into the Northern Territory (Van Dyck & Strahan 2008). Little ecological information is known about the Pilbara population of the species, it has a patchy distribution and is infrequently recorded. The species is omnivorous but often feeds on flowers and insects (Cruz *et al.* 2012). Northern brushtail possum has been recorded approximately 45 km south west of the Warrawoona Gold (Biologic 2020). The species is most often recorded from major drainage lines that contain large hollow-bearing eucalypts and rocky habitats (i.e. gorge/ gully habitat) where suitable shelter sites are present throughout its arid distribution (Kerle *et al.* 1992); Van Dyck & Strahan 2008). The species is considered "Possible" to occur within the survey area within the Major Drainage Line habitats.

Peregrine falcon (*Falco peregrinus*)

The Peregrine falcon is listed under the BC Act as "Other Specially Protected Fauna (OS)" and is considered rare over much of its range (Johnstone & Storr 1998). In arid areas, it is most often encountered along cliffs above rivers, ranges and wooded watercourses where it hunts birds (Johnstone & Storr 1998). It typically nests on rocky ledges occurring on tall, vertical cliff faces between 25 and 50 metres high (Olsen & Olsen 1989).

The Peregrine falcon was recorded in 2001 approximately 10 km west of the Warrawoona Gold Project DBCA (2020). The Peregrine Falcon is considered rare over much of its range (Johnstone & Storr 1998), however, the Drainage habitats are likely to provide suitable foraging habitat for the species. The species is rated as "Likely" to occur on the survey area (Table 16).

Ctenotus nigrilineatus

This species is currently listed as Priority 1 by DBCA. Records of *Ctenotus nigrilineatus* have been collected from spinifex plains at the base of granite outcrops (How *et al.* 1991, How & Dell 2004) and sand and stony soils often associated with *Acacia trachycarpa* over *Triodia pungens* near drainage (Rapallo 2006).

Potential habitats within the survey area may include the Stony Plain and Sandy/Loam Plain habitats. The closest record of *Ctenotus nigrilineatus* is located ~57 km east of the Warrawoona Gold Project from 2000 (DBCA 2017 TPF records cited in Biologic 2019b). The species is rated as "Possible" to occur on the survey area (Table 16).

Gane's blind snake (*Anilios ganei*)

Gane's blind snake (*Anilios ganei*) – is listed Priority 1 by the DBCA. Gane's blind snake is endemic to the Pilbara region. Little is known of this species' ecology or habitat, but it is assumed that, like other blind snakes, it feeds primarily on ants, ant larvae, termites and other small insects (Cogger 2014). Blind snakes usually remain in the topsoil or in ant and termite mounds, only coming to the surface at night or after rain. Records of the species are often associated with moist gorges and gullies (Cogger 2014).

The species has been recorded from various habitats but is most likely to be present in rocky terrain and along drainage lines (Biologic 2020). The closest record is a 2014 record from McPhee's Creek, 36 km to the south west of the Warrawoona Gold Project (Biologic 2020). The species is rated as "Possible" to occur on the survey area (Table 16).

Ctenotus uber johnstonei

Ctenotus uber johnstonei is listed Priority 2 by the DBCA and occurs in reddish soils within the interior of Western Australia (Wilson & Swan 2017). Little is known about the habitat preferences of this species, but within the Pilbara the taxon is known from stony hillslopes and plains habitats with variable vegetation cover, often dominated by open Acacia shrubland (*Acacia xiphophylla*) and Triodia hummock grassland (Cogger 2014).

Records for this species are few, *Ctenotus uber johnstonei* has been previously recorded approximately 68 km south of the Warrawoona Gold Project (Biologic 2020). Habitat suitable for the species within the survey area includes Hillcrest/ Hillslope, Stony Plain and Hill and Rises within the study area. The species is rated as "Possible" to occur on the survey area (Table 16).

Brush-tailed mulgara (*Dasycercus blythi*)

The Brush-tailed mulgara (DBCA Priority 4) is a small carnivorous marsupial occurring from southwestern Queensland across the Simpson, Tanami, and Great Sandy Deserts and central Western Australia, including parts of the Pilbara SEWPAC 2011). The Brush-tailed mulgara occurs in *Triodia* sand plain and gibber plain habitats (Pavey *et al.* 2012). Mulgara can use multiple burrow systems within a home-range and changing these frequently (Körtner *et al.* 2008). Brush-tailed mulgara has been recorded from the Sandy Plain habitat of the Warrawoona Gold Project (Biologic 2019a) and the nearest DBCA record is 18 km south of the survey area from the northern section of the corridor (DBCA 2020).

Habitat within the survey area considered most suitable to support the species is the Sandy/Loam Plain habitat. The species is rated as "Highly Likely" to occur on the survey area (Table 16).

Preclearance surveys will determine presence of mulgara burrows at the time of clearing and allow for avoidance.

Long-tailed Dunnart (*Sminthopsis longicauda*)

This species is currently listed as Priority 4 by DBCA. It is a nocturnal and agile species that is distributed through the Pilbara, north eastern goldfields and Gibson desert, south to the Nullarbor Plain, to central Northern Territory and western South Australia (Van Dyck & Strahan 2008). Its core habitat includes rocky scree slopes with hummock grass and shrubs, and tall open Acacia shrubland and woodlands (Mckenzie *et al.* 2008).

The Long-tailed dunnart has a relatively widespread distribution, but is sparsely distributed and can be locally uncommon within the Pilbara region. The species typically occurs on plateaus near breakaways

and scree slopes, and on rugged boulder-strewn scree slopes (Gibson & McKenzie 2012). Its core habitat includes rocky scree slopes with hummock grass and shrubs, and tall open Acacia shrubland and woodlands (Burbidge *et al.* 2008).

The nearest DBCA (2020) record of this species is located approximately six km north of the survey area (just outside Marble Bar) from 1999. Habitat within the survey area considered most suitable to support the species are the Hillcrest/Hillslope and Hills and Rises habitat. The species is rated as "Likely" to occur on the survey area (Table 16).

Spectacled Hare-wallaby (*Lagorchestes conspicillatus leichardti*)

This species is currently listed as Priority 3 by DBCA. The Spectacled hare-wallaby is sparsely distributed and generally uncommon across northern Australia, distributed from northern Queensland in the east, to the Pilbara where the species is considered relatively rare (Van Dyck & Strahan 2008). The species shelters within grass tussocks and spinifex hummocks and low shrubs (Ingleby & Westoby 1992).

The nearest record of this species is 1.1 km north-east of the Warrawoona Gold Project from an unknown date (DBCA 2020). The Sandy/Loam Plain and Stony Plain habitat which comprises expanses of *Triodia* hummock grasslands provides suitable habitat for the species. The species is rated as "Likely" to occur on the survey area (Table 16), however it is acknowledged that Spectacled hare-wallaby is locally uncommon.

Western Pebble-mound mouse (*Pseudomys chapmani*)

This species is listed as Priority 4 by DBCA. The Western pebble-mound mouse has experienced a significant decline in their range through the Gascoyne and Murchison and is now considered endemic to the Pilbara (Start *et al.* 2000). This species almost exclusively occurs on the gentler slopes of rocky ranges where the ground is covered with a stony mantle and vegetated by hard spinifex, often with a sparse overstorey of eucalypts and scattered shrubs (Anstee & Armstrong 2001).

Western pebble-mound mouse has been recorded from the Warrawoona Gold Project within the Hillcrest/ Hillslope and Stony Plain habitat. The closest DBCA (2020) records are 20 km to the west of Warrawoona Gold Project from 2014. The Hillcrest/Hillslope, Hillslope and Rises and Stony Plain habitat provides suitable habitat for the species. The species is rated as "Likely" to occur on the survey area (Table 16).

Fork-tailed swift (*Apus pacificus*)

The fork-tailed swift (Migratory EPBC/BC Act) is a wide ranging but sparsely distributed species that occurs in a wide range of dry and/or open habitats (Johnstone & Storr 1998). The species does not breed in Australia, migrating from breeding grounds in the northern Hemisphere. The species usually arrives in Australia in October, where it remains in various parts of the continent to as long as April. The species is often observed during foraging or migration, with flocks ranging from 10 to 1,000 individuals (Higgins 1999).

The fork-tailed swift is migratory, and would forage above the survey area during summer (Johnstone & Storr 1998). The species is predominately aerial (Higgins 1999), may be observed but would not typically utilise the habitats of the survey area. The species is rated as "Unlikely" to occur on the survey area (Table 16).

Oriental plover (Charadrius veredus)

Oriental Plover (Migratory EPBC/BC Act) utilises a variety of habitats, including coastal habitats, such as estuarine mudflats and sandbanks, on sandy or rocky ocean beaches as well as open inland environments such as, semi-arid or arid grasslands, where the grass is short and sparse (Johnstone & Storr 2004).

There is a Bird Atlas record 155 km east of the survey area from 2005 (DBCA 2020) and suitable habitat may occur within the Sandy/Loam, Stony Plain, Major Drainage and Medium Drainage. Despite the 2005 record, the likelihood of occurrence is ranked as "Possible (infrequent visitor)" as the Oriental plover is regarded as casual in the Pilbara interior, occurring mainly on coastal plains south to Cardabia but also Barrow Island on southward passage (Johnstone *et al.* 2013).

Common sandpiper (*Actitis hypoleucos*)

The Common sandpiper (Migratory EPBC/BC Act) favours tidal and reef flats, beaches, saltwork ponds, river pools, flooded claypans, freshwater soaks and ephemeral waters. Usually in ones or twos, occasionally in small parties (Johnstone *et al.* 2013). There are Bird Atlas records from the early 2000s from Marble Bar: Chinaman Pool and Dooleana Gorge (DBCA 2020) and the species was recorded on the large dam associated with the Moolyella tin mine to the northeast during a separate survey (Rapallo 2021). Given the small size of the Hillside-Marble Bar Road turkeys nest located in the westernmost section of the pipeline corridor, and the lack of large permanent pools within the survey area the Common sandpiper is regarded as "Unlikely" to occur (Table 16).

Sharp-tailed sandpiper (*Calidris acuminata*)

The Sharp-tailed sandpiper (Migratory EPBC/BC Act) favours flooded samphire flats and grasslands, mangrove creeks mudflats, beaches, river pools, saltwork ponds, sewage ponds and freshwater soaks (Johnstone *et al.* 2013). There are Bird Atlas records from 2005 within 15 km of the survey area (DBCA 2020) . Given the small size of the Hillside-Marble Bar Road turkeys nest and the lack of large permanent pools within the survey area the Sharp-tailed sandpiper is regarded as "Unlikely" to occur. (Table 16).

Common greenshank (*Tringa nebularia*)

The Common greenshank (Migratory EPBC/BC Act) inhabitants tidal mudflats, mangrove creeks, flooded samphire flats, beaches, river pools, and saltwork and sewage ponds (Johnstone *et al.* 2013). There is a Bird Atlas record from 2005 (DBCA 2020) within 15 km of the survey area. Suitable habitat may occur within the Major Drainage and turkeys nest dam located on the survey area. The species is uncommon south of Dampier and within the interior, occurring generally in ones, twos or small parties, compared to Eighty Mile Beach and Roebuck Bay where at arrival (Johnstone *et al.* 2013) recorded a population in excess of 3,000 birds. This species may appear anywhere where there is a small amount of water even for a short while. The species is rated as "Possible (infrequent visitor)" to the survey area (Table 16).

Wood sandpiper (*Tringa glareola*)

Wood Sandpiper (Migratory EPBC/BC Act) inhabitants river pools, sewage ponds, flooded claypans, freshwater lagoons and bore overflows (Johnstone *et al.* 2013). There is a Bird Atlas record from the early 2000s (DBCA 2020) within 15 km of the survey area. Suitable habitat may occur within the Major Drainage and turkeys nest located on the survey area. The species is ranked as "Possible (infrequent visitor)" to the survey area as the species is likely a passage migrant with peak numbers along Port Hedland-Shay Gap area in September after which several locations in that area are less commonly utilised (Johnstone *et al.* 2013).

Osprey (*Pandion haliaetus*)

Osprey (Migratory EPBC/BC Act) inhabit mainly sheltered seas around islands, tidal creeks, estuaries and saltwork ponds, also large river pools (Johnstone *et al.* 2013). There are Bird Atlas records (DBCA 2020) from the early 2000s within 35 km of the survey area from the Coongan River and Doolena Gorge. Given the small size of Hillside-Marble Bar Road turkeys nest and the lack of large permanent pools within the survey area the Osprey is regarded as "Unlikely" to occur.

Glossy ibis (*Plegadis falcinellus*)

Glossy Ibis (Migratory EPBC/BC Act) occurs in freshwater wetlands, irrigated areas, margins of dams, floodplains, brackish and saline wetlands, tidal mudflats, pastures, lawns and public gardens (Johnstone *et al.* 2013). There is a 2018 Birdata record for Marble Bar (Birdlife Australia 2020b). Suitable habitat may occur within the Major Drainage and turkeys nest located on the survey area. The species is ranked as "Possible (infrequent visitor)" as the species is an infrequent visitor with few records for the Pilbara.

Yellow wagtail (*Motacilla flava*)

Yellow wagtail (Migratory EPBC/BC Act). An uncommon but regular visitor to the Pilbara region (Johnstone *et al.* 2013). The species occupies a range of damp or wet habitats with low vegetation although favours edges of fresh water, especially sewage ponds. There is a 2010 Bird data record for Marble Bar (Birdlife Australia 2020b). Given the small size of Hillside-Marble Bar Road turkeys nest and the lack of large permanent pools within the survey area and few records for the Pilbara, the Yellow wagtail is regarded as "Unlikely" to occur.

Migratory Species Unlikely to occur on the survey area

Seven migratory species are considered "Unlikely" to occur within the survey area due to their rare occurrence in the Pilbara region, the absence of suitable habitat within the survey area and/or the occurrence of the survey area well outside the species' known or expected distribution and absence of recorded occurrences proximal to the survey area; Australian painted snipe, Oriental pratincole, Barn swallow, Grey wagtail, Eastern curlew, Pectoral sandpiper and Curlew sandpiper. The occurrence of these species is likely to be infrequent and limited only to rare occasions, such rare vagrants and/or migrating individuals blown off course by cyclonic activity.

4.4.2 Fauna habitat descriptions

A total of seven broad fauna habitat types were recorded for the survey area. Habitat descriptions and the extent of each of these habitat types is presented in Table 17 and Appendix IX and mapped in Figure 10 and Figure 11.

Stony Plain was the dominant broad fauna habitats within the survey area, covering approximately 113 ha (42%), followed by Sandy/Loam Plain (63 ha, 23%), Hills and rises (47 ha, 18%), Medium drainage (19 ha, 7%) and Minor drainage (12 ha, 5%). The remaining two broad fauna habitats each covered less than five percent of the survey area. These were Major drainage (9 hectares, 3%) and Hill crest/ hill slope (4 ha, 1%). A small section of the survey area (2 ha, <1%) was cleared and/or contained roads; these areas are not further discussed.

All of the fauna habitats comprised a mosaic of burn histories with a large percent of the survey area burnt during a fire in late 2020. The condition of habitats within the study area ranged from Excellent to Good in areas not recently burnt, and Poor to Degraded in areas affected by recent fire, as described in

section 0 and Table 15. The largest disturbance was caused by recent fires that created a burn mosaic across the survey area, and also by cattle grazing, weed infestations (especially *Cenchrus ciliaris) and cattle grazing (Appendix IX).

4.4.3 Habitat Ranking and Extent

Of the seven broad fauna habitats recorded within the corridor, the Major Drainage habitat and Sandy/Loam Plain habitat are ranked as high significance for vertebrate fauna due to the potential to provide core habitat for species of conservation significance (Appendix II). The remainder were deemed to be of moderate significance, either due to foraging/dispersal habitats, or habitats known to support priority or migratory species. All habitats are represented outside of the survey area, throughout the region and in conservation estate.

Sandy Loam Plain

Sandy/Loam Plain habitat was ranked as High significance due to the potential for Greater bilby and Brush-tailed mulgara breeding, foraging and dispersal habitat. Both species are rated as "Highly Likely" to occur on the survey area.

There are Greater bilby records proximal to the corridor from 2014 in the DBCA threatened species database, however the database does not indicate type of record or source (DBCA 2020). No evidence of Greater bilby was recorded during the current survey; nor was the species detected via targeted searches for the Warrawoona Gold Project (Biologic 2019a).

Greater bilbies are recorded as having low site fidelity and high mobility (Southgate *et al.* 2007); males regularly move three to five kilometres between burrows on consecutive days; and have been recorded moving up to 15 km in a few weeks (Southgate & Possingham 1995).

Brush-tailed mulgara has been recorded from the Sandy Plain habitat of the Warrawoona Gold Project (Biologic 2019a). Mulgara can use multiple burrow systems within a home-range and changing these frequently (Körtner *et al.* 2008).

Sandy/Loam Plain habitat provides breeding, shelter, foraging, dispersal habitat for the Spectacled hare-wallaby DBCA Priority 4) and supporting habitat (dispersal and foraging habitat) for Grey falcon, Pilbara leaf-nosed bat, and Ghost bat. Sandy/Loam Plain habitat contains some suitable areas of habitat for the Night parrot but the species was not recorded on the survey area via acoustic recorder).

A total of 63 ha of the corridor (23.3 %) comprises Sandy/Loam Plain habitat and a substantial amount of Sandy Plain habitat is known to occur outside the corridor to the south of the Warrawoona Gold Project and within the Granitic land system. The habitat type is widespread in the broader landscape (Biologic 2019a) and not restricted to the corridor. Fauna occurring on the Sandy/Loam Plain Habitat are therefore unlikely to be substantially impacted by clearing for a pipeline, from a regional perspective.

Local populations of Greater bilby and Brush-tailed mulgara may be temporarily impacted by clearing of any active burrows. Clearing activities should be managed to avoid burrows to minimise impacts to such species. Neither Greater bilby , Brush-tailed mulgara or species known to use the Sandy/Loam Plain habitat would not be restricted to the Sandy/Loam Plain habitat of the survey area.

Major Drainage

The Major Drainage habitat provides a range of microhabitats and a stable source of food and water, within vast landscape of relatively resource-poor spinifex plains (How *et al.* 1991). More specifically, nectivorous avifauna benefit from the flowering plants and hollow-nesting species make use of the large eucalypts that line the banks (Burbidge *et al.* 2010). Mammal, reptile and amphibian fauna may also congregate around permanent water pools (How *et al.* 1991).

Due to the widespread availability of microhabitats, such as leaf litter accumulations, large trees, hollows, and semi-permanent/permanent water sources, the Major Drainage habitat provides foraging and dispersal habitat for Northern quoll, Pilbara leaf-nosed bat, Pilbara olive python and Peregrine Falcon and Northern Brushtail Possum and where there is sufficient moisture Gane's blind snake. Grey falcon may utilise the Major Drainage habitat for nesting and foraging.

Until habitat preferences are further defined for Ghost bat it is assumed that the Major Drainage habitat is also utilised in some capacity by Ghost bat.

Migratory bird species can use drainage systems as conduits for movement throughout an otherwise arid landscape (Storr 1984, Bamford *et al.* 2008).

Migratory species assessed as "Possible infrequent visitors" to the Major Drainage habitat

- Oriental plover
- Common greenshank
- Wood sandpiper
- Glossy ibis

Local populations of Northern quoll, Pilbara leaf-nosed bat, Pilbara olive python, Peregrine Falcon, Northern Brushtail Possum, Gane's blind snake and migratory birds are not anticipated to be impacted by the clearing of a narrow corridor of Major Drainage habitat beyond temporary displacement and direct short-term impact from machinery because this habitat does not contain critical or preferred breeding habitat for the majority of these species.

Northern quoll, Pilbara olive python and Peregrine Falcon breeding habitat is located within the Rocky breakaway habitat of the Warrawoona Gold Project and will not be impacted by the proposal. The Rocky breakaway habitat is extensive and predominately intact (only 0.8 ha of this habitat has been approved for clearance within the Warrawoona Gold Project).

Both Gane's blind snake and the Northern Brushtail Possum have a patchy distribution and are infrequently recorded. The migratory birds are all infrequent visitors to the area.

The Pilbara leaf-nosed bat will potentially forage over most habitats within the corridor with Major Drainage containing most significant foraging habitats due to the small pools that occur post rainfall. The species was recorded in Major Drainage habitat during the survey. Pilbara leaf-nosed bat was also recorded foraging at the artificial water bodies that occur on the Moolyella Pipeline Corridor (Rapallo 2021) and would also forage around the small turkey's nest dam adjacent to the Hillside - Marble Bar road. Ghost bat will potentially forage over most habitats of the survey area.

The Grey Falcon does use the Major Drainage habitats for breeding; however, it is noted that this habitat is not restricted, and the species has not been recorded nesting on survey area.

A total of 9 ha of the corridor (3.4%) comprises of Major Drainage habitat. The habitat type is widespread in the broader landscape, and the affected areas are contiguous with surrounding occurrences of Major Drainage habitat. Fauna occurring within this habitat type are therefore unlikely to be substantially impacted by clearing for a pipeline, from a regional perspective.

Stony Plain, the dominant habitat within the corridor (42.1%) provides breeding, shelter, foraging, dispersal habitat for the priority listed Western Pebble-mound mouse and Spectacled hare-wallaby and supporting habitat (dispersal and foraging habitat) for Grey falcon, Pilbara leaf-nosed bat, and Ghost bat. Stony Plain provides potential *Ctenotus nigrilineatus* habitat. Stony Plain habitat contains some suitable areas of habitat for the Night parrot, however the species was not recorded on the survey area via acoustic recorder).

Minor Drainage, Medium Drainage habitats provides potential dispersal and foraging habitat for Pilbara olive python, Northern quoll, Ghost bat, Pilbara Leaf-nosed bat, Peregrine falcon, Grey Falcon, Oriental plover (Migratory BC/EPBC Act) and where there is sufficient moisture, Gane's blind snake . As these habitats are primarily dispersal and foraging habitat for conservation significant species, fauna occurring within this habitat type are unlikely to be substantially impacted by clearing for a pipeline, from a regional perspective.

Hillcrest/ Hillslope and Hills and Rises habitats provides supporting habitat (dispersal and foraging habitat) for Ghost bat, Pilbara Leaf-nosed bat, Northern quoll and breeding, shelter, foraging, dispersal habitat for the priority listed Western pebble-mound mouse and Long-tailed dunnart. Hillcrest/ Hillslope and Hills and Rises habitat contains potential habitat for *Ctenotus uber johnstonei*. Hillcrest/ Hillslope habitat is primarily dispersal and foraging habitat for listed threatened species. Fauna occurring within this habitat type are unlikely to be substantially impacted by clearing for a pipeline, from a regional perspective.

Given the habitats are represented outside of the survey area, throughout the region and in conservation estate and primarily represent foraging and dispersal habitat of listed threatened species rather than breeding habitat, with management (clearing protocols and preclearance surveys), clearing within the survey area is unlikely to impact local populations beyond temporary displacement.

4.4.4 Habitat Features

Caves

No additional natural caves were recorded within the survey area, and none are likely to occur based on the habitats and landforms present.

Water Bodies

One small turkeys nest dam is located at the northern extent of the survey area adjacent to the Hillside - Marble Bar road and a small pool of water was recorded within a recently burnt section of Minor Drainage (relevé site S42-TN101).

Table 17 Broad fauna habitats identified in the survey area

Habitat	Description	Extent	Photos
Stony Plain Potential Conservation Significant Species ▪ Night parrot (possible foraging/ dispersal) ▪ Ghost bat (foraging/ dispersal) ▪ Pilbara leaf-nosed bat (foraging/ dispersal) ▪ Grey falcon (foraging) ▪ Spectacled hare-wallaby (breeding/ shelter, foraging/ dispersal) ▪ *Ctenotus nigrilineatus* (possible habitat) ▪ Western pebble-mound mouse (breeding/ shelter, foraging/ dispersal) ▪ Potential Ctenotus uber johnstonei habitat Area: 113 hectares Percentage of survey area: 42% **Significance: Moderate**	Flat to undulating stony plain with *Triodia* hummock grasses and scattered shrubland patches gravelly clay loam or skeletal soil. This habitat contains small rocky outcrops.	Stony Plain habitat is common and widespread within the survey area, and more broadly across the Pilbara region. The stony plain habitat is not restricted to the survey area and is represented in conservation estate.	 **Site OPP-45**  **Site OPP-71**

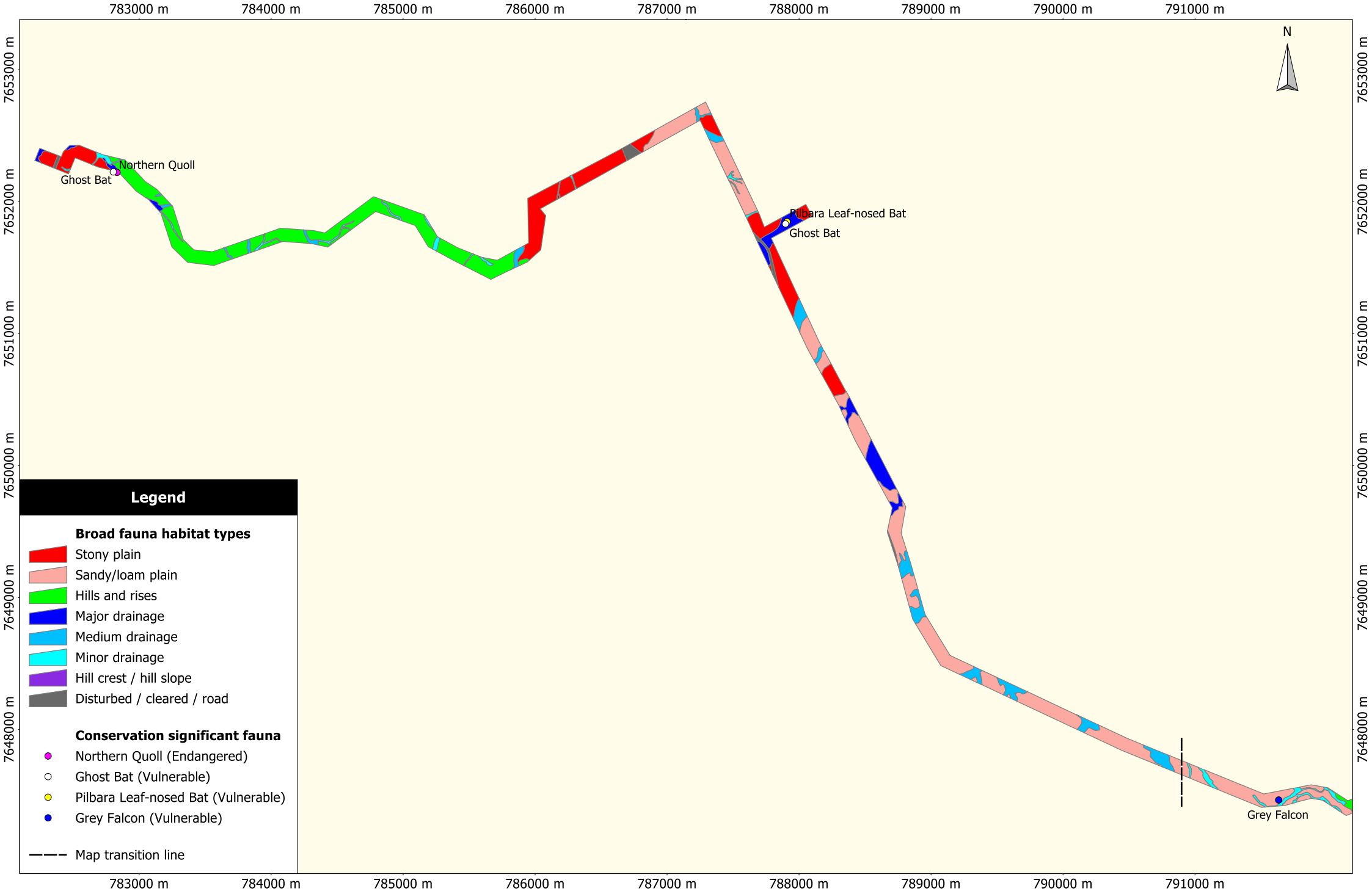
Habitat	Description	Extent	Photos
Sandy/Loam Plain Potential Conservation Significant Species ▪ Night parrot (possible foraging/ dispersal) ▪ Ghost bat (foraging/ dispersal) ▪ Pilbara Leaf-nosed Bat (foraging/ dispersal) ▪ Greater bilby (breeding/foraging/ dispersal) ▪ Brush-tailed mulgara ((breeding/foraging/ dispersal) ▪ Grey falcon (foraging) ▪ Spectacled hare-wallaby (breeding/ shelter, foraging/ dispersal) ▪ Ctenotus nigrilineatus (possible habitat) Area : 63 hectares Percentage of survey area: 23 % **Significance: High**	The Sandy/Loam Plain habitat occurs on flat terrain on both sand/loam plains and alluvial drainage. Vegetation comprises low mixed shrubland dominated by Grevillea pyramidalis and Acacia species, sometimes with emergent Corymbia hamersleyana low trees. The understorey is Triodia hummock grassland. Soils are sandy loams sometimes calcareous and stony and typically associated with medium /major drainage.	The Sandy/Loam Plain habitat is regionally common throughout the Pilbara region. The Sandy Loamy Plain habitat is not restricted to the survey area and is represented in conservation estate.	 **Site S40-GAP06**

Habitat	Description	Extent	Photos
Major Drainage Potential Conservation Significant Species ▪ Ghost bat (foraging/ dispersal) ▪ Pilbara leaf-nosed bat (foraging/ dispersal) ▪ Grey falcon (breeding/ nesting, foraging) ▪ Pilbara olive python (foraging/dispersal) ▪ Northern quoll (foraging/ dispersal) ▪ Northern Brushtail Possum (foraging/ dispersal) ▪ Peregrine falcon (foraging/ dispersal) ▪ Oriental plover (infrequent visitor) ▪ Common greenshank (infrequent visitor) ▪ Wood sandpiper (infrequent visitor) ▪ Glossy ibis (infrequent visitor) ▪ Gane's blind snake (DBCA Priority 1) Area : 9 hectares Percentage of survey area: 3% **Significance: High**	Shallow seasonally fed drainage lines characterised by non-vegetated channels and floodplains with fringing riparian vegetation comprising scattered Eucalyptus victrix open woodland over a patchy understory often dominated by Corymbia hamersleyana and Acacia species, and small ephemerals grasses and herbs. Can contain Melaleuca species in-between major channels. Water can be present in small pools following recent rainfall; however, drainage lines are seasonally dry and dependent on large rainfall events. Contains microhabitat such as leaf litter accumulations, large trees, hollows.	Un-named tributaries of the Coongan River The tributaries are continuous for some distance outside of the survey area and are representative of major drainage habitat occurring across the Pilbara region. The major drainage habitat is not restricted to the survey area and is represented in conservation estate.	 **Site S39-GAP05**

Habitat	Description	Extent	Photos
Medium Drainage Potential Conservation Significant Species ▪ Ghost bat (foraging/ dispersal) ▪ Pilbara leaf-nosed bat (foraging/ dispersal) ▪ Grey falcon (breeding/ nesting, foraging) ▪ Pilbara olive python (foraging/dispersal) ▪ Northern quoll (foraging/ dispersal) ▪ Peregrine falcon (foraging/ dispersal) ▪ Oriental plover (occasional visitor) ▪ Gane's blind snake (DBCA Priority 1) Area : 19 hectares Percentage of survey area: 7% **Significance: Moderate**	Wide gravelly drainage channels lined with Corymbia hamersleyana and tall Acacia trees, typically dissecting the Hillcrest/Hillslope, Hillslopes and Rises or Stony Plain Habitat. Contains microhabitat such as leaf litter accumulations, large trees, hollows. Buffel Grass (*_Cenchrus ciliaris_) dominates the understorey in many places.	Predominantly a subset of the major drainage habitat: Medium Drainage Lines – Rocky occurs throughout the Pilbara region due to the topography of the region. The medium drainage habitat is not restricted to the survey area and is represented in conservation estate.	 **Site OPP-50**
Minor Drainage Potential Conservation Significant Species ▪ Ghost bat (foraging/ dispersal) ▪ Grey falcon (foraging) ▪ Pilbara olive python (foraging/dispersal) ▪ Northern quoll (foraging/dispersal) ▪ Peregrine falcon (foraging/ dispersal) Area : 12 hectares Percentage of survey area: 5% **Significance: Moderate**	The Minor Drainage habitat represents the narrow drainage channels within the Hillcrest / Hillslope, Stony Plain, Hills and rises and Sandy/Loam Plain habitat. Vegetation typically represents that of the surrounding stony or sandy plains but occurring in denser patches of mixed shrubs including Acacias. Substrate is generally gravelly with occasional sandy patches.	The Minor Drainage Line habitat is common throughout the Pilbara bioregion particularly within the Chichester and Hamersley subregions where it is associated with the Stony Plain habitats. The minor drainage habitat is not restricted to the survey area and is represented in conservation estate.	 **Site OPP-46**

Habitat	Description	Extent	Photos
Hills and Rises Potential Conservation Significant Species ▪ Ghost bat (foraging/ dispersal) ▪ Pilbara leaf-nosed bat (foraging/ dispersal) ▪ Northern quoll (foraging/ dispersal) ▪ Western pebble-mound mouse (breeding/ shelter, foraging/ dispersal) ▪ Potential Ctenotus uber johnstonei habitat Area : 43 hectares Percentage of survey area: 18% **Significance: Moderate**	Hills, rises or undulating lower slopes, occasionally isolated areas of rocky outcrop with Triodia spp. grassland and/or sparse open acacia shrubland on gravelly clay loam substrate or skeletal soil, this habitat contains small rocky outcrops, typically not large enough or with enough cracking/crevices to provide shelter for denning species such as Northern quoll. Unlike the Hillcrest/ hillslope habitat this habitat does not typically surround deep gorges or gullies or the rocky breakaway habitat such as that found within the Warrawoona Ranges.	The hills and rises habitat Is distributed across the Pilbara region typically as foothills or lower slopes of the Hillcrest/ hillslope habitat or isolated hills/rises within the stony plain habitat. The Hills and rises habitat is not restricted to the survey area and is represented in conservation estate.	 **Site S19-ET03**

Habitat	Description	Extent	Photos
Hillcrest/Hillslope Potential Conservation Significance Species ▪ Ghost bat (foraging/ dispersal) ▪ Northern quoll (foraging/ dispersal) ▪ Pilbara leaf-nosed bat (foraging/ dispersal) ▪ Western pebble-mound mouse (breeding/ shelter, foraging/ dispersal) ▪ Long-tailed dunnart (breeding, foraging/ dispersal) ▪ Potential Ctenotus uber johnstonei habitat Area : 4 hectares Percentage of survey area: 1 % **Significance: Moderate**	Hillcrest/Hillslope habitat is dominated by varying species of *Triodia* with scattered Eucalypts. Typically, rocky substrate, often with exposed bedrock, and skeletal red soils. This habitat typically does not contain the extensive cracks and crevices of the rocky breakaway habitat.	This habitat corresponds to the slopes of the Warrawoona Range that occurs at the southern end of the survey area. This habitat is broadly represented across the Pilbara region in areas of topography typically the slopes and crests of hills that contain gorges and gullies. This habitat type is represented in conservation estate	 **Site S30-ET13**



Rapallo environmental

Calidus Resources
Big Schist Pipeline Corridor
Flora and Fauna Assessment
(J020996)

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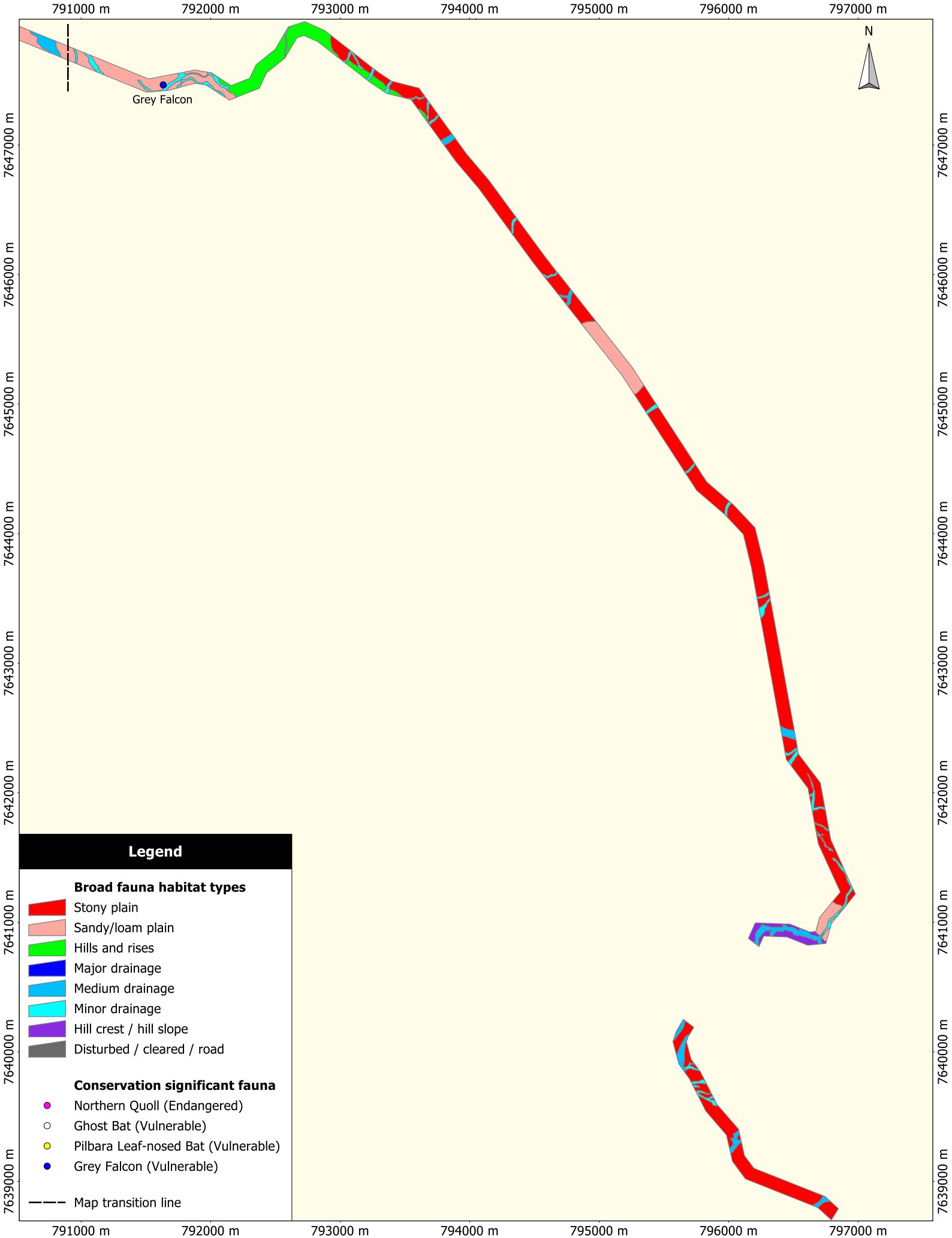
Original Size: A4 Scale: 1:35,000
Datum: MGA94 Zone 50
0 1 km

Figure 10

Broad fauna habitats of the
Big Schist survey area (west)



Rapallo environmental

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Flora and Fauna Assessment
(J020996)

CALIDUS RESOURCES LIMITED

Original Size: A4
Scale: 1:35,000
Datum: MGA94 Zone 50

Figure 9

Broad fauna habitats of the Big Schist survey area (east)

4.5 Survey adequacy and limitations

The EPA Technical guidance for detailed flora surveys recommends a minimum of three quadrats in each vegetation unit, with additional quadrats required in widespread vegetation units. There are no specific guidelines for the number or placement of relevés during reconnaissance flora surveys (EPA 2016a).

The flora survey was considered adequate to meet the survey objectives outlined in section 1.2. The assessment is a reconnaissance level survey, designed to verify desktop information and enable broad-scale vegetation mapping. The survey was conducted during optimal conditions as there was considerable rainfall prior to the survey. As such, the survey met (EPA 2016a) guidance for a reconnaissance flora and vegetation survey.

The terrestrial vertebrate fauna survey was conducted in accordance with EPA (2020) *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for environmental impact assessment*. The requirements for a basic fauna survey are habitat assessment, photographs, and mapping, to gather broad fauna and habitat information to verify desktop results. As such, the survey met EPA (2020) guidance for a basic fauna survey.

An assessment of the potential survey limitations are presented in Table 18 and Table 19.

Table 18 Limitations of the reconnaissance flora survey

Aspect	Limitation	Discussion
Scope and intensity	No	Scope and intensity of survey were suitable to achieve the aims of a reconnaissance flora and vegetation survey, as per EPA (2016a). Vegetation types could be classified, described, and mapped at a broad scale across the survey area to meet survey objectives outlined in section 1.2.
Availability of contextual information at a regional and local scale	No	Sufficient desktop flora and vegetation information was available for the region to place the survey area in a regional context.
Competency/experience of the team carrying out the survey, including experience in bioregion surveyed	No	The senior botanist involved in the field survey has extensive experience conducting flora and vegetation surveys throughout Western Australia, particularly the Pilbara.
Proportion of flora recorded and/or collected, any identification issues	No	The survey comprised a reconnaissance flora and vegetation survey as per EPA (2016a). Flora taxa encountered in the survey area were collected, either at relevés, or opportunistically.
Was the appropriate area fully surveyed (effort and extent)	No	The survey area was adequately assessed at the intensity appropriate for a reconnaissance flora survey.
Access restrictions within the survey area	No	Approximately two thirds of the survey area were accessible with a 4WD vehicle, while the other parts of the survey area could be accessed on foot. This enabled the survey team to access all corners of the survey area.
Survey timing, rainfall, season of survey	No	The flora survey was completed in March 2021, which falls within the EPA (2016) recommended primary survey period for vegetation surveys in the Eremaean Botanical Province. Rainfall in the month preceding the survey was also slightly above average.

Aspect	Limitation	Discussion
Disturbances that may have affected the results of the survey (e.g. fire, flooding, clearing)	Yes	Vegetation mapping was complicated due to the recent fire (late 2020) that burnt though the majority of the survey area and a 2018 fire scar, resulting in a heterogeneous fire mosaic of burnt and unburnt patches and differing post fire ages. Where possible relevés were positioned to capture the original unburnt vegetation. Mapping of burnt versus unburnt patches with the mosaic was not possible due to time constraints, and because due to the recent nature of the fire there was no aerial imagery available showing the fire scare (the latest available imagery was from 2018).

Table 19 Limitations of the basic fauna survey

Aspect	Limitation	Discussion
Scope and intensity	No	Scope and intensity of survey were suitable to achieve the aims of a basic fauna survey as outlined in EPA (2020).
Availability of contextual information at a regional and local scale	No	Sufficient desktop information was available at both the bioregional and local scale to place the survey area in a regional context.
Competency/experience of the team carrying out the survey, including experience in bioregion surveyed	No	The senior ecologist has eight years of experience conducting fauna surveys on a wide range of fauna groups across Australia .
Proportion of fauna recorded and/or collected, any identification issues	No	The survey comprised a basic fauna survey as per EPA (2020). The desktop study identified 329 vertebrate fauna species with potential to occur in the survey area. The field component verified the desktop and identified habitats of the survey area with a focus on potential conservation significant fauna habitat. The majority of fauna species were identified on sight in the field, while other species were identified to at least genus level from acoustic recorders and camera traps.
Was the appropriate area fully surveyed (effort and extent)	No	The survey area was adequately assessed at the intensity appropriate for a basic fauna survey. Absence of vehicle tracks to some parts of the survey area was compensated for by traverses on foot.
Access restrictions within the survey area	No	The survey area was accessible. A number of tracks were in sufficient condition to allow vehicle access, and this allowed the survey team to access all corners of the survey area.
Survey timing, rainfall, season of survey	No	The basic fauna survey was completed in March 2021. This falls within the EPA (2020) recommended timing to survey reptiles in the Eremaean botanical province. The survey was sufficient to meet EPA (2020) requirements for a basic field survey, and to meet survey objectives outlined in section 1.2.
Disturbances that may have affected the results of the survey (e.g. fire, flooding, clearing)	No	The survey area was affected by recent fire which affected large parts of the survey area. Other disturbances included tracks, weeds, and clearing. There was sufficient unburnt vegetation available outside of these disturbances, and habitat sites were positioned to avoid disturbed areas. Fire scars complicated mapping, however, habitats were described from a landform perspective rather than from vegetation.

5 Conclusion

Flora and vegetation

A reconnaissance flora and vegetation survey was completed across the survey area over six days, from 16 to 21 March 2921, with all major vegetation types visited and sampled. A total of 34 non-permanent relevés were sampled to record the broad vegetation types and their condition, as well as collecting an inventory of flora species present.

The reconnaissance survey recorded 125 vascular flora taxa from 30 families, including 120 native species and five introduced taxa. No Threatened or Priority flora taxa were recorded. The survey recorded five weeds, one of which (**Calotropis procera*) was a Declared Pests, recorded from a single location. No Threatened or Priority Ecological Communities (TEC-PEC) were recorded from the survey area.

Seven broad vegetation types were identified and mapped across the survey area. Vegetation types D and E contained groundwater dependent taxa associated with drainage habitats were considered locally significant as was vegetation type G (hill crest and hill slope) due to the small size (2 ha, <1%) within the survey area.

The survey area comprises a mosaic of burnt and unburnt areas. Vegetation condition ranged from Excellent to Good in areas not recently burnt, and Poor to Degraded in recently burned areas.

Vertebrate Fauna

A basic vertebrate survey was completed across the survey area over six days, from 16 to 21 March 2021, with all major habitat types visited and sampled. Habitat data was recorded at 39 point locations throughout the survey area.

A total of 329 vertebrate fauna species were identified as having the potential to occur within the survey area. This comprises 37 native and 10 introduced mammal species, 162 bird species, 106 reptile species, 10 amphibian species and 4 fish.

A total of 32 species of conservation significance were identified in the desktop assessment as potentially occurring within the survey area. This comprised eight species listed as Threatened (5 mammals, 2 bird and 1 reptile), 1 species as Other Specially Protected, and seven Priority species. 19 bird species are listed as Migratory.

Excluding migratory birds, of the species of conservation significance identified as potentially occurring within the survey area, four species were “Confirmed” (Pilbara leaf-nosed bat, Northern quoll, Ghost bat, Grey falcon) and three species assessed as “Highly Likely” (Greater bilby, Pilbara olive python, Brush-tailed mulgara). Four species were assessed as “Likely” (Long-tailed Dunnart, Spectacled hare-wallaby, Western pebble-mound mouse, and Peregrine falcon) and the remainder were listed as “Possible” (4 species) or “Unlikely” (1 species) due to lack of suitable habitat and/or based on species distribution and lack of contemporary records.

Migratory birds were assessed as “Possible (infrequent visitor)” (7 species) to “Unlikely” to occur (8 species), dependent on the species distribution and contemporary records primarily due to the presence of habitat within the major and medium drainage lines and the dams within the historical mining areas. No migratory birds were confirmed on the survey area.

The survey recorded 54 vertebrate species comprising 34 birds, 12 mammals (two introduced), and eight reptiles. No amphibians (frogs) were recorded.

Four conservation significant species were recorded during the survey. These were the Pilbara leaf-nosed bat (Vulnerable under the BCA and EPBC Act), The Ghost bat (Vulnerable under the BCA and EPBC Act), the Northern Quoll (Endangered under the BCA and EPBC Act) and The Grey Falcon (Vulnerable under the BCA Act). The Pilbara leaf-nosed bat and Ghost bat were both picked up as foraging visitor calls on SM4 ultrasonic recorders. One Northern Quoll was detected on a Motion detection camera in the Northwest section of the survey area. Two Grey falcons were recorded opportunistically in a minor drainage line in central part of the survey area.

Stony Plain was the dominant broad fauna habitats within the survey area, covering approximately 113 ha (42%), followed by Sandy/Loam Plain (63 ha, 23%), Hills and rises (47 ha, 18%), Medium drainage (19 ha, 7%) and Minor drainage (12 ha, 5%). The remaining two broad fauna habitats each covered less than five percent of the survey area. These were Major drainage (9 hectares, 3%) and Hill crest/ hill slope (4 ha, 1%). A small section of the survey area (2 ha, <1%) was cleared and/or contained roads; these areas are not further discussed.

Of the seven broad fauna habitats recorded within the corridor, the Major Drainage habitat and Sandy/loam Plain habitat were assessed as high significance for vertebrate fauna due to the potential to provide core habitat for species of conservation significance. The remainder were deemed to be of moderate significance, either due to foraging/dispersal habitats, or habitats known to support priority or migratory species.

Given the habitats are represented outside of the survey area, throughout the region and in conservation estate and primarily represent foraging and dispersal habitat of listed threatened species rather than breeding habitat, with management (clearing protocols and preclearance surveys), clearing within the survey area is unlikely to impact local populations beyond temporary displacement.

Note Pilbara leaf-nosed bat and Ghost bat breeding habitat is located within the old workings proximal to the Warrawoona Gold project and breeding habitat will not be impacted by clearing in pipeline corridor. No additional roosts were located during the survey.

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7 Appendices

No	Title
Appendix I	Likelihood of occurrence matrix: Vertebrate fauna
Appendix II	Significance assessment criteria: Habitat and vegetation
Appendix III	Conservation codes for Australian flora and fauna
Appendix IV	Flora desktop results: All flora taxa
Appendix V	Flora desktop results: Conservation significant flora and likelihood assessment
Appendix VI	Fauna desktop results: All fauna
Appendix VII	Fauna desktop results: Conservation significant vertebrate fauna
Appendix VIII	Flora relevé locations
Appendix IX	Fauna habitat sites
Appendix X	Acoustic Recorder (SM4) and camera detail
Appendix XI	Flora taxa per vegetation type
Appendix XII	Site Fauna Records
Appendix XIII	SM4 Analysis (Bat Call 2021)
Appendix XIV	Summary of flora relevé data

Appendix I Likelihood of occurrence matrix: Vertebrate fauna

Species records relative to survey area	Habitat suitability			
	High (breeding and foraging)	**Medium (foraging habitat)**	**Low (dispersal habitat)**	**Unsuitable** [6]
Records within 10 km [1]	Highly Likely	Likely	Likely	Possible
Records within 50 km [2]	Likely	Possible	Possible	Unlikely
Records within 100 km [3]	Possible	Possible	Possible	Unlikely
Records within 200 km [4]	Possible	Unlikely	Unlikely	Unlikely
No records within 200 km [5]	Unlikely	Unlikely	Unlikely	Highly unlikely

Footnotes for highly cryptic or poorly known species for which there are few records, and for under-surveyed areas:
1 – survey area occurs within currently known range and species has high dispersal capability.
2 – survey area occurs within currently known range and species has low dispersal capability.
3 – survey area occurs on margin of currently known range and species has high dispersal capability.
4 – survey area occurs outside of currently known range and species has high dispersal capability.
5 – survey area occurs outside of currently known range and species has low dispersal capability.
Footnotes with habitat suitability:
6 – Depending on a species' ecology, 'unsuitable' can either mean 'not preferred' or 'not containing resources', or it can be 'prohibitive' (i.e. absence of water for aquatic species). This distinction affects the final likelihood score in this column.

Appendix II Significance assessment criteria: Habitat and vegetation

Habitat significance assessment criteria

Rank	Criteria
High	Fauna listed as threatened under the EPBC Act and/ or BC Act and fauna listed as Species of Special Conservation Interest or Other Specially Protected Species have been recorded breeding from this habitat type within the survey area
	Fauna listed as threatened under the EPBC Act and/ or BC Act and fauna listed as species of Special Conservation Interest or Other Specially Protected Species have been recorded foraging or sheltering from this habitat type within the survey area where the species is solely reliant on this habitat type for foraging or sheltering
	Habitat known to be suitable core habitat (breeding), for EPBC Act and/ or BC Act listed threatened fauna and/or fauna listed as species of Special Conservation Interest or Other Specially Protected Species, and there are records of this species within 40km^2
	Habitat known to be suitable core habitat (foraging or sheltering), for EPBC Act and/ or BC Act listed threatened fauna and or fauna listed as species of Special Conservation Interest or Other Specially Protected Species, and there are records of this species within 40km^2 and the species is solely reliant on this habitat type for foraging or sheltering.
	Habitat is regionally uncommon or limited in extent and known to support species listed as: ▪ Threatened fauna under the EPBC Act and/or BC Act, but it is not their core habitat (e.g. may be used periodically/ seasonally or for dispersal). ▪ DBCA listed Priority fauna which are known to be solely reliant on this habitat.
	Habitat known to support EPBC Act and/or BC Act listed Migratory fauna such as breeding grounds, or important feeding grounds such as Eighty Mile Beach (including ephemeral habitats) defined via international agreement e.g. RAMSA and also Important Bird Areas (Dutson *et al.* 2009) https://www.birdlife.org.au/documents/OTHPUB-IBA-supp.pdf
Moderate	Habitat known to regularly support EPBC Act and/or BC Act listed Migratory fauna – (not breeding grounds or important feeding grounds)
	Habitat that is regionally uncommon (e.g. occurs in small and isolated areas) and supports a particularly diverse and uncommon faunal assemblage.
	Habitat is common and widespread and known to support species listed as: Threatened fauna under the EPBC Act and/or BC Act but it is not their core habitat (e.g. may be used periodically/ seasonally or for dispersal, or foraging habitats that where the species is not solely reliant on that habitat for resources, is an occasional visitor or foraging habitat is marginal. Species of Special Conservation Interest or Other Specially Protected Species under the BC Act but it is not their core habitat (e.g. may be used periodically/ seasonally or for dispersal) or foraging habitats that where the species is not solely reliant on that habitat for resources, is an occasional visitor or foraging habitat is marginal. DBCA listed Priority fauna which are known to be solely reliant on this habitat
Low	▪ Habitat is widespread/common and does not solely support any DBCA listed Priority fauna ▪ Habitat has minimal records of EPBC Act and/or BC Act listed Migratory fauna – (not breeding grounds or important feeding grounds). Especially so if these records are > 10 years old.

Vegetation significance assessment criteria

Score	Criteria
High	Supports threatened flora species/ threatened ecological community listed under the EPBC Act and/ or BC Act or supports a: unique or regionally significant population of Priority 1 or Priority 2 species; a unique or regionally significant priority ecological community or occurs in association with a major river or creek system.
Moderate	Supports a population of priority 1, priority 2 flora species or an unlisted species that is restricted and warrants listing/ priority ecological community or occurs in association with a major river or creek system or supports a unique/ unusual floral assemblage not recognised by DBCA as a PEC.
Low	Supports a population of priority 3 or priority 4 species / priority ecological community or occurs in association with a medium ephemeral river or creek system with sensitive obligate phreatophytic vegetation or supports a unique/ unusual floral assemblage or disturbance sensitive communities such as mulga on sheet flow, or occurs in association with a unique/ unusual landform or refugia such as gorges, high ranges, outcrops or seepage areas not common in the IBRA subregion
Very Low	Vegetation and landform is widespread/common and does not solely support priority 3 or priority 4 flora species. May contain, presumed facultative phreatophytic vegetation species not in association with a river or creek system typically in association with un-incised drainage lines and flood plains.
Negligible	Vegetation and landform is widespread/common and do not support priority flora species. May contain presumed facultative phreatophytic vegetation.

Appendix III Conservation codes for Australian flora and fauna

Threatened species under the Commonwealth EPBC Act

Threatened fauna and flora may be listed under Section 178 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in any one of the following categories:

EX Extinct

EW Extinct in the wild

CR Critically endangered

EN Endangered

VU Vulnerable

CD Conservation dependent

Migratory and Marine species under the Commonwealth EPBC Act

Migratory and Marine species are not listed as Threatened but are protected for other reason. Only Migratory species are considered Matters of National Environmental Significance (MNES) while Marine species are not.

MI Migratory

MA Marine

Migratory species listed under international agreements to which Australia is a party are protected under section 209 of the EPBC Act and are considered MNES. Listed migratory species are those listed in the:

- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
- China-Australia Migratory Bird Agreement (CAMBA)
- Japan-Australia Migratory Bird Agreement (JAMBA)
- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)

Marine species are those listed under s248 of the EPBC Act. Marine species are not considered MNES.

Conservation codes for Western Australian flora and fauna under the Western Australian *Biodiversity Conservation Act 2016*

Threatened, Extinct and Specially Protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*.

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

Threatened species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species

Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines.

Published under **schedule 1** of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 201*8 for critically endangered flora.

EN Endangered species

Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under **schedule 2** of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora*.

VU Vulnerable species

Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines.

Published under **schedule 3** of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where "there is no reasonable doubt that the last member of the species has died", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under **schedule 4** of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018 for extinct flora*.

EW Extinct in the wild species

Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

MI Migratory species

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program.

Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under **schedule 5** of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD **Species of conservation interest (conservation dependent fauna)**

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under **schedule 6** of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018.*

OS **Other specially protected species**

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Published as other specially protected fauna under **schedule 7** of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

Priority species

Priority species are possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations. In this report, priority species are given the codes P1, P2, P3 and P4.

P1 **Priority 1: Poorly-known species**

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

P2 **Priority 2: Poorly-known species**

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

P3 **Priority 3: Poorly-known species**

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

P4 **Priority 4: Rare, Near Threatened and other species in need of monitoring**

(a) **Rare**. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) **Near Threatened**. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Appendix IV – Flora desktop results: All vascular flora taxa

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Acanthaceae	*Rostellularia adscendens var. latifolia*	P3		2		4						1	1	1	1	1		
Aizoaceae	**Trianthema portulacastrum*										1							1
Aizoaceae	*Trianthema cusackianum*			3														
Aizoaceae	*Trianthema oxycalyptrum var. oxycalyptrum*			3														
Aizoaceae	*Trianthema pilosum*			3														
Aizoaceae	*Trianthema triquetrum*			3														
Aizoaceae	*Zaleya galericulata*			2														
Aizoaceae	*Zaleya galericulata subsp. galericulata*			3														
Amaranthaceae	**Aerva javanica*			3				1	1	1	1	1	1	1	1	1		1
Amaranthaceae	**Amaranthus viridis*															1		
Amaranthaceae	*Alternanthera nana*			2														
Amaranthaceae	*Alternanthera nodiflora*			3														
Amaranthaceae	*Amaranthus cuspidifolius*			2														
Amaranthaceae	*Amaranthus undulatus*			3														
Amaranthaceae	*Gomphrena canescens*			3														
Amaranthaceae	*Gomphrena canescens subsp. canescens*			3														
Amaranthaceae	*Gomphrena cunninghamii*			3														
Amaranthaceae	*Gomphrena leptoclada*			3														
Amaranthaceae	*Gomphrena leptoclada subsp. leptoclada*			2														
Amaranthaceae	*Gomphrena leptophylla*	P3		3		2					1							
Amaranthaceae	*Gomphrena tenella*			2														
Amaranthaceae	*Ptilotus aervoides*			3														
Amaranthaceae	*Ptilotus arthrolasius*			3														
Amaranthaceae	*Ptilotus astrolasius*			3														
Amaranthaceae	*Ptilotus auriculifolius*			3														
Amaranthaceae	*Ptilotus axillaris*			3														
Amaranthaceae	*Ptilotus calostachyus*			3														
Amaranthaceae	*Ptilotus clementii*			3														
Amaranthaceae	*Ptilotus exaltatus*			3														
Amaranthaceae	*Ptilotus fusiformis*			3														
Amaranthaceae	*Ptilotus gaudichaudii*			2														
Amaranthaceae	*Ptilotus helipteroides*			2														
Amaranthaceae	*Ptilotus incanus*			3														
Amaranthaceae	*Ptilotus mollis*	P4		3		16		1			1	2	1	1		1	1	1

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Amaranthaceae	*Ptilotus nobilis*			3														
Amaranthaceae	*Ptilotus polystachyus*			3														
Amaranthaceae	*Ptilotus wilsonii*	P1				2												
Apocynaceae	**Calotropis procera*						1									1		1
Apocynaceae	*Gymnanthera cunninghamii*	P3				2		1	1	1	2				1			
Apocynaceae	*Marsdenia angustata*			3														
Apocynaceae	*Schenkia clementii*			2														
Araliaceae	*Trachymene oleracea*			3														
Araliaceae	*Trachymene oleracea subsp. oleracea*			3														
Asphodelaceae	**Aloe vera var. officinalis*			3														
Asteraceae	**Bidens bipinnata*										1				1			
Asteraceae	**Flaveria trinervia*			3							2	1	1	1	1	1		1
Asteraceae	**Sonchus oleraceus*										1				1	1		
Asteraceae	*Blumea tenella*			3														
Asteraceae	*Calocephalus beardii*			3														
Asteraceae	*Centipeda minima*			2														
Asteraceae	*Centipeda minima subsp. macrocephala*			3														
Asteraceae	*Centipeda minima subsp. minima*			2														
Asteraceae	*Chrysocephalum apiculatum*			3														
Asteraceae	*Chrysocephalum pterochaetum*			2														
Asteraceae	*Ixiochlamys cuneifolia*			1														
Asteraceae	*Pentalepis trichodesmoides*			2														
Asteraceae	*Pentalepis trichodesmoides subsp. trichodesmoides*			3														
Asteraceae	*Peripleura virgata*			2														
Asteraceae	*Pluchea dentex*			3														
Asteraceae	*Pluchea ferdinandi-muelleri*			3														
Asteraceae	*Pluchea rubelliflora*			3														
Asteraceae	*Pluchea tetranthera*			3														
Asteraceae	*Podolepis capillaris*			2														
Asteraceae	*Pseudognaphalium luteoalbum*			3														
Asteraceae	*Pterocaulon serrulatum*			2														
Asteraceae	*Pterocaulon serrulatum var. velutinum*			2														
Asteraceae	*Pterocaulon sphacelatum*			3														
Asteraceae	*Pterocaulon sphaeranthoides*			3														
Asteraceae	*Rhodanthe margarethae*			3														
Asteraceae	*Streptoglossa adscendens*			1														

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Asteraceae	*Streptoglossa decurrens*			3														
Asteraceae	*Streptoglossa odora*			3														
Bignoniaceae	*Byblis filifolia*			3														
Bixaceae	*Cochlospermum macnamarae*	P1		2		5					1				1	1		
Boraginaceae	*Heliotropium ammophilum*			2														
Boraginaceae	*Heliotropium chrysocarpum*			3														
Boraginaceae	*Heliotropium crispatum*			3														
Boraginaceae	*Heliotropium cunninghamii*			3														
Boraginaceae	*Heliotropium inexplicitum*			2														
Boraginaceae	*Heliotropium muticum*	P3		6		26			1	1	1	1			1	1	1	1
Boraginaceae	*Heliotropium pachyphyllum*			3														
Boraginaceae	*Heliotropium parviantrum*	P1				1												
Boraginaceae	*Heliotropium skeleton*			2														
Boraginaceae	*Heliotropium tenuifolium*			1														
Boraginaceae	*Trichodesma zeylanicum*			3														
Boraginaceae	*Trichodesma zeylanicum var. zeylanicum*			3														
Brassicaceae	*Lepidium catapycnon*	P4				2												
Brassicaceae	*Lepidium pholidogynum*			3														
Campanulaceae	*Lobelia arnhemiaca*			2														
Campanulaceae	*Wahlenbergia tumidifructa*			3														
Caryophyllaceae	*Polycarpaea corymbosa*			2														
Caryophyllaceae	*Polycarpaea corymbosa var. corymbosa*			3														
Caryophyllaceae	*Polycarpaea holtzei*			3														
Caryophyllaceae	*Polycarpaea longiflora*			3														
Celastraceae	*Stackhousia muricata*			1														
Chenopodiaceae	*Atriplex spinulosa*	P1				15												
Chenopodiaceae	*Dysphania kalpari*			2														
Chenopodiaceae	*Dysphania melanocarpa*			3														
Chenopodiaceae	*Dysphania melanocarpa forma leucocarpa*			2														
Chenopodiaceae	*Dysphania plantaginella*			3														
Chenopodiaceae	*Dysphania rhadinostachya subsp. inflata*			3														
Chenopodiaceae	*Dysphania rhadinostachya subsp. rhadinostachya*			3														
Chenopodiaceae	*Dysphania sphaerosperma*			3														
Chenopodiaceae	*Salsola australis*			3														
Chenopodiaceae	*Sclerolaena cornishiana*			3														
Chenopodiaceae	*Sclerolaena costata*			3														

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Chenopodiaceae	*Sclerolaena densiflora*			1														
Chenopodiaceae	*Sclerolaena eriacantha*			1														
Chenopodiaceae	*Sclerolaena hostilis*			3														
Cleomaceae	*Cleome uncifera subsp. uncifera*			3														
Cleomaceae	*Cleome viscosa*			3														
Combretaceae	*Terminalia circumalata*			3														
Commelinaceae	*Cartonema parviflorum*			1														
Commelinaceae	*Commelina ensifolia*			1														
Convolvulaceae	*Bonamia erecta*			1														
Convolvulaceae	*Bonamia linearis*			2														
Convolvulaceae	*Bonamia media*			3														
Convolvulaceae	*Bonamia pannosa*			3														
Convolvulaceae	*Bonamia pilbarensis*			3														
Convolvulaceae	*Duperreya commixta*			1														
Convolvulaceae	*Evolvulus alsinoides*			2														
Convolvulaceae	*Evolvulus alsinoides var. decumbens*			2														
Convolvulaceae	*Evolvulus alsinoides var. villosicalyx*			3														
Convolvulaceae	*Ipomoea muelleri*			3														
Convolvulaceae	*Polymeria ambigua*			3														
Convolvulaceae	*Polymeria calycina*			2														
Convolvulaceae	*Polymeria mollis*			2														
Cucurbitaceae	**Citrullus colocynthis*								1	1								
Cucurbitaceae	**Citrullus lanatus*										2				1			
Cucurbitaceae	*Cucumis melo*			2														
Cucurbitaceae	*Cucumis sp. Barrow Island (D.W. Goodall 1264)*	P2				1												
Cucurbitaceae	*Cucumis variabilis*			3														
Cucurbitaceae	*Trichosanthes cucumerina*			2														
Cyperaceae	*Bulbostylis barbata*			3														
Cyperaceae	*Bulbostylis burbidgeae*	P4		3		6					2				1			
Cyperaceae	*Bulbostylis turbinata*			3														
Cyperaceae	*Cyperus betchei subsp. commiscens*			2														
Cyperaceae	*Cyperus bifax*			2														
Cyperaceae	*Cyperus cunninghamii*			3														
Cyperaceae	*Cyperus cunninghamii subsp. cunninghamii*			3														
Cyperaceae	*Cyperus difformis*			3														
Cyperaceae	*Cyperus hesperius*			3														

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Cyperaceae	*Cyperus iria*			3														
Cyperaceae	*Cyperus ixiocarpus*			1														
Cyperaceae	*Cyperus squarrosus*			3														
Cyperaceae	*Cyperus vaginatus*			3														
Cyperaceae	*Eleocharis geniculata*			2														
Cyperaceae	*Fimbristylis dichotoma*			3														
Cyperaceae	*Fimbristylis elegans*			2														
Cyperaceae	*Fimbristylis microcarya*			2														
Cyperaceae	*Fimbristylis rara*			3														
Cyperaceae	*Fimbristylis sieberiana*	P3				1												
Cyperaceae	*Fimbristylis simulans*			3														
Cyperaceae	*Fimbristylis sp. Shay Gap (K.R. Newbey 10293)*	P1				3												
Cyperaceae	*Fuirena ciliaris*			2														
Cyperaceae	*Lipocarpha microcephala*			2														
Cyperaceae	*Schoenoplectiella laevis*			3														
Cyperaceae	*Schoenoplectus subulatus*			3														
Cyperaceae	*Schoenus coultasii*	P1		2		1										1		
Cyperaceae	*Schoenus falcatus*			2														
Droseraceae	*Drosera finlaysoniana*			3														
Eriocaulaceae	*Eriocaulon pusillum*			2												1		
Euphorbiaceae	**Ricinus communis*							1										
Euphorbiaceae	*Adriana tomentosa var. tomentosa*			3														
Euphorbiaceae	*Croton aridus*	P3				1												
Euphorbiaceae	*Euphorbia australis*			3														
Euphorbiaceae	*Euphorbia australis var. australis*			3														
Euphorbiaceae	*Euphorbia australis var. subtomentosa*			3														
Euphorbiaceae	*Euphorbia biconvexa*			3														
Euphorbiaceae	*Euphorbia boophthona*			2														
Euphorbiaceae	*Euphorbia careyi*			1														
Euphorbiaceae	*Euphorbia clementii*	P3		2		11		1	1	1								1
Euphorbiaceae	*Euphorbia coghlanii*			3														
Euphorbiaceae	*Euphorbia inappendiculata var. inappendiculata*	P2				3												
Euphorbiaceae	*Euphorbia tannensis subsp. eremophila*			2														
Euphorbiaceae	*Euphorbia trigonosperma*			2														
Euphorbiaceae	*Euphorbia vaccaria var. erucoides*			1														
Fabaceae	**Parkinsonia aculeata*														1			

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Fabaceae	*Vachellia farnesiana*			2				1			1	2	1	1	1	1		1
Fabaceae	*Acacia acradenia*			3														
Fabaceae	*Acacia ampliceps*			3														
Fabaceae	*Acacia ancistrocarpa*			3														
Fabaceae	*Acacia aphanoclada*	P1				38						1	1	1				
Fabaceae	*Acacia arrecta*			1														
Fabaceae	*Acacia bivenosa*			3														
Fabaceae	*Acacia colei var. ileocarpa*			1														
Fabaceae	*Acacia coriacea subsp. pendens*			3														
Fabaceae	*Acacia cowleana*			2														
Fabaceae	*Acacia cyperophylla var. omearana*	P1				18					1							
Fabaceae	*Acacia eriopoda*			3														
Fabaceae	*Acacia eriopoda x trachycarpa*			3														
Fabaceae	*Acacia fecunda*	P1				10												
Fabaceae	*Acacia glaucocaesia*			1														
Fabaceae	*Acacia gregorii*			2														
Fabaceae	*Acacia hilliana*			2														
Fabaceae	*Acacia inaequilatera*			3														
Fabaceae	*Acacia leeuweniana*	P1				19												
Fabaceae	*Acacia levata*	P3		2		13					1					1		
Fabaceae	*Acacia ligulata*			2														
Fabaceae	*Acacia maitlandii*			3														
Fabaceae	*Acacia orthocarpa*			3														
Fabaceae	*Acacia ptychophylla*			3														
Fabaceae	*Acacia pyrifolia*			3														
Fabaceae	*Acacia pyrifolia var. pyrifolia*			3														
Fabaceae	*Acacia retivenea subsp. clandestina*			2														
Fabaceae	*Acacia sabulosa*			2														
Fabaceae	*Acacia sericophylla*			2														
Fabaceae	*Acacia sp. indet.*										2							
Fabaceae	*Acacia sp. Marble Bar*			3														
Fabaceae	*Acacia sp. Marble Bar (J.G. & M.H. Simmons 3499)*	P1				1												
Fabaceae	*Acacia sp. Nullagine (B.R. Maslin 4955)*	P1				1					1							
Fabaceae	*Acacia sphaerostachya*			2														
Fabaceae	*Acacia spondylophylla*			3														
Fabaceae	*Acacia stellaticeps*			3														

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Fabaceae	*Acacia synchronicia*			2														
Fabaceae	*Acacia tenuissima*			1														
Fabaceae	*Acacia tetragonophylla*			3														
Fabaceae	*Acacia trachycarpa*			3														
Fabaceae	*Acacia trachycarpa x tumida var. pilbarensis*			3														
Fabaceae	*Acacia tumida var. pilbarensis*			3														
Fabaceae	*Acacia wanyu*			2														
Fabaceae	*Alysicarpus muelleri*			3														
Fabaceae	*Cajanus cinereus*			3														
Fabaceae	*Cajanus marmoratus*			1														
Fabaceae	*Crotalaria crispata*			2														
Fabaceae	*Crotalaria cunninghamii*			3														
Fabaceae	*Crotalaria cunninghamii subsp. sturtii*			3														
Fabaceae	*Crotalaria medicaginea*			2														
Fabaceae	*Crotalaria medicaginea var. neglecta*			3														
Fabaceae	*Crotalaria novae-hollandiae*			2														
Fabaceae	*Crotalaria novae-hollandiae subsp. novae-hollandiae*			2														
Fabaceae	*Crotalaria ramosissima*			3														
Fabaceae	*Cullen badocanum*			3														
Fabaceae	*Cullen cinereum*			2														
Fabaceae	*Cullen lachnostachys*			3														
Fabaceae	*Cullen leucanthum*			3														
Fabaceae	*Cullen leucochaites*			2														
Fabaceae	*Cullen martinii*			3														
Fabaceae	*Cullen pallidum*			3														
Fabaceae	*Cullen pogonocarpum*			3														
Fabaceae	*Cullen pustulatum*			2														
Fabaceae	*Cullen stipulaceum*			3														
Fabaceae	*Desmodium filiforme*			1														
Fabaceae	*Dichrostachys spicata*			3														
Fabaceae	*Erythrina vespertilio*			2														
Fabaceae	*Gastrolobium grandiflorum*			2														
Fabaceae	*Gompholobium simplicifolium*			3														
Fabaceae	*Indigastrum parviflorum*			2														
Fabaceae	*Indigofera ammobia*	P3				2												
Fabaceae	*Indigofera colutea*			3														

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Fabaceae	*Indigofera hirsuta*			3														
Fabaceae	*Indigofera ixocarpa*	P2				4												
Fabaceae	*Indigofera linifolia*			3														
Fabaceae	*Indigofera linnaei*			2														
Fabaceae	*Indigofera monophylla*			3														
Fabaceae	*Indigofera rugosa*			3														
Fabaceae	*Indigofera trita*			3														
Fabaceae	*Indigofera trita subsp. trita*			2														
Fabaceae	*Isotropis atropurpurea*			3														
Fabaceae	*Leucaena leucocephala*			3														
Fabaceae	*Lotus australis*			1														
Fabaceae	*Parkinsonia aculeata*			3														
Fabaceae	*Petalostylis labicheoides*			3														
Fabaceae	*Rhynchosia australis*			3														
Fabaceae	*Rhynchosia bungarensis*	P4				1									1			
Fabaceae	*Rhynchosia minima*			3														
Fabaceae	*Rothia indica subsp. australis*	P3				4					1	1			1	1		
Fabaceae	*Senna artemisioides subsp. helmsii*			1														
Fabaceae	*Senna artemisioides subsp. oligophylla*			3														
Fabaceae	*Senna ferraria*			1														
Fabaceae	*Senna glaucifolia*			3														
Fabaceae	*Senna glutinosa*			3														
Fabaceae	*Senna glutinosa subsp. chatelainiana*			3														
Fabaceae	*Senna glutinosa subsp. glutinosa*			3														
Fabaceae	*Senna glutinosa subsp. pruinosa*			3														
Fabaceae	*Senna glutinosa subsp. x luerssenii*			3														
Fabaceae	*Senna notabilis*			3														
Fabaceae	*Senna stricta*			2														
Fabaceae	*Senna symonii*			3														
Fabaceae	*Senna venusta*			3														
Fabaceae	*Sesbania cannabina*			3														
Fabaceae	*Sesbania formosa*			3														
Fabaceae	*Swainsona decurrens*			3														
Fabaceae	*Swainsona formosa*			3														
Fabaceae	*Swainsona kingii*			3														
Fabaceae	*Swainsona stenodonta*			3														

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Fabaceae	*Swainsona thompsoniana*	P3														1		
Fabaceae	*Tephrosia clementii*			2														
Fabaceae	*Tephrosia densa*			3														
Fabaceae	*Tephrosia leptoclada*			1														
Fabaceae	*Tephrosia oxalidea*			2														
Fabaceae	*Tephrosia rosea var. clementii*			3														
Fabaceae	*Tephrosia rosea var. rosea*			1														
Fabaceae	*Tephrosia simplicifolia*			1														
Fabaceae	*Tephrosia sp. B Kimberley Flora*			3														
Fabaceae	*Tephrosia sp. Bungaroo Creek*			3														
Fabaceae	*Tephrosia sp. NW Eremaean*			3														
Fabaceae	*Tephrosia stipuligera*			1														
Fabaceae	*Tephrosia supina*			3														
Fabaceae	*Tephrosia virens*			3														
Fabaceae	*Vigna lanceolata*			3														
Fabaceae	*Vigna lanceolata var. lanceolata*			2														
Goodeniaceae	*Dampiera candicans*			3														
Goodeniaceae	*Goodenia forrestii*			3														
Goodeniaceae	*Goodenia lamprosperma*			3														
Goodeniaceae	*Goodenia microptera*			3														
Goodeniaceae	*Goodenia muelleriana*			3														
Goodeniaceae	*Goodenia nuda*	P4				1					1							
Goodeniaceae	*Goodenia scaevolina*			2														
Goodeniaceae	*Goodenia stobbsiana*			3														
Goodeniaceae	*Goodenia triodiophila*			3														
Goodeniaceae	*Scaevola amblyanthera*			2														
Goodeniaceae	*Scaevola amblyanthera var. centralis*			3														
Haloragaceae	*Haloragis gossei*			3														
Haloragaceae	*Haloragis gossei var. gossei*			2														
Haloragaceae	*Myriophyllum verrucosum*			3														
Hydrocharitaceae	*Najas tenuifolia*			3														
Hydrocharitaceae	*Vallisneria annua*			3														
Lamiaceae	*Clerodendrum floribundum var. angustifolium*			3														
Lamiaceae	*Clerodendrum floribundum var. ovatum*			3														
Lamiaceae	*Quoya zonalis K.A.Sheph. & Hislop*	EN				80		1	1	2								
Lauraceae	*Cassytha capillaris*			2														

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Lauraceae	*Cassytha filiformis*			1														
Loganiaceae	*Mitrasacme connata*			2														
Loranthaceae	*Amyema miquelii*			1														
Loranthaceae	*Amyema preissii*			3														
Loranthaceae	*Amyema sanguinea var. sanguinea*			2														
Loranthaceae	*Lysiana casuarinae*			3														
Loranthaceae	*Lysiana murrayi*			1														
Lythraceae	*Ammannia baccifera*			3														
Lythraceae	*Ammannia multiflora*			3														
Malvaceae	**Malvastrum americanum*								1	1	2	1	1	1	1	1		1
Malvaceae	*Abutilon aff. hannii*								1	1	1				1	1	1	1
Malvaceae	*Abutilon fraseri*			1														
Malvaceae	*Abutilon hannii*			2														
Malvaceae	*Abutilon lepidum*			3														
Malvaceae	*Abutilon malvifolium*			3														
Malvaceae	*Abutilon sp.*			2														
Malvaceae	*Abutilon sp. Dioicum*			3														
Malvaceae	*Abutilon sp. Pilbara*			3														
Malvaceae	*Androcalva luteiflora*			3														
Malvaceae	*Corchorus carnarvonensis*			3														
Malvaceae	*Corchorus elachocarpus*			2														
Malvaceae	*Corchorus incanus*			2														
Malvaceae	*Corchorus incanus subsp. incanus*			3														
Malvaceae	*Corchorus laniflorus*			2														
Malvaceae	*Corchorus lasiocarpus subsp. lasiocarpus*			2														
Malvaceae	*Corchorus parviflorus*			3														
Malvaceae	*Corchorus sp. Yarrie (J. Bull & D. Roberts CAL 01.05)*	P1				6												
Malvaceae	*Corchorus tridens*			3														
Malvaceae	*Corchorus walcottii*			3														
Malvaceae	*Gossypium australe*			3														
Malvaceae	*Gossypium sturtianum*			2														
Malvaceae	*Hibiscus austrinus*			2														
Malvaceae	*Hibiscus austrinus var. austrinus*			3														
Malvaceae	*Hibiscus coatesii*			3														
Malvaceae	*Hibiscus goldsworthii*			1														
Malvaceae	*Hibiscus leptocladus*			3														

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Malvaceae	*Hibiscus sturtii*			2														
Malvaceae	*Hibiscus sturtii var. campylochlamys*			3														
Malvaceae	*Hibiscus sturtii var. platychlamys*			3														
Malvaceae	*Hibiscus verdcourtii*			2														
Malvaceae	*Melhania oblongifolia*			3														
Malvaceae	*Sida arenicola*			2														
Malvaceae	*Sida clementii*			2														
Malvaceae	*Sida echinocarpa*			3														
Malvaceae	*Sida fibulifera*			2														
Malvaceae	*Sida macropoda*			3														
Malvaceae	*Sida rohlenae*			3														
Malvaceae	*Sida sp. Articulation below*			3														
Malvaceae	*Sida sp. Excedentifolia*			2														
Malvaceae	*Sida sp. Pilbara*			3														
Malvaceae	*Triumfetta appendiculata*			3														
Malvaceae	*Triumfetta chaetocarpa*			3														
Malvaceae	*Triumfetta clementii*			3														
Malvaceae	*Triumfetta maconochieana*			3														
Malvaceae	*Triumfetta propinqua*			3														
Malvaceae	*Waltheria indica*			2														
Malvaceae	*Waltheria virgata*			3														
Marsileaceae	*Marsilea sp.*			3														
Menispermaceae	*Tinospora smilacina*			2														
Molluginaceae	*Trigastrotheca molluginea*			3														
Montiaceae	*Calandrinia pentavalvis*			1														
Montiaceae	*Calandrinia quadrivalvis*			3														
Montiaceae	*Calandrinia stagnensis*			3														
Montiaceae	*Calandrinia tepperiana*			3														
Moraceae	*Ficus aculeata var. indecora*			3														
Moraceae	*Ficus brachypoda*			1														
Moraceae	*Ficus virens*			2														
Myrtaceae	*Corymbia flavescens*			3														
Myrtaceae	*Corymbia hamersleyana*			3														
Myrtaceae	*Eucalyptus camaldulensis*			2														
Myrtaceae	*Eucalyptus camaldulensis subsp. obtusa*			3														
Myrtaceae	*Eucalyptus camaldulensis subsp. refulgens*			2														

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Myrtaceae	*Eucalyptus leucophloia*			1														
Myrtaceae	*Eucalyptus leucophloia subsp. leucophloia*			3														
Myrtaceae	*Eucalyptus rowleyi*	P3				7												
Myrtaceae	*Eucalyptus victrix*			3														
Myrtaceae	*Melaleuca argentea*			3														
Myrtaceae	*Melaleuca glomerata*			3														
Myrtaceae	*Melaleuca lasiandra*			1														
Myrtaceae	*Melaleuca linophylla*			3														
Nyctaginaceae	*Boerhavia burbidgeana*			2														
Nyctaginaceae	*Boerhavia coccinea*			3														
Nyctaginaceae	*Boerhavia gardneri*			3														
Oleaceae	*Jasminum didymum*			1														
Oleaceae	*Jasminum didymum subsp. lineare*			3														
Onagraceae	*Ludwigia perennis*			3														
Orobanchaceae	*Buchnera linearis*			2														
Papaveraceae	**Argemone ochroleuca*			6				1			1				1	1		
Passifloraceae	**Passiflora foetida var. hispida*															1		
Pedaliaceae	*Josephinia eugeniae*			2														
Pedaliaceae	*Josephinia sp. Mt Edgar Station*			3														
Pedaliaceae	*Josephinia sp. Woodstock (A.A. Mitchell PRP 989)*	P1																1
Phrymaceae	*Mimulus gracilis*			2														
Phrymaceae	*Peplidium sp. E Evol. Fl. Fauna Arid Aust.*			2														
Phyllanthaceae	*Flueggea virosa*			2														
Phyllanthaceae	*Flueggea virosa subsp. melanthesoides*			3														
Phyllanthaceae	*Notoleptopus decaisnei*			3														
Phyllanthaceae	*Phyllanthus hebecarpus*	P3				2					1							
Phyllanthaceae	*Phyllanthus maderaspatensis*			3														
Plantaginaceae	*Stemodia grossa*			3														
Plantaginaceae	*Stemodia viscosa*			3														
Poaceae	**Cenchrus ciliaris*			6			1	1	1	1	2	1	1	1	1	1		1
Poaceae	**Cenchrus setiger*										1	1	1	1		1		1
Poaceae	**Chloris barbata*										2					1		
Poaceae	**Chloris virgata*										1							1
Poaceae	**Cynodon dactylon*							1			2				1	1		
Poaceae	**Digitaria ciliaris*										1							
Poaceae	**Echinochloa colona*			2							1					1		

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Poaceae	**Eragrostis minor*																	1
Poaceae	**Setaria verticillata*			2				1				1	1	1		1		
Poaceae	*Acrachne racemosa*			1														
Poaceae	*Amphipogon caricinus var. caricinus*			3														
Poaceae	*Aristida burbidgeae*			3														
Poaceae	*Aristida contorta*			3														
Poaceae	*Aristida holathera*			3														
Poaceae	*Aristida hygrometrica*			2														
Poaceae	*Aristida inaequiglumis*			1														
Poaceae	*Chloris pumilio*			2														
Poaceae	*Chrysopogon fallax*			3														
Poaceae	*Cymbopogon ambiguus*			3														
Poaceae	*Cymbopogon obtectus*			3														
Poaceae	*Cymbopogon procerus*			2														
Poaceae	*Cynodon convergens*			2														
Poaceae	*Cynodon prostratus*			2														
Poaceae	*Dactyloctenium radulans*			3														
Poaceae	*Dichanthium sericeum subsp. humilius*			3														
Poaceae	*Digitaria brownii*			3														
Poaceae	*Digitaria ctenantha*			3														
Poaceae	*Diplachne fusca subsp. fusca*			1														
Poaceae	*Enneapogon caerulescens*			3														
Poaceae	*Enneapogon lindleyanus*			3														
Poaceae	*Enneapogon polyphyllus*			3														
Poaceae	*Enneapogon robustissimus*			2														
Poaceae	*Enteropogon ramosus*			2														
Poaceae	*Eragrostis crateriformis*	P3		1		15					1	1	1	1	1	1		1
Poaceae	*Eragrostis cumingii*			3														
Poaceae	*Eragrostis desertorum*			2														
Poaceae	*Eragrostis dielsii*			3														
Poaceae	*Eragrostis eriopoda*			3														
Poaceae	*Eragrostis setifolia*			2														
Poaceae	*Eragrostis speciosa*			3														
Poaceae	*Eragrostis tenellula*			3														
Poaceae	*Eriachne aristidea*			3														
Poaceae	*Eriachne benthamii*			3														

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Poaceae	*Eriachne ciliata*			3														
Poaceae	*Eriachne melicacea*			3														
Poaceae	*Eriachne mucronata*			3														
Poaceae	*Eriachne obtusa*			2														
Poaceae	*Eriachne pulchella*			3														
Poaceae	*Eriachne pulchella subsp. pulchella*			3														
Poaceae	*Eriachne tenuiculmis*			3														
Poaceae	*Eulalia aurea*			3														
Poaceae	*Heteropogon contortus*			3														
Poaceae	*Iseilema dolichotrichum*			2														
Poaceae	*Iseilema fragile*			2														
Poaceae	*Iseilema vaginiflorum*			3														
Poaceae	*Paraneurachne muelleri*			3														
Poaceae	*Paspalidium basicladum*			2														
Poaceae	*Paspalidium clementii*			3														
Poaceae	*Paspalidium rarum*			1														
Poaceae	*Paspalidium tabulatum*			3														
Poaceae	*Perotis rara*			2														
Poaceae	*Schizachyrium fragile*			2														
Poaceae	*Setaria dielsii*			2														
Poaceae	*Setaria surgens*			3														
Poaceae	*Sorghum plumosum*			2														
Poaceae	*Sporobolus actinocladus*			3														
Poaceae	*Sporobolus australasicus*			3														
Poaceae	*Themeda avenacea*			2														
Poaceae	*Themeda sp. Hamersley Station (M.E. Trudgen 11431)*	P3				1												
Poaceae	*Themeda triandra*			3														
Poaceae	*Tragus australianus*			2														
Poaceae	*Triodia angusta*			2														
Poaceae	*Triodia basitricha*	P3				4												
Poaceae	*Triodia brizoides*			3														
Poaceae	*Triodia chichesterensis*	P3				1												
Poaceae	*Triodia epactia*			3														
Poaceae	*Triodia longiceps*			3														
Poaceae	*Triodia wiseana*			3														
Poaceae	*Triraphis mollis*			2														

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Poaceae	*Urochloa holosericea subsp. velutina*			2														
Poaceae	*Urochloa piligera*			2														
Poaceae	*Yakirra australiensis*			3														
Poaceae	*Yakirra australiensis var. australiensis*			2														
Polygalaceae	*Polygala glaucifolia*			3														
Polygalaceae	*Polygala isingii*			3														
Portulacaceae	**Portulaca pilosa*															1		
Portulacaceae	*Portulaca ?digyna*															1	1	1
Portulacaceae	*Portulaca conspicua*			2														
Portulacaceae	*Portulaca cyclophylla*			1														
Portulacaceae	*Portulaca digyna*			3														
Portulacaceae	*Portulaca oleracea*			3														
Posidoniaceae	*Potamogeton tepperi*			3														
Proteaceae	*Grevillea pyramidalis*			2														
Proteaceae	*Grevillea pyramidalis subsp. leucadendron*			3														
Proteaceae	*Grevillea pyramidalis subsp. pyramidalis*			1														
Proteaceae	*Grevillea wickhamii*			1														
Proteaceae	*Grevillea wickhamii subsp. aprica*			3														
Proteaceae	*Grevillea wickhamii subsp. hispidula*			1														
Proteaceae	*Hakea lorea subsp. lorea*			3														
Psilotaceae	*Psilotum nudum*			2														
Pteridaceae	*Acrostichum speciosum*			1												1		
Pteridaceae	*Cheilanthes brownii*			2														
Pteridaceae	*Cheilanthes sieberi subsp. pseudovellea*			3														
Pteridaceae	*Cheilanthes sieberi subsp. sieberi*			3														
Rubiaceae	*Dolichocarpa crouchiana*			3														
Rubiaceae	*Dolichocarpa sp.*															1		
Rubiaceae	*Dolichocarpa sp. Hamersley Station (A.A. Mitchell PRP 1479)*	P3				1												
Rubiaceae	*Synaptantha tillaeacea*			3														
Rubiaceae	*Synaptantha tillaeacea var. tillaeacea*			3														
Santalaceae	*Exocarpos sparteus*			3														
Santalaceae	*Santalum lanceolatum*			3														
Sapindaceae	*Atalaya hemiglauca*			3														
Scrophulariaceae	*Eremophila latrobei subsp. glabra*			1														
Scrophulariaceae	*Eremophila longifolia*			3														

Family	Scientific Name	Status		Databases [1]			Reports reviewed for the desktop											
		BC Act	EPBC Act	NM	PM	TPFL	GHD17	MA07	WM12a	WM12b	WM12c	WM13a	WM13b	WM13c	WM14c	WM16	WM18	WM20
Scrophulariaceae	*Eremophila maculata subsp. filifolia*	P1				3												
Scrophulariaceae	*Eremophila sp.*			3														
Solanaceae	**Solanum nigrum*							1			1					1		
Solanaceae	*Nicotiana benthamiana*			3														
Solanaceae	*Nicotiana occidentalis subsp. occidentalis*			3														
Solanaceae	*Nicotiana rosulata subsp. rosulata*			2														
Solanaceae	*Nicotiana umbratica*	P3		3		8					1	1			1	1		
Solanaceae	*Physalis angulata*			2														
Solanaceae	*Solanum ashbyae*			3														
Solanaceae	*Solanum cleistogamum*			1														
Solanaceae	*Solanum dioicum*			1														
Solanaceae	*Solanum diversiflorum*			3														
Solanaceae	*Solanum horridum*			3														
Solanaceae	*Solanum lasiophyllum*			2														
Solanaceae	*Solanum phlomoides*			3														
Solanaceae	*Solanum sp. Mosquito Creek (A.A. Mitchell et al. AAM 10795)*	P1				9												
Stylidiaceae	*Stylidium desertorum*			3														
Stylidiaceae	*Stylidium weeliwolli*	P3		2		1										1		
Typhaceae	*Typha domingensis*			1														
Violaceae	*Hybanthus aurantiacus*			3														
Zygophyllaceae	**Tribulus terrestris*										1					1		1
Zygophyllaceae	*Tribulus astrocarpus*			2														
Zygophyllaceae	*Tribulus cistoides*			2														
Zygophyllaceae	*Tribulus hirsutus*			3														
Zygophyllaceae	*Tribulus platypterus*			3														
Zygophyllaceae	*Tribulus suberosus*			2														
Elatinaceae	*Bergia ammannioides*			2														
Elatinaceae	*Bergia pedicellaris*			2														

Footnotes:

1 = Databases reviewed for the desktop

NM DBCA (2021) NatureMap database
PM AWE (2021) Protected Matters Search Tool
TPFL DBCA Threatened and Priority Flora Database (including data from the WA Herbarium)

2 = Survey reports reviewed for the desktop

WM20 Woodman Environmental (2020) Warrawoona Gold Project. Detailed Flora and Vegetation Assessment.
MA07 Mattiske (2007). Flora and Vegetation and Assessment of Groundwater Dependent Ecosystems in the Panorama Project Survey Area.
WM12a Woodman Environmental (2012a) – mining project and infrastructure corridor to GNH
WM12b Woodman Environmental (2012b) – camp and haul road corridor to Marble Bar Road
WM12c Woodman Environmental (2012c) - mining area and Public Road Upgrade (PRU)
WM13a Woodman Environmental (2013a) - PRU supplementary survey

WM12c *Woodman Environmental (2012c) - mining area and Public Road Upgrade (PRU)*
WM13a *Woodman Environmental (2013a) - PRU supplementary survey*
WM13b *Woodman Environmental (2013b) - McPhee Creek Project Study Area*
WM18 *Woodman Environmental (2018) Corunna Downs Intersection Works Flora and Vegetation Assessment. Report for Atlas Iron Ltd. May 2018.*
WM13c *Woodman Environmental (2013c) - Targeted significant flora survey*
WM14a *Woodman Environmental (2014a) - Project Discharge Options*
WM14b *Woodman Environmental (2014b) - Eastern Corridor (Yandeyarra to Mt Webber and McPhee Creek)*
WM14c *Woodman Environmental (2014c) – Rail spur linking Eastern Corridor to a third party rail line*
WM16 *Woodman Environmental (2016) – Level 2 Flora and Vegetation Assessment*
GHD17 *GHD (2017) – Biological Assessments - M030 Material Pit Extraction Area 356 SLK; Coongan Gorge Road Realignment (Level 1 flora and vegetation surveys)*
WM18 *Woodman Environmental (2018) Corunna Downs Intersection Works Flora and Vegetation Assessment. Report for Atlas Iron Ltd. May 2018.*

Appendix V – Flora desktop results: Conservation significant flora and likelihood assessment

Family	Scientific Name	Status	Total records	Growth form	Flowering period	Habitat information	Habitat in survey area	Distance	Likelihood rating
Acanthaceae	*Rostellularia* adscendens var. latifolia	P3	11	Herb or shrub, 3 m high.	April to May	Near creeks, rocky hills. Ironstone soils.	Yes	29 km	Unlikely
Amaranthaceae	*Gomphrena leptophylla*	P3	6	Prostrate or erect to spreading annual, herb,.0.15 m high, flowers white.	March to September	Sand, sandy to clayey loam, granite, quartzite. Open flats, sandy creek beds, edges salt pans & marshes, stony hillsides.	Yes	15-70 km	Possible
Amaranthaceae	*Ptilotus mollis*	P4	28	Compact, perennial shrub, to no info on FloraBase.5 m high, soft grey foliage.	May or September	Stony hills and screes.	Yes	0-54 km	Highly likely
Amaranthaceae	*Ptilotus wilsonii*	P1	2	Shrub, ca 0.5 m high. Fl. green-white	October	Stony gravelly soils, rocky hills. Lower hill slope. Gravelly, calcrete / limestone - like rocky surface.	Yes	67 km	Unlikely
Apocynaceae	*Gymnanthera cunninghamii*	P3	8	Erect shrub, 1-2 m high	January to December	Sandy soils and drainage lines	Yes	51-76 km	Unlikely
Bixaceae	*Cochlospermum macnamarae*	P1	10	no info on FloraBase	No info	Granite boulders, skeletal brown sand	Yes	35-58 km	Possible
Boraginaceae	*Heliotropium murinum*	P3	12	Short-lived perennial, herb, up to 0.4 m high	May or September	Red sand. Sand plains. Flat. Brown light clay/sand over ironstone. 0-10% loose rock. Collection site: private property.	Yes	2-70 km	Highly likely
Boraginaceae	*Heliotropium muticum*	P3	28	Ascending to spreading perennial, herb, to 0.3 m high. Cryptic species that responds to fire.	April to June, September	Flat terrain, low in landscape, skeletal red brown granitic soil, very gritty. Clay loams, floodplains, sandplains	Yes	13-65 km	Likely
Boraginaceae	*Heliotropium parviantrum*	P1	1	Erect annual, herb, to 0.15 m high	February to June	Sandy soils. Flats, plains, rocky slopes.	Yes	68 km	Unlikely
Brassicaceae	*Lepidium catapycnon*	P4	2	Erect annual, herb, to 0.15 m high	February to June	Sandy soils. Flats, plains, rocky slopes.	Yes	74 km	Unlikely
Chenopodiaceae	*Atriplex spinulosa*	P1	15	Monoecious, erect annual herb to 0.2	No info	Quartz drainage lines and brown silty clay loams	Maybe	65-78 km	Unlikely
Cucurbitaceae	*Cucumis* sp. Barrow Island (D.W. Goodall 1264)	P2	1	no info on FloraBase	May	Lower footslope of a basalt hill	Maybe	35 km	Unlikely

Family	Scientific Name	Status	Total records	Growth form	Flowering period	Habitat information	Habitat in survey area	Distance	Likelihood rating
Cyperaceae	*Bulbostylis burbidgeae*	P4	12	Tufted, erect to spreading annual, grass-like or herb (sedge). 25 cm high, spikelets in a simple umbel or rarely solitary; stamens 3; involucral bracts long, hairy.	March, June to August	Granite outcrops, granitic soils, cliff bases.	Yes	19-60 km	Unlikely
Cyperaceae	*Fimbristylis sieberiana*	P3	1	Shortly rhizomatous, tufted perennial, grass-like or herb (sedge), 0.25-0.6 m high	May to June	Drainage line with black clay loam soil. Mud, skeletal soil pockets. Pool edges, sandstone cliff	No	70 km	Unlikely
Cyperaceae	*Fimbristylis* sp. Shay Gap (K.R. Newbey 10293)	P1	3	Tufted annual, grass-like or herb (sedge), 0.12-0.15 m high, inflorescence of 3-many spikelets	June to July	Sandy soil, basalt, Drainage line	Yes	50-70 km	Possible
Cyperaceae	*Schoenus coultasii* [3]	P1	4	no info on FloraBase	No info	Granite seepage area. Brown sandy loam.	Maybe	25-66 km	Unlikely
Euphorbiaceae	*Croton aridus*	P3	1	Monoecious, multi-stemmed evergreen shrub to 1.5m high	August	Deep red sand, pindan soil. Sandplains or ridges, spinifex sandplains	Maybe	90km	Unlikely
Euphorbiaceae	*Euphorbia clementii*	P3	17	Erect herb to 0.6 m high.	April	Gravelly hillsides, stony grounds. Drainage lines, red, orange sandy loams, some stony areas	Yes	2-80 km	Highly likely
Euphorbiaceae	*Euphorbia inappendiculata* var. *inappendiculata*	P2	3	no info on FloraBase	May	Claypan, red-brown sandy clay.	No	47-60 km	Unlikely
Fabaceae	*Acacia aphanoclada*	P1	41	Slender, wispy shrub, 1.7-5 m high.	August to October	Skeletal stony soils. Rocky hills, ridges & rises.	Yes	40-85 km	Possible
Fabaceae	*Acacia cyperophylla* var. *omearana*	P1	19	Tree, 4-10m high, minni-ritchi bark	March, April, August, October	Stony and gritty alluvium. Associated with creek and drainage lines on sandy and rocky soils	Yes	40-70 km	Possible
Fabaceae	*Acacia fecunda*	P1	10	Erect, obconic tree to 3m, grey bark, phyllodes are sub-glacous, spikes	April, May, August, October	Quartzite gibbers, grey-red skeletal soil, creeklines, road verges. Base of hills, scree slopes.	Yes	70-80 km	Unlikely
Fabaceae	*Acacia leeuweniana*	P1	19	Narrow obconic tree to 14 m. Bark minni ritchi, inflorescence in spikes	No info	Gritty, skeletal red-grey sandy loam, light orange-btrown gravelly sand, granite. In rock fissures in outcrops, among boulders	Yes	45-50 km	Possible

Family	Scientific Name	Status	Total records	Growth form	Flowering period	Habitat information	Habitat in survey area	Distance	Likelihood rating
Fabaceae	*Acacia levata*	P3	17	Spreading, multi-stemmed shrub, 1-3 m high, to 5 m wide.	May and October	Sand or sandy loam over granite. Hillslopes. Rocky hillslopes, stony clay loams, associated with spinifex	Yes	25-60 km	Possible
Fabaceae	*Acacia* sp. Marble Bar (J.G. & M.H. Simmons 3499)	P1	1	Shrub, inflorescence in spikes, to 30mm long. Fl. Yellow.	September	Dry watercourse amongst low rocky hills. Only one record of this taxon in FloraBase from 1997.	Yes	3 km	Possible
Fabaceae	*Acacia* sp. Nullagine (B.R. Maslin 4955)	P1	2	no info on FloraBase	No info	Rocky clay, low lying area between rocky hills.	Yes	37 km	Possible
Fabaceae	*Indigofera ammobia*	P3	2	no info on FloraBase	No info	Hummock sandplains	Yes	70 km	Possible
Fabaceae	*Indigofera ixocarpa*	P2	4	Shrub, to 1 m high	March, May	Stony alluvial soils Skeletal red soils over massive ironstone.	Yes	65-70 km	Unlikely
Fabaceae	*Rhynchosia bungarensis*	P4	2	Compact, prostrate shrub, to 0.5 m high	May, July, November	Granite outcrop, with boulders. Skeletal brown sandy loam. Pebbly, shingly coarse sand amongst boulders. Banks of flow line in the mouth of a gully in a valley wall.	Maybe	59-71 km	Unlikely
Fabaceae	*Rothia indica* subsp. *australis*	P3	8	Prostrate annual, herb, to 0.3 m high, densely covered in spreading hairs.	April to August	Sandy soils. Sandhills and sandy flats. Sandy drainage flat. Red/brown sandy loam. Some rocks	Yes	53-87 km	Possible
Fabaceae	*Swainsona thompsoniana*	P3	1	Erect, herb	April, June, August	No info	No info	38 km	Possible
Goodeniaceae	*Goodenia nuda*	P4	2	Erect to ascending herb, to 5 m high.	April to August	Open depression. Brown sandy loam with granite stones.	Maybe	38 km	Possible
Lamiaceae	*Quoya zonalis* [1] K.A.Sheph. & Hislop	EN	84	no info on FloraBase	June-September	Granite and rocky outcrops	Yes	42-75 km	Possible
Malvaceae	*Corchorus* sp. Yarrie (J. Bull & D. Roberts CAL 01.05)	P1	6	Shrub 0.4 to 1.8 m, – 1.8 m high.	May, June	Mesas (stony hills), hilltops, steep hill slopes, drainage lines associated with mesas.	Maybe (after recovery from fire)	7.5-80 km	Possible
Myrtaceae	*Eucalyptus rowleyi*	P3	7	no info on FloraBase	June to July	Creeklines, grey sandy loams	Yes	75-80 km	Unlikely
Pedaliaceae	*Josephinia* sp. Woodstock (A.A. Mitchell PRP 989)	P1	1	Small herb or shrub to 0.4 m high. Pink to mauve foxglove-like flowers, serrated leaves, and woolly stems and abaxial surface of foliage.	No info	Sheet flow or drainage lines, on red sandy (granitic) plains. Loamy minor drainage line.	Yes	6.8-65 km	Likely
Phyllanthaceae	*Phyllanthus hebecarpus*	P3	3	no info on FloraBase	No info	Granite outcrop and red sandy plain	Yes	50 km	Unlikely

Family	Scientific Name	Status	Total records	Growth form	Flowering period	Habitat information	Habitat in survey area	Distance	Likelihood rating
Poaceae	*Eragrostis crateriformis*	P3	23	Annual, grass-like or herb, 0.17-0.42 m high.	May or July	Creek banks, depressions, Claypans, red-brown clay loams	Yes	7-88 km	Highly likely
Poaceae	*Themeda* sp. Hamersley Station (M.E. Trudgen 11431)	P3	1	Tussocky perennial, grass-like or herb, 0.9-1.8 m high	August	Red clay. Clay pan, grass plain. Moist, red sand-loam along minor creek. Over dolerite (bright red rocks). Burnt in 2003.	Yes	50 km	Possible
Poaceae	*Triodia basitricha*	P3	4	no info on FloraBase	May	Ironstone hills	Maybe	40-75 km	Possible
Poaceae	*Triodia chichesterensis*	P3	1	no info on FloraBase	May	No info	No info	48 km	Possible
Rubiaceae	*Dolichocarpa* sp. Hamersley Station (A.A. Mitchell PRP 1479)[2]	P3	1	no info on FloraBase	No info	No info	No info	50 km	Possible
Scrophulariaceae	*Eremophila maculata* subsp. *filifolia*	P1	3	no info on FloraBase	July	Plain. Red sand. Collection site: rangeland.	Maybe	69 km	Unlikely
Solanaceae	*Nicotiana umbratica*	P3	15	Erect, short-lived annual or perennial, herb, 0.3-0.7 m high. Fl. White.	April to June	Shallow soils, outcrops. Rocky outcrops. Granite outcrops	Yes	20 km	Possible
Solanaceae	*Solanum* sp. Mosquito Creek (A.A. Mitchell et al. AAM 10795)	P1	9	no info on FloraBase	March, June, October	Drainage lines, semi-saline clay pans, stony undulating plains	Yes	68 km	Unlikely
Stylidiaceae	*Stylidium weeliwolli*	P3	4	Annual, herb, 0.1-0.25 m high, throat appendages 4, rod-shaped. Fl. pink & red.	August to September	Gritty sand soil, sandy clay. Edge of watercourses. Granite seepage area. Brown sandy loam.	Yes	38-75 km	Possible

Footnotes:

1 = Name change from: Pityrodia sp. Marble Bar

2 = Name change from: Oldenlandia sp. Hamersley Station

3 = Name change from: Schoenus sp. Marble Bar

Appendix VI – Fauna desktop results: All vertebrate fauna

Family	Scientific name	Common name	Status		Databases [1]				Survey reports reviewed [2]											
			BC Act	EPBC	NM	PM	TPFa	BD	BA01	BA09a	BA09b	BL19	BT07	EC10	EC12	HO91	MO7	MWH16	OE11	BL20
Birds																				
Casuariidae	*Dromaius novaehollandiae*	Emu									1					1				
Anatidae	*Dendrocygna eytoni*	Plumed Whistling-Duck						1		1										
Anatidae	*Malacorhynchus membranaceus*	Pink-eared Duck			34			13												
Anatidae	*Cygnus atratus*	Black Swan			3			5			1				1					
Anatidae	*Aythya australis*	Hardhead			3			13												
Anatidae	*Anas superciliosa*	Pacific Black Duck			4			52	1	1					1	1				
Anatidae	*Anas gracilis*	Grey Teal			1292			42		1					1	1				
Anatidae	*Chenonetta jubata*	Australian Wood Duck			2			1												
Phasianidae	*Coturnix pectoralis*	Stubble Quail		MA												1				
Phasianidae	*Synoicus ypsilophorus*	Brown Quail			3			6	1	1					1					
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe			3			20								1				
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe			229			10												
Columbidae	*Geophaps plumifera*	Spinifex Pigeon			3			67	1	1	1	1	1	1	1	1		1	1	
Columbidae	*Phaps chalcoptera*	Common Bronzewing			224			9	1	1	1		1	1	1	1		1	1	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon			112			39	1	1	1		1		1	1		1		
Columbidae	*Geopelia cuneata*	Diamond Dove			3			75	1	1	1	1	1		1	1		1		
Columbidae	*Geopelia placida*	Peaceful Dove			3			47	1	1	1	1			1	1		1	1	
Cuculidae	*Centropus phasianinus*	Pheasant Coucal			4			6	1	1			1		1	1				
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-Cuckoo		MA	3	3		29	1	1			1		1			1		
Cuculidae	*Chalcites osculans*	Black-eared Cuckoo		MA							1					1				
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo			3			42	1	1	1		1		1	1		1		
Otididae	*Ardeotis australis*	Australian Bustard			3			4	1	1	1		1		1	1		1		
Podargidae	*Podargus strigoides*	Tawny Frogmouth						2	1	1			1		1	1			1	
Eurostopodidae	*Eurostopodus argus*	Spotted Nightjar		MA	3			5	1	1	1			1	1	1		1	1	
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar			4			4	1	1	1				1	1		1		
Apodidae	*Apus pacificus*	Fork-tailed Swift	MI	MI, MA		6									1	1				
Rallidae	*Hypotaenidia philippensis*	Buff-banded Rail			3			2							1					
Rallidae	*Zapornia tabuensis*	Spotless Crake		MA	141			2												
Rallidae	*Porphyrio porphyrio*	Purple Swamphen		MA	22			1												
Rallidae	*Tribonyx ventralis*	Black-tailed Native-hen			3			1												
Rallidae	*Fulica atra*	Eurasian Coot			3			19								1				

Family	Scientific name	Common name	Status		Databases [1]				Survey reports reviewed [2]											
			BC Act	EPBC	NM	PM	TPFa	BD	BA01	BA09a	BA09b	BL19	BT07	EC10	EC12	HO91	MO7	MWH16	OE11	BL20
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew			3			11	1	1	1		1		1	1		1		
Recurvirostridae	*Himantopus leucocephalus*	Pied Stilt		MA	3			21								1				
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover		MA	3			9												
Charadriidae	*Charadrius veredus*	Oriental Plover	MI	MI, MA	3	6	2	2								1				
Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel			3			92	1	1	1				1	1		1		
Charadriidae	*Vanellus miles*	Masked Lapwing			3			10												
Charadriidae	*Erythrogonys cinctus*	Red-kneed Dotterel			3			12												
Rostratulidae	*Rostratula australis*	Australian Painted-snipe	EN	EN		6														
Scolopacidae	*Numenius madagascariensis*	Eastern Curlew	CR	CR, MI, MA		3														
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	MI	MI, MA	3	6	4	4												
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	CR	CR, MI, MA		8														
Scolopacidae	*Calidris melanotos*	Pectoral Sandpiper	MI	MI, MA		6														
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	MI	MI, MA	3	6	4	9								1				
Scolopacidae	*Tringa nebularia*	Common Greenshank	MI	MI, MA	3		1	2								1				
Scolopacidae	*Tringa glareola*	Wood Sandpiper	MI	MI, MA	3		6	11								1				
Turnicidae	*Turnix velox*	Little Button-quail			3			4	1	1		1			1	1		1		
Glareolidae	*Stiltia isabella*	Australian Pratincole		MA	1			1								1				
Glareolidae	*Glareola maldivarum*	Oriental Pratincole	MI	MI, MA		6														
Laridae	*Chlidonias hybrida*	Whiskered Tern						1							1	1				
Ciconiidae	*Ephippiorhynchus asiaticus*	Black-necked Stork			3			17	1	1										
Pelicanidae	*Pelecanus conspicillatus*	Australian Pelican		MA	167			48	1							1				
Ardeidae	*Nycticorax caledonicus*	Nankeen Night-Heron		MA	98			16	1				1			1				
Ardeidae	*Bubulcus ibis*	Cattle Egret		MA		3														
Ardeidae	*Ardea pacifica*	White-necked Heron			3			57	1	1						1				
Ardeidae	*Ardea alba*	Great Egret		MA		3		38	1							1				
Ardeidae	*Ardea alba modesta*	Eastern Great Egret		MA	3															
Ardeidae	*Ardea intermedia*	Intermediate Egret		MA	3			7												
Ardeidae	*Egretta novaehollandiae*	White-faced Heron			5			67	1	1	1		1		1	1				
Ardeidae	*Egretta garzetta*	Little Egret		MA	3			12												
Threskiornithidae	*Threskiornis moluccus*	Australian White Ibis						4												
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		MA	3			32	1							1				
Threskiornithidae	*Plegadis falcinellus*	Glossy Ibis	MI	MI, MA	2		1	2												
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant			5			51	1							1				
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant						55	1							1				

Family	Scientific name	Common name	Status		Databases [1]				Survey reports reviewed [2]											
			BC Act	EPBC	NM	PM	TPFa	BD	BA01	BA09a	BA09b	BL19	BT07	EC10	EC12	HO91	MO7	MWH16	OE11	BL20
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter			3			57	1						1	1				
Pandionidae	*Pandion haliaetus*	Osprey	MI	MI	2	6	2	2												1
Accipitridae	*Elanus axillaris*	Black-shouldered Kite			2				1							1		1		
Accipitridae	*Hamirostra melanosternon*	Black-breasted Buzzard						1		1										
Accipitridae	*Lophoictinia isura*	Square-tailed Kite													1					
Accipitridae	*Aquila audax*	Wedge-tailed Eagle			3			10	1	1	1	1	1	1	1	1		1	1	
Accipitridae	*Hieraaetus morphnoides*	Little Eagle			3			16	1		1					1				
Accipitridae	*Circus approximans*	Swamp Harrier		MA	3			2												
Accipitridae	*Circus assimilis*	Spotted Harrier			3			15	1	1	1			1		1		1		
Accipitridae	*Accipiter fasciatus*	Brown Goshawk		MA	29			12	1	1			1	1		1		1	1	
Accipitridae	*Accipiter cirrocephalus*	Collared Sparrowhawk			6			1	1						1	1		1		
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle		MA	3	3		2												
Accipitridae	*Haliastur sphenurus*	Whistling Kite		MA	3			65	1	1	1				1			1		
Accipitridae	*Milvus migrans*	Black Kite			25			13		1					1	1		1		
Tytonidae	*Tyto alba*	Barn Owl			2											1		1		
Strigidae	*Ninox connivens*	Barking Owl			46					1						1				
Strigidae	*Ninox boobook*	Southern Boobook			5			19	1	1	1			1	1	1		1		
Meropidae	*Merops ornatus*	Rainbow Bee-eater		MA	3	3		93	1	1	1		1	1	1	1		1	1	
Alcedinidae	*Todiramphus sanctus*	Sacred Kingfisher		MA	3			42	1	1	1				1	1			1	
Alcedinidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher			3			27	1	1	1		1		1	1		1	1	
Alcedinidae	*Dacelo leachii*	Blue-winged Kookaburra			5			66	1	1	1		1	1	1	1		1	1	
Falconidae	*Falco cenchroides*	Nankeen Kestrel		MA	3			38	1	1	1	1		1	1	1		1	1	
Falconidae	*Falco longipennis*	Australian Hobby			2			1								1				
Falconidae	*Falco berigora*	Brown Falcon			3			23	1	1	1		1	1	1	1		1	1	
Falconidae	*Falco hypoleucos*	Grey Falcon	VU		2	3	1								1					
Falconidae	*Falco subniger*	Black Falcon			3			2												
Falconidae	*Falco peregrinus*	Peregrine Falcon	OS		3		1	3								1		1		
Cacatuidae	*Nymphicus hollandicus*	Cockatiel			75			22	1	1	1		1		1	1		1	1	
Cacatuidae	*Eolophus roseicapilla*	Galah			8			86	1	1	1	1	1	1	1	1		1	1	
Cacatuidae	*Cacatua sanguinea*	Little Corella			3			90	1	1	1			1	1	1		1	1	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck			10			22	1	1	1			1	1	1		1	1	
Psittaculidae	*Pezoporus occidentalis*	Night Parrot	CR	EN		3														
Psittaculidae	*Neopsephotus bourkii*	Bourke's Parrot			5			1												
Psittaculidae	*Melopsittacus undulatus*	Budgerigar			8			35	1	1		1	1		1	1		1		
Ptilonorhynchidae	*Ptilonorhynchus guttatus*	Western Bowerbird			86			10	1	1			1		1	1		1	1	
Climacteridae	*Climacteris melanurus*	Black-tailed Treecreeper						2										1		

Family	Scientific name	Common name	Status		Databases [1]				Survey reports reviewed [2]											
			BC Act	EPBC	NM	PM	TPFa	BD	BA01	BA09a	BA09b	BL19	BT07	EC10	EC12	HO91	MO7	MWH16	OE11	BL20
Maluridae	*Malurus lamberti*	Variegated Fairy-wren			5			10	1	1	1		1	1	1	1		1	1	
Maluridae	*Malurus leucopterus*	White-winged Fairy-wren			85			10		1				1	1	1				
Maluridae	*Stipiturus ruficeps*	Rufous-crowned Emu-wren			1			1	1							1				
Maluridae	*Amytornis striatus whitei*	Pilbara Grasswren			280			4	1	1	1	1		1	1	1		1	1	
Meliphagidae	*Sugomel niger*	Black Honeyeater						2			1					1				
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater			16			77	1	1	1		1	1	1	1		1	1	
Meliphagidae	*Melithreptus gularis*	Black-chinned Honeyeater			11			6	1	1			1		1			1		
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater							1		1					1			1	
Meliphagidae	*Conopophila whitei*	Grey Honeyeater																	1	
Meliphagidae	*Epthianura tricolor*	Crimson Chat			2			8	1						1	1		1		
Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater			3			3			1				1	1				
Meliphagidae	*Gavicalis virescens*	Singing Honeyeater			3			38	1	1	1	1	1		1	1		1	1	
Meliphagidae	*Ptilotula keartlandi*	Grey-headed Honeyeater			106			38	1	1	1		1	1	1	1		1	1	
Meliphagidae	*Ptilotula plumula*	Grey-fronted Honeyeater						2										1		
Meliphagidae	*Ptilotula penicillata*	White-plumed Honeyeater						130	1	1	1		1	1	1	1		1	1	
Meliphagidae	*Purnella albifrons*	White-fronted Honeyeater			1			1								1				
Meliphagidae	*Manorina flavigula*	Yellow-throated Miner			44			104	1	1	1	1	1	1	1	1		1	1	
Pardalotidae	*Pardalotus rubricatus*	Red-browed Pardalote			106			56	1	1	1		1		1	1		1		
Pardalotidae	*Pardalotus striatus*	Striated Pardalote			3			5	1	1				1						
Acanthizidae	*Gerygone fusca*	Western Gerygone							1							1				
Acanthizidae	*Smicrornis brevirostris*	Weebill			3			9	1		1	1		1	1	1		1	1	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill			1															
Acanthizidae	*Acanthiza robustirostris*	Slaty-backed Thornbill						1												
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned Babbler			5			44		1	1				1			1		
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike												1		1				
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		MA	4			105	1	1	1		1	1	1	1		1	1	
Campephagidae	*Lalage tricolor*	White-winged Triller			3			24	1	1			1		1	1		1		
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler			15			16	1		1			1	1			1		
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush			4			36	1	1	1		1	1	1	1		1	1	
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird			124			5	1	1	1				1	1		1	1	
Artamidae	*Gymnorhina tibicen*	Australian Magpie			3			35	1	1	1		1	1	1	1		1		
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird			3			73	1	1	1		1	1	1	1		1	1	
Artamidae	*Cracticus torquatus*	Grey Butcherbird			3			1							1					
Artamidae	*Artamus personatus*	Masked Woodswallow			2			2		1			1		1	1				
Artamidae	*Artamus cinereus*	Black-faced Woodswallow			3			37	1	1	1	1	1	1	1	1		1	1	
Artamidae	*Artamus minor*	Little Woodswallow			3			34	1	1			1	1	1	1		1		

Family	Scientific name	Common name	Status		Databases [1]				Survey reports reviewed [2]											
			BC Act	EPBC	NM	PM	TPFa	BD	BA01	BA09a	BA09b	BL19	BT07	EC10	EC12	HO91	MO7	MWH16	OE11	BL20
Artamidae	*Artamus leucorynchus*	White-breasted Woodswallow			1			1												
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail			3			113	1	1	1	1	1	1	1	1		1	1	
Rhipiduridae	*Rhipidura fuliginosa albiscapa*	Tasmanian Grey Fantail																1		
Corvidae	*Corvus orru*	Torresian Crow			6			54	1	1	1	1	1	1	1	1		1	1	
Corvidae	*Corvus bennetti*	Little Crow			3			13			1					1		1		
Monarchidae	*Grallina cyanoleuca*	Magpie-lark		MA	3			154	1	1	1		1		1	1		1	1	
Petroicidae	*Petroica goodenovii*	Red-capped Robin														1				
Petroicidae	*Melanodryas cucullata*	Hooded Robin			10			1										1		
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird			3			3	1	1						1		1		
Estrildidae	*Emblema pictum*	Painted Finch			3			73	1	1	1	1	1	1	1	1		1	1	
Estrildidae	*Neochmia ruficauda*	Star Finch			12			4			1				1	1				
Estrildidae	*Taeniopygia guttata*	Zebra Finch			3			112	1	1	1	1	1	1	1	1		1	1	
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit		MA	18			21		1	1				1	1		1		
Motacillidae	*Motacilla flava*	Yellow Wagtail	MI	MI, MA		6		1												
Motacillidae	*Motacilla cinerea*	Grey Wagtail	MI	MI, MA		6														
Alaudidae	*Mirafra javanica*	Horsfield's Bushlark			4			5			1	1			1					
Locustellidae	*Cincloramphus cruralis*	Brown Songlark						3	1						1	1				
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark						31	1						1			1		
Locustellidae	*Poodytes gramineus*	Little Grassbird			5			2				1								
Locustellidae	*Poodytes carteri*	Spinifexbird			3			15	1	1	1			1	1	1		1	1	
Acrocephalidae	*Acrocephalus australis*	Australian Reed-Warbler			7			15			1					1				
Hirundinidae	*Petrochelidon ariel*	Fairy Martin			6			51		1				1	1	1		1		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin			196			30	1		1			1	1	1		1		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		MA	3			3												
Hirundinidae	*Hirundo rustica*	Barn Swallow	MI	MI, MA		6														
Mammals																				
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna			3				2	1		1		2		1		1	1	
Dasyuridae	*Dasycercus blythi*	Brush-tailed Mulgara, Ampurta	P4		2		3						1			1				
Dasyuridae	*Dasykaluta rosamondae*	Kaluta			3						1				1	1		1		
Dasyuridae	*Dasyurus hallucatus*	Northern Quoll	EN	EN	3	3	20		2	1	1	2	1	2	1	1		1	1	
Dasyuridae	*Ningaui timealeyi*	Pilbara Ningaui			33				2				1		1	1		1		
Dasyuridae	*Planigale ingrami*	Long-tailed Planigale			29													1	1	
Dasyuridae	*Planigale maculata*	Common Planigale							2		1			2	1	1				

Family	Scientific name	Common name	Status		Databases [1]				Survey reports reviewed [2]											
			BC Act	EPBC	NM	PM	TPFa	BD	BA01	BA09a	BA09b	BL19	BT07	EC10	EC12	HO91	MO7	MWH16	OE11	BL20
Dasyuridae	*Pseudantechinus roryi*	Rory's Pseudantechinus			2				2	1				2	1					
Dasyuridae	*Pseudantechinus woolleyae*	Woolley's Pseudantechinus			113							1			1	1		1	1	
Dasyuridae	*Sminthopsis longicaudata*	Long-tailed Dunnart	P4		3		5								1					
Dasyuridae	*Sminthopsis macroura*	Froggatt's Stripe-faced Dunnart			3						1		1			1				
Dasyuridae	*Sminthopsis youngsoni*	Lesser Hairy-footed Dunnart			2										1	1				
Thylacomyidae	*Macrotis lagotis*	Bilby, Dalgyte	VU	VU	247	3	70									1				1
Phalangeridae	*Trichosurus vulpecula arnhemensis*	Northern Brushtail Possum	VU																	1
Phalangeridae																		1		
Macropodidae	*Lagorchestes conspicillatus*	Barrow Is. Spectacled Hare-wallaby			2		2													
Macropodidae	*Lagorchestes conspicillatus leichardti*	Spectacled Hare-wallaby	P4		3				2				1			1		1		
Macropodidae	*Osphranter robustus*	Euro, Biggada			40				2	1	1	1	1	2	1	1		1	1	
Macropodidae	*Osphranter rufus*	Red Kangaroo, Marlu			150						1					1		1		
Macropodidae	*Petrogale rothschildi*	Rothschild's Rock-wallaby			85				2	1				2	1	1		1	1	
Muridae	**Mus musculus*	House Mouse			15	3			2		1		1	2		1		1		
Muridae	*Pseudomys chapmani*	Western Pebble-mound Mouse	P4		65		9		2	1	1	1	1	2	1	1		1		
Muridae	*Pseudomys delicatulus*	Delicate Mouse			56				2						1	1		1		
Muridae	*Pseudomys desertor*	Desert Mouse			101				2		1		1	2	1			1		
Muridae	*Pseudomys hermannsburgensis*	Sandy Inland Mouse			11								1		1	1		1	1	
Muridae	*Zyzomys argurus*	Common Rock-rat			3				2	1	1	1	1	2	1	1		1	1	
Leporidae	**Oryctolagus cuniculus*	Rabbit				2														
Pteropodidae	*Pteropus alecto*	Black Flying-fox														1				
Rhinonycteridae	*Rhinonicteris aurantia (Pilbara)*	Pilbara Leaf-nosed Bat	VU	VU	6	3	20		2	1		2	1	2	1		1	1	1	
Megadermatidae	*Macroderma gigas*	Ghost Bat	VU	VU	45	3	68		2	1		2	1		1	1	1	1	1	
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheath-tailed Bat			3					1				2				1	1	
Emballonuridae	*Taphozous georgianus*	Common Sheath-tailed Bat			3				2	1		1		2	1	1		1	1	
Emballonuridae	*Taphozous hilli*	Hill's Sheath-tailed Bat			1															
Molossidae	*Austronomus australis*	White-striped Free-tailed Bat							2	1										
Molossidae	*Chaerephon jobensis*	Greater Northern Free-tailed Bat			3					1	1			2				1		

Family	Scientific name	Common name	Status		Databases [1]				Survey reports reviewed [2]											
			BC Act	EPBC	NM	PM	TPFa	BD	BA01	BA09a	BA09b	BL19	BT07	EC10	EC12	HO91	MO7	MWH16	OE11	BL20
Molossidae	*Ozimops lumsdenae*	Northern Free-tailed Bat												2				1		
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat			3						1			2	1			1	1	
Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat			116										1			1		
Vespertilionidae	*Scotorepens greyii*	Little Broad-nosed Bat			3					1			1	2	1	1		1	1	
Vespertilionidae	*Vespadelus finlaysoni*	Finlayson's Cave Bat			3				2	1	1	1		2	1	1		1	1	
Canidae	**Vulpes vulpes*	Red Fox				3										1				
Canidae	*Canis familiaris sp.*	Dog / Dingo				3			2	1		1				1		1	1	
Felidae	**Felis catus*	Cat			3	3			2	1	1				1	1		1	1	
Equidae	**Equus asinus*	Donkey				3			2							1				
Equidae	**Equus caballus*	Horse				3														
Suidae	**Sus scrofa*	Pig				3														
Camelidae	**Camelus dromedarius*	Dromedary, Camel			3	3			2	1					1	1		1		
Bovidae	**Bos taurus*	European Cattle			3					1			1	2	1	1		1	1	
Reptiles																				
Cheluidae	*Chelodina steindachneri*	Flat-shelled Turtle			3										1	1		1		
Carphodactylidae	*Nephrurus levis*	Smooth Knob-tailed Gecko			4										1	1				
Carphodactylidae	*Nephrurus wheeleri*	Southern Banded Knob-tailed Gecko			20															
Diplodactylidae	*Crenadactylus ocellatus*	South-western Clawless Gecko							1						1					
Diplodactylidae	*Diplodactylus conspicillatus*	Variable Fat-tailed Gecko			3									1	1	1		1		
Diplodactylidae	*Diplodactylus galaxias*	Northern Pilbara Beak-faced Gecko													1					
Diplodactylidae	*Diplodactylus savagei*	Southern Pilbara Beak-faced Gecko			3				1	1	1		1	1	1			1	1	
Diplodactylidae	*Lucasium squarrosum*	Mottled Ground Gecko												1						
Diplodactylidae	*Lucasium stenodactylum*	Sand-plain Gecko			4					1	1		1	1	1	1		1	1	
Diplodactylidae	*Lucasium wombeyi*	Pilbara Ground Gecko			9					1	1		1	1	1			1	1	
Diplodactylidae	*Oedura fimbria*	Western Marbled Velvet Gecko			245					1					1	1		1	1	
Diplodactylidae	*Rhynchoedura ornata*	Western Beaked Gecko			3										1	1		1		
Diplodactylidae	*Strophurus elderi*	Jewelled Gecko			3				1		1		1	1	1	1		1		
Diplodactylidae	*Strophurus jeanae*	Southern Phasmid Gecko														1				
Diplodactylidae	*Strophurus wellingtonae*	Western-shield Spiny-tailed Gecko									1									
Gekkonidae	*Gehyra pilbara*	Pilbara Dtella			3				1		1					1			1	
Gekkonidae	*Gehyra punctata*	Spotted Rock Dtella			3				1	1				1	1	1		1	1	
Gekkonidae	*Gehyra variegata*	Variegated gehyra			3				1	1	1		1	1	1	1		1	1	

Family	Scientific name	Common name	Status		Databases [1]				Survey reports reviewed [2]											
			BC Act	EPBC	NM	PM	TPFa	BD	BA01	BA09a	BA09b	BL19	BT07	EC10	EC12	HO91	MO7	MWH16	OE11	BL20
Gekkonidae	*Heteronotia binoei*	Bynoe's Gecko			3				1	1	1			1	1	1		1	1	
Gekkonidae	*Heteronotia spelea*	Pilbara Cave Gecko			3									1	1			1	1	
Pygopodidae	*Delma butleri*	Spinifex Delma			2						1			1				1		
Pygopodidae	*Delma elegans*	Pilbara Delma			3				1					1	1			1	1	
Pygopodidae	*Delma fraseri*	Fraser's Delma													1					
Pygopodidae	*Delma nasuta*	Sharp-snouted Delma			3				1	1	1				1	1		1	1	
Pygopodidae	*Delma pax*	Peace Delma			3				1		1		1	1	1	1		1	1	
Pygopodidae	*Delma tincta*	Black-necked Delma			3										1	1		1	1	
Pygopodidae	*Lialis burtonis*	Burton's Snake-lizard			3				1		1				1	1		1		
Pygopodidae	*Pygopus nigriceps*	Western Hooded Scaly-foot			21										1			1		
Agamidae	*Ctenophorus caudicinctus*	Western Ring-tailed Dragon			6				1	1	1	1	1	1	1	1		1	1	
Agamidae	*Ctenophorus isolepis*	Yellowy Military Dragon			5					1					1	1		1		
Agamidae	*Ctenophorus nuchalis*	Central Netted Dragon			3										1	1		1		
Agamidae	*Ctenophorus reticulatus*	Western Netted Dragon			1						1			1						
Agamidae	*Ctenophorus scutulatus*	Lozenge-marked Dragon												1						
Agamidae	*Diporiphora valens*	Southern Pilbara Tree Dragon													1	1				
Agamidae	*Gowidon longirostris*	Long-nosed Dragon			3				1	1	1			1	1	1		1	1	
Agamidae	*Lophognathus gilberti*	Top End Ta-Ta Dragon									1									
Agamidae	*Pogona minor*	Dwarf Bearded Dragon			6						1				1	1				
Scincidae	*Carlia munda*	Striped Rainbow Skink			3				1	1	1		1		1	1		1	1	
Scincidae	*Carlia triacantha*	Desert Rainbow Skink			2										1			1		
Scincidae	*Cryptoblepharus buchananii*	Buchanban's Snake-eyed Skink							1						1	1				
Scincidae	*Cryptoblepharus ustulatus*	Russet Snake-eyed Skink								1					1			1	1	
Scincidae	*Ctenotus duricola*	Eastern Pilbara Lined Ctenotus			3								1	1	1	1		1	1	
Scincidae	*Ctenotus grandis*	Grand ctenotus			5									1	1	1		1	1	
Scincidae	*Ctenotus hanloni*	Nimble Ctentous			1															
Scincidae	*Ctenotus helenae*	Dusky Ctenotus			3										1	1				
Scincidae	*Ctenotus inornatus*	Bar-shouldered Ctenotus			3													1		
Scincidae	*Ctenotus leonhardii*	Common Desert Ctenotus			2													1		
Scincidae	*Ctenotus nigrilineatus*	Pin-striped Firesnout Ctenotus	P1													1				
Scincidae	*Ctenotus pantherinus*	Leopard Ctenotus			7					1	1			1	1	1		1	1	
Scincidae	*Ctenotus piankai*	Coarse Sands Ctenotus			1						1				1					

Family	Scientific name	Common name	Status		Databases [1]				Survey reports reviewed [2]											
			BC Act	EPBC	NM	PM	TPFa	BD	BA01	BA09a	BA09b	BL19	BT07	EC10	EC12	HO91	MO7	MWH16	OE11	BL20
Scincidae	*Ctenotus rubicundus*	Ruddy Ctenotus			3				1	1				1	1			1	1	
Scincidae	*Ctenotus rutilans*	Rusty-shouldered Ctenotus			2													1		
Scincidae	*Ctenotus saxatilis*	Rock Ctenotus			3				1	1	1		1	1	1	1			1	
Scincidae	*Ctenotus schomburgkii*	Barred Wedge-snouted Ctenotus													1	1				
Scincidae	*Ctenotus serventyi*	North-western Sandy-loam Ctenotus														1				
Scincidae	*Ctenotus uber*	Western Spotted Ctenotus			1															
Scincidae	*Ctenotus uber johnstonei*	Western Spotted Ctenotus	P2																	1
Scincidae	*Cyclodomorphus melanops*	Spinifex Slender Blue-tongue			6				1		1		1		1	1		1	1	
Scincidae	*Egernia epsisolus*	Eastern Pilbara Spiny-tailed Skink			3									1	1	1		1		
Scincidae	*Egernia formosa*	Goldfields Crevice-skink			2				1	1			1		1	1		1	1	
Scincidae	*Eremiascincus richardsonii*	Broad-banded Sand Swimmer									1					1				
Scincidae	*Lerista bipes*	Western Two-toed Slider			3					1				1	1	1		1	1	
Scincidae	*Lerista clara*	Sharp-blazed Three-toed Slider																	1	
Scincidae	*Lerista jacksoni*	Jackson's Three-toed Slider			3										1			1	1	
Scincidae	*Lerista muelleri*	Mueller's Three-toed Slider			3				1	1	1		1	1	1	1		1		
Scincidae	*Lerista timida*	Dwarf Three-toed Slider			1															
Scincidae	*Lerista verhmens*	Powerful Three-toed Slider			3										1					
Scincidae	*Liopholis striata*	Night Skink														1				
Scincidae	*Menetia greyii*	Common Dwarf Skink			41										1	1		1	1	
Scincidae	*Menetia surda*	Western Dwarf Skink			9				1											
Scincidae	*Morethia ruficauda*	Fire-tailed Skink			11				1	1	1		1	1	1	1		1	1	
Scincidae	*Notoscincus ornatus*	Ornate Soil-crevice Skink			95				1				1		1	1		1	1	
Scincidae	*Proablepharus reginae*	Spinifex Snake-eyed Skink			23				1						1	1			1	
Scincidae	*Tiliqua multifasciata*	Central Blue-tongue			3						1				1	1		1		
Varanidae	*Varanus acanthurus*	Spiny-tailed Goanna			3				1	1	1			1	1	1		1	1	
Varanidae	*Varanus brevicauda*	Short-tailed Pygmy Goanna			2										1	1		1		
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor			1											1				
Varanidae	*Varanus eremius*	Pygmy Desert Goanna			2								1	1	1	1		1		
Varanidae	*Varanus giganteus*	Perentie			3				1	1	1			1	1	1		1	1	
Varanidae	*Varanus gouldii*	Bungarra or Sand Goanna			1					1					1	1				
Varanidae	*Varanus panoptes*	Yellow-spotted Monitor			2					1	1				1	1		1		

Family	Scientific name	Common name	Status		Databases [1]				Survey reports reviewed [2]											
			BC Act	EPBC	NM	PM	TPFa	BD	BA01	BA09a	BA09b	BL19	BT07	EC10	EC12	HO91	MO7	MWH16	OE11	BL20
Varanidae	*Varanus pilbarensis*	Northern Pilbara Rock Goanna			2										1	1		1	1	
Varanidae	*Varanus tristis*	Racehorse Goanna			2					1	1		1		1	1		1	1	
Typhlopidae	*Anilios ammodytes*	Pilbara Blind Snake								1				1	1			1	1	
Typhlopidae	*Anilios diversus*	Northern Blind Snake														1				
Typhlopidae	*Anilios ganei*	Gane's Blind Snake	P1																	1
Typhlopidae	*Anilios grypus*	Northern Beaked Blind Snake									1			1	1	1		1	1	
Typhlopidae	*Anilios hamatus*	Northern Hook-snouted Blind Snake														1		1		
Typhlopidae	*Indotyphlops braminus*	Brahminy Blind Snake				1														
Pythonidae	*Antaresia perthensis*	Pygmy Python			3				1					1	1	1		1		
Pythonidae	*Antaresia stimsoni*	Stimson's Python								1					1	1			1	
Pythonidae	*Aspidites melanocephalus*	Black-headed Python								1						1				
Pythonidae	*Liasis olivaceus barroni*	Pilbara Olive Python	VU	VU	16	3	2			1	1				1	1		1	1	
Elapidae	*Acanthophis pyrrhus*	Desert Death Adder			2											1		1		
Elapidae	*Acanthophis wellsi*	Pilbara Death Adder			8					1	1				1			1		
Elapidae	*Brachyurophis approximans*	North-western Shovel-nosed Snake			2										1	1		1		
Elapidae	*Demansia psammophis*	Yellow-faced Whipsnake			5										1	1		1		
Elapidae	*Demansia rufescens*	Rufous Whipsnake			3				1						1			1	1	
Elapidae	*Furina ornata*	Moon Snake			3						1			1	1	1		1		
Elapidae	*Parasuta monachus*	Monk Snake			7							1			1			1		
Elapidae	*Pseudechis australis*	Mulga Snake			19							1			1	1		1		
Elapidae	*Pseudonaja mengdeni*	Western Brown Snake			335						1			1	1	1				
Elapidae	*Pseudonaja modesta*	Ringed Brown Snake			54					1					1	1		1		
Elapidae	*Suta fasciata*	Rosen's Snake			3										1			1		
Elapidae	*Suta punctata*	Spotted Snake														1				
Elapidae	*Vermicella snelli*	Pilbara Bandy Bandy			3								1					1	1	
Amphibians																				
Pelodryadidae	*Cyclorana australis*	Giant Frog													1				1	
Pelodryadidae	*Cyclorana maini*	Sheep Frog			3						1			1	1	1		1		
Pelodryadidae	*Litoria rubella*	Little Red Tree Frog			30				1	1			1	1	1	1		1	1	
Limnodynastidae	*Neobatrachus aquilonius*	Northern Burrowing Frog									1									
Limnodynastidae	*Neobatrachus sutor*	Shoemaker Frog			7															
Limnodynastidae	*Notaden nichollsi*	Desert Spadefoot			77										1					
Limnodynastidae	*Platyplectrum spenceri*	Centralian Burrowing Frog			180					1				1	1	1		1		

Family	Scientific name	Common name	Status		Databases [1]				Survey reports reviewed [2]											
			BC Act	EPBC	NM	PM	TPFa	BD	BA01	BA09a	BA09b	BL19	BT07	EC10	EC12	HO91	MO7	MWH16	OE11	BL20
Myobatrachidae	*Uperoleia glandulosa*	Glandular Toadlet								1	1				1	1				
Myobatrachidae	*Uperoleia russelli*	Northwest Toadlet			2				1	1			1	1		1			1	
Myobatrachidae	*Uperoleia saxatilis*	Pilbara Toadlet			3										1			1		
Fish																				
Terapontidae	*Leiopotherapon unicolor*	Spangled grunter			3				1	1									1	
Melanotaeniidae	*Melanotaenia australis*	Western rainbowfish			3				1	1	1								1	
Clupeidae	*Nematalosa erebi*	Bony bream			22				1											
Plotosidae	*Neosilurus hyrtlii*	Hurtl's catfish			41				1										1	

Footnotes:

1 = Databases reviewed for the desktop

NM *DBCA (2021) NatureMap database*
PM *AWE (2021) Protected Matters Search Tool*
BD *Birdlife Australia (2021) Birdata*
TPFa *DBCA Threatened and Priority Fauna Database*

2 = Survey reports reviewed for the desktop

BA01 *Bamford Consulting Ecologists. (2001). Panorama Project Area: Baseline Fauna Study as Part of the Sulphur Springs Feasibility Study. Unpublished report prepared for Astron Environmental on behalf of Outokumpu Mining Australia Pty Ltd.*
BA09a *Bamford Consulting Ecologists. (2009a). Fauna Assessment of the Abydos DSO Project. Unpublished report prepared for Atlas Iron Limited.*
BA09b *Bamford Consulting Ecologists. (2009b). Fauna Assessment of the BC Iron Nullagine Iron Ore project. Unpublished report prepared for Astron Environmental Services on behalf of BC Iron.*
BL19 *Biologic (2019) Warrawoona Gold Project: Habitat assessment and targeted vertebrate fauna survey.*
BT07 *Biota (2007) Panorama Project: Mine site and haul road corridor targeted fauna survey.*
EC10 *ecologia Environment. (2010). Mount Webber Iron Ore Project: Vertebrate Fauna Assesment. Unpublished report prepared for Giralia Resources NL.*
EC12 *ecologia Environment. (2012). North Star Project: Level 2 Terrestrial Vertebrate Fauna Assessment. Unpublished report prepared for Fortescue Metals Group.*
HO91 *How, R. A., Dell, J., & Cooper, N. K. (1991b). Vertebrate fauna of the Abydos-Woodstock Reserve, northeast Pilbara. Records of the Western Australian Museum, 37(Suppl.), 78-125.*
MO7 *Molhar. (2007). Field Survey for Conservation Significant Bats Near Sulphur Springs, Pilbara. Unpublished report prepared for CBH Resources Limited.*
MWH16 *MWH, Australia. (2016). Corunna Downs Project: Terrestrial Vertebrate Fauna Survey. Unpublished report prepared for Atlas Iron Limited.*
OE11 *Outback Ecology. (2011). Abydos DSO Project Terrestrial Vertebrate Fauna Baseline Survey. Unpublished report prepared for Atlas Iron Limited.*
BL20 *Biologic (2020) McPhee Creek Consolidated Terrestrial Fauna Report. McPhee Creek Project Report to Roy Hill and Atlas Iron Limited.*

** Introduced*

Appendix VII – Fauna desktop results: Conservation significant vertebrate fauna

Family	Scientific name	Common name	Status		Databases [1]				Survey reports reviewed [2]											
			BC Act	EPBC Act	NM	PM	TPFa	BD	BA01	BA09a	BA09b	BL19	BT07	EC10	EC12	HO91	MO7	MWH16	OE11	BL20
Birds																				
Phasianidae	*Coturnix pectoralis*	Stubble Quail		MA												1				
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-Cuckoo		MA	3	3		29	1	1			1		1			1		
Cuculidae	*Chalcites osculans*	Black-eared Cuckoo		MA							1					1				
Eurostopodidae	*Eurostopodus argus*	Spotted Nightjar		MA	3			5	1	1	1			1	1	1		1	1	
Apodidae	*Apus pacificus*	Fork-tailed Swift	MI	MI, MA		6									1	1				
Rallidae	*Zapornia tabuensis*	Spotless Crake		MA	141			2												
Rallidae	*Porphyrio porphyrio*	Purple Swamphen		MA	22			1												
Recurvirostridae	*Himantopus leucocephalus*	Pied Stilt		MA	3			21								1				
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover		MA	3			9												
Charadriidae	*Charadrius veredus*	Oriental Plover	MI	MI, MA	3	6	2	2								1				
Rostratulidae	*Rostratula australis*	Australian Painted-snipe	EN	EN		6														
Scolopacidae	*Numenius madagascariensis*	Eastern Curlew	CR	CR, MI, MA		3														
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	MI	MI, MA	3	6	4	4												
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	CR	CR, MI, MA		8														
Scolopacidae	*Calidris melanotos*	Pectoral Sandpiper	MI	MI, MA		6														
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	MI	MI, MA	3	6	4	9								1				
Scolopacidae	*Tringa nebularia*	Common Greenshank	MI	MI, MA	3		1	2								1				
Scolopacidae	*Tringa glareola*	Wood Sandpiper	MI	MI, MA	3		6	11								1				
Glareolidae	*Stiltia isabella*	Australian Pratincole		MA	1			1								1				
Glareolidae	*Glareola maldivarum*	Oriental Pratincole	MI	MI, MA		6														
Pelicanidae	*Pelecanus conspicillatus*	Australian Pelican		MA	167			48	1							1				
Ardeidae	*Nycticorax caledonicus*	Nankeen Night-Heron		MA	98			16	1				1			1				
Ardeidae	*Bubulcus ibis*	Cattle Egret		MA		3														
Ardeidae	*Ardea alba*	Great Egret		MA		3		38	1							1				
Ardeidae	*Ardea alba modesta*	Eastern Great Egret		MA	3															
Ardeidae	*Ardea intermedia*	Intermediate Egret		MA	3			7												
Ardeidae	*Egretta garzetta*	Little Egret		MA	3			12												
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		MA	3			32	1							1				
Threskiornithidae	*Plegadis falcinellus*	Glossy Ibis	MI	MI, MA	2		1	2												
Pandionidae	*Pandion haliaetus*	Osprey	MI	MI	2	6	2	2												1
Accipitridae	*Circus approximans*	Swamp Harrier		MA	3			2												

Family	Scientific name	Common name	Status		Databases [1]				Survey reports reviewed [2]											
			BC Act	EPBC Act	NM	PM	TPFa	BD	BA01	BA09a	BA09b	BL19	BT07	EC10	EC12	HO91	MO7	MWH16	OE11	BL20
Accipitridae	*Accipiter fasciatus*	Brown Goshawk		MA	29			12	1	1			1	1		1		1	1	
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle		MA	3	3		2												
Accipitridae	*Haliastur sphenurus*	Whistling Kite		MA	3			65	1	1	1				1			1		
Meropidae	*Merops ornatus*	Rainbow Bee-eater		MA	3	3		93	1	1	1		1	1	1	1		1	1	
Alcedinidae	*Todiramphus sanctus*	Sacred Kingfisher		MA	3			42	1	1	1				1	1			1	
Falconidae	*Falco cenchroides*	Nankeen Kestrel		MA	3			38	1	1	1	1		1	1	1		1	1	
Falconidae	*Falco hypoleucos*	Grey Falcon	VU		2	3	1								1					
Falconidae	*Falco peregrinus*	Peregrine Falcon	OS		3		1	3								1		1		
Psittaculidae	*Pezoporus occidentalis*	Night Parrot	CR	EN		3														
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		MA	4			105	1	1	1		1	1	1	1		1	1	
Monarchidae	*Grallina cyanoleuca*	Magpie-lark		MA	3			154	1	1	1		1		1	1		1	1	
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit		MA	18			21		1	1				1	1		1		
Motacillidae	*Motacilla flava*	Yellow Wagtail	MI	MI, MA		6		1												
Motacillidae	*Motacilla cinerea*	Grey Wagtail	MI	MI, MA		6														
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		MA	3			3												
Hirundinidae	*Hirundo rustica*	Barn Swallow	MI	MI, MA		6														
Mammals																				
Dasyuridae	*Dasycercus blythi*	Brush-tailed Mulgara, Ampurta	P4		2		3						1			1				
Dasyuridae	*Dasyurus hallucatus*	Northern Quoll	EN	EN	3	3	20		2	1	1	2	1	2	1	1		1	1	
Dasyuridae	*Sminthopsis longicaudata*	Long-tailed Dunnart	P4		3		5								1					
Thylacomyidae	*Macrotis lagotis*	Bilby, Dalgyte	VU	VU	247	3	70									1				1
Phalangeridae	*Trichosurus vulpecula arnhemensis*	Northern Brushtail Possum	VU																	1
Macropodidae	*Lagorchestes conspicillatus leichardti*	Spectacled Hare-wallaby	P4		3				2				1			1		1		
Muridae	*Pseudomys chapmani*	Western Pebble-mound Mouse	P4		65		9		2	1	1	1	1	2	1	1		1		
Rhinonycteridae	*Rhinonicteris aurantia (Pilbara)*	Pilbara Leaf-nosed Bat	VU	VU	6	3	20		2	1		2	1	2	1		1	1	1	
Megadermatidae	*Macroderma gigas*	Ghost Bat	VU	VU	45	3	68		2	1		2	1		1	1	1	1	1	
Reptiles																				
Scincidae	*Ctenotus nigrilineatus*	Pin-striped Firesnout Ctenotus	P1													1				
Scincidae	*Ctenotus uber johnstonei*	Western Spotted Ctenotus	P2																	1
Typhlopidae	*Anilios ganei*	Gane's Blind Snake	P1																	1
Pythonidae	*Liasis olivaceus barroni*	Pilbara Olive Python	VU	VU	16	3	2			1	1				1	1		1	1	

Footnotes:

1 = Databases reviewed for the desktop

NM	*DBCA (2021) NatureMap database*
PM	*AWE (2021) Protected Matters Search Tool*
BD	*Birdlife Australia (2021) Birdata*
TPFa	*DBCA Threatened and Priority Fauna Database*

2 = Survey reports reviewed for the desktop

BA01	*Bamford Consulting Ecologists. (2001). Panorama Project Area: Baseline Fauna Study as Part of the Sulphur Springs Feasibility Study. Unpublished report prepared for Astron Environmental on behalf of Outokumpu Mining Australia Pty Ltd.*
BA09a	*Bamford Consulting Ecologists. (2009a). Fauna Assessment of the Abydos DSO Project. Unpublished report prepared for Atlas Iron Limited.*
BA09b	*Bamford Consulting Ecologists. (2009b). Fauna Assessment of the BC Iron Nullagine Iron Ore project. Unpublished report prepared for Astron Environmental Services on behalf of BC Iron.*
BL19	*Biologic (2019) Warrawoona Gold Project: Habitat assessment and targeted vertebrate fauna survey.*
BT07	*Biota (2007) Panorama Project: Mine site and haul road corridor targeted fauna survey.*
EC10	*ecologia Environment. (2010). Mount Webber Iron Ore Project: Vertebrate Fauna Assesment. Unpublished report prepared for Giralia Resources NL.*
EC12	*ecologia Environment. (2012). North Star Project: Level 2 Terrestrial Vertebrate Fauna Assessment. Unpublished report prepared for Fortescue Metals Group.*
HO91	*How, R. A., Dell, J., & Cooper, N. K. (1991b). Vertebrate fauna of the Abydos-Woodstock Reserve, northeast Pilbara. Records of the Western Australian Museum, 37(Suppl.), 78-125.*
MO7	*Molhar. (2007). Field Survey for Conservation Significant Bats Near Sulphur Springs, Pilbara. Unpublished report prepared for CBH Resources Limited.*
MWH16	*MWH, Australia. (2016). Corunna Downs Project: Terrestrial Vertebrate Fauna Survey. Unpublished report prepared for Atlas Iron Limited.*
OE11	*Outback Ecology. (2011). Abydos DSO Project Terrestrial Vertebrate Fauna Baseline Survey. Unpublished report prepared for Atlas Iron Limited.*
BL20	*Biologic (2020) McPhee Creek Consolidated Terrestrial Fauna Report. McPhee Creek Project Report to Roy Hill and Atlas Iron Limited.*

Appendix VIII – Flora relevé locations

Site name	Type	Survey date	Vegetation Code	Latitude	Longitude
S04-TN01	Relevé	17/03/2021	A	-21.2080	119.7610
S05-TN02	Relevé	17/03/2021	E	-21.2100	119.7567
S06-TN03	Relevé	18/03/2021	A	-21.2101	119.7568
S07-TN04	Relevé	18/03/2021	E	-21.2153	119.7537
S09-TN05	Relevé	18/03/2021	C	-21.2148	119.7497
S11-TN06	Relevé	18/03/2021	C	-21.2121	119.7456
S13-TN07	Relevé	18/03/2021	F	-21.2143	119.7354
S14-TN08	Relevé	18/03/2021	C	-21.2130	119.7282
S15-TN09	Relevé	18/03/2021	D	-21.2121	119.7275
S16-TN10	Relevé	18/03/2021	C	-21.2111	119.7271
S17-ET01	Relevé	18/03/2021	F	-21.2513	119.8085
S18-ET02	Relevé	18/03/2021	C	-21.2505	119.8171
S19-ET03	Relevé	19/03/2021	C	-21.2506	119.8166
S20-ET04	Relevé	19/03/2021	C	-21.2493	119.8176
S21-ET05	Relevé	19/03/2021	C	-21.2481	119.8222
S22-ET06	Relevé	19/03/2021	A	-21.2516	119.8287
S23-ET07	Relevé	19/03/2021	E	-21.2549	119.8308
S24-ET08	Relevé	19/03/2021	A	-21.2676	119.8414
S25-ET09	Relevé	19/03/2021	B	-21.2702	119.8444
S26-ET10	Relevé	19/03/2021	A	-21.2885	119.8556
S27-ET11	Relevé	19/03/2021	B	-21.3086	119.8603
S28-ET12	Relevé	19/03/2021	E	-21.3097	119.8592
S29-BG01	Relevé	19/03/2021	D	-21.2122	119.7734
S30-ET13	Relevé	19/03/2021	G	-21.3100	119.8591
S31-ET14	Relevé	19/03/2021	E	-21.3179	119.8499
S32-ET15	Relevé	19/03/2021	A	-21.3268	119.8574
S35-GAP01	Relevé	20/03/2021	E	-21.2049	119.7667
S36-GAP02	Relevé	20/03/2021	B	-21.2050	119.7664
S37-GAP03	Relevé	21/03/2021	A	-21.2232	119.7769
S38-GAP04	Relevé	21/03/2021	D	-21.2244	119.7782
S39-GAP05	Relevé	21/03/2021	D	-21.2280	119.7803
S40-GAP06	Relevé	21/03/2021	B	-21.2482	119.7997
S41-TN100	Relevé	21/03/2021	D	-21.2096	119.7244
S42-TN101	Relevé	21/03/2021	F	-21.2089	119.7239
S04-TN01	Relevé	17/03/2021	A	-21.2080	119.7610

Appendix IX – Fauna habitat sites in the Big Schist pipeline corridor

Site name	Survey date	Site type	Broad fauna habitat	Field notes on habitat	Slope	Soil type	Soil colour	Rock type	Rock_cover	Rock outcropping	Outcrop description	Leaf Litter	Vegetation condition	Notes on disturbance	Fire History	Latitude	Longitude
S01-Hab	16/03/21	Fauna habitat site	Hills and rises	Very open Indigofera monophylla, Corchorus drainage and Grevillea Wickhamii shrubland over Triodia epactia, Triodia wiseana and Cymbopogon hummock grassland with occasional Corymbia hamersleyana	10-20 degrees (moderate)	Sand	Orange brown	Stones, rocks	20-39%	Yes	Outcropping plus boulders and smaller rocks in minor drainage channel	10% cover, 2 cm depth	Excellent	None	Long unburnt	-21.2507	119.8165
S04-TN01	17/03/21	Relevé and habitat site	Stony plain	Stony spinifex plain (Triodia), emergent Acacia inaequilatera.	negligible (flat plain)	Clay-loam	Dark orange (red)	Small stones	20-39%	No		Negligible	Very Good	None	Long unburnt	-21.2080	119.7610
S05-TN02	17/03/21	Relevé and habitat site	Medium drainage	Drainage channel lined with Triodia and mixed shrubs.	5-10 degrees (gentle slope)	gravel	Orange brown	Small stones	60-79%	No		10% cover, 2-5 cm depth	Very Good	Historic fire	Historic fire	-21.2100	119.7567
S06-TN03	18/03/21	Relevé and habitat site	Stony plain	Triodia wiseana with emergent Acacia inaequilatera.	5-10 degrees (gentle slope)	Calcareous	Other	Calcrete	60-79%	No		10% cover, <1 cm depth	Very Good	Historic fire	Historic fire	-21.2101	119.7568
S07-TN04	18/03/21	Relevé and habitat site	Medium drainage	Corymbia hamersleyana (burnt). Arivela viscosa dominant after recent fire	5-10 degrees (gentle slope)	no soil (stones)	n/a	Stones	60-79%	No		10% cover, 10-20 cm depth	Poor	Recent fire	Recent (within 12 months)	-21.2153	119.7537
S08-Hab	18/03/21	Fauna habitat site	Stony plain	Triodia with acacia	5-10 degrees (gentle slope)	Gravel	Orange brown	Scree	80-100%	No		10% cover, 2 cm depth	Good	None	Historic fire	-21.2150	119.7542
S09-TN05	18/03/21	Relevé and habitat site	Hills and rises	Recently burnt Triodia and Arivela viscosa ground cover	10-20 degrees (moderate)	no soil (stones)	n/a	Scree	80-100%	Yes	Eroded breakaway	Negligable	Poor	Recent fire	Recent (within 12 months)	-21.2148	119.7497
S10-Hab	18/03/21	Fauna habitat site	Minor drainage	Heavily burnt. Upper storey dead acacias. Trioda regrowth. Arivela viscosa ground cover.	5-10 degrees (gentle slope)	no soil (stones)	n/a	Stones	80-100%	No		Negligable	Poor	Recent fire	Recent (within 12 months)	-21.2142	119.7479
S11-TN06	18/03/21	Relevé and habitat site	Hills and rises	Triodia, Arivela viscosa	20-40 degrees (steep slope)	Scree	Orange brown	Scree	80-100%	No		Negligable	Poor	Recent fire	Recent (within 12 months)	-21.2121	119.7456
S12-Hab	18/03/21	Fauna habitat site	Hills and rises	Triodia wiseana and epactia with shrubland of Indigofera monophyulla with emergent Acacia inaequilatera. Burnt December 2020.	20-40 degrees (steep slope)	Scree	Orange brown	Scree	80-100%	No		Negligable	Poor	Recent fire	Recent (within 12 months)	-21.2122	119.7425
S13-TN07	18/03/21	Relevé and habitat site	Minor drainage	Drainage with mixed regrowth. Acacia mid now burnt from recent fire. Arivela viscosa ground cover.	5-10 degrees (gentle slope)	Scree	Orange brown	Scree	80-100%	No		Negligable	Poor	Recent fire	Recent (within 12 months)	-21.2143	119.7354
S14-TN08	18/03/21	Relevé and habitat site	Hills and rises	Triodia regrowth	10-20 degrees (moderate)	Scree	Orange brown	Scree	80-100%	Yes	Rocky breakaway. Scree	Negligable	Poor	Recent fire	Recent (within 12 months)	-21.2130	119.7282
S15-TN09	18/03/21	Relevé and habitat site	Major Drainage	Eucalyptus canopy over mixed shrubs, over Buffel grass ground cover.	5-10 degrees (gentle slope)	Loam	Very dark brown	n/a	none	No		10% cover, 2 cm depth	Good	Weeds	Historic fire	-21.2121	119.7275
S16-TN10	18/03/21	Relevé and habitat site	Hills and rises	Corymbia hamersleyana (burnt), Arivela viscosa	5-10 degrees (gentle slope)	Scree	Orange brown	Small stones	60-79%	No		Negligable	Poor	Recent fire	Recent (within 12 months)	-21.2111	119.7271
S17-ET01	18/03/21	Relevé and habitat site	Minor drainage	Regrowth after fire. Eucalypts and acacias in upper stratum over mixed grasses and forbes.	negligible (flat plain)	Loam	Orange brown	Stones	0-19%	No		Negligable	Good	Recent fire, cattle	Recent (within 12 months)	-21.2513	119.8085
S18-ET02	18/03/21	Relevé and habitat site	Hills and rises	Grevillea wickhamii, Triodia long unburnt	10-20 degrees (moderate)	Scree	Orange brown	Scree	80-100%	Yes	Breakaway on either side of gully	10% cover, 2 cm depth	Very Good	none	Long unburnt	-21.2505	119.8171

Appendix IX – Fauna habitat sites in the Big Schist pipeline corridor

Site name	Survey date	Site type	Broad fauna habitat	Field notes on habitat	Slope	Soil type	Soil colour	Rock type	Rock_cover	Rock outcropping	Outcrop description	Leaf Litter	Vegetation condition	Notes on disturbance	Fire History	Latitude	Longitude
S19-ET03	19/03/21	Relevé and habitat site	Hills and rises	Corymbia in drainage channel. Mixed shrub and dense Triodia ground cover	10-20 degrees (moderate)	Scree	Orange brown	Scree	60-79%	Yes	Breakaway on either side of drain	10% cover, 2 cm depth	Very Good	none	Long unburnt	-21.2506	119.8166
S20-ET04	19/03/21	Relevé and habitat site	Hills and rises	Mixed shrubs including Acacia, over unburnt Triodia on scree slope. Good crevices.	20-40 degrees (steep slope)	Scree	Orange brown	Boulders	60-79%	Yes	Boulders	10% cover, 2 cm depth	Very Good	none	Long unburnt	-21.2493	119.8176
S21-ET05	19/03/21	Relevé and habitat site	Hills and rises	Acacia and grevilia upper and mid-storey. Triodia and mixed shrub base	10-20 degrees (moderate)	Scree	Orange brown	Scree	60-79%	No		10% cover, 2 cm depth	Good	none	Historic fire	-21.2481	119.8222
S22-ET06	19/03/21	Relevé and habitat site	Stony plain	Acacias over unburnt Triodia.	5-10 degrees (gentle slope)	Scree	Orange brown	Scree	80-100%	No		10% cover, 2-5 cm depth	Very Good	none	Long unburnt	-21.2516	119.8287
S23-ET07	19/03/21	Relevé and habitat site	Medium drainage	Corymbia and melaleuca lined creek. Mixture of stones including sandstone and limestone. Highly diverse shrub layer. Triodia and mixed grasses.	5-10 degrees (gentle slope)	Loam	Brown	Gravel	40-59%	No		10% cover, 2-5 cm depth	Good	Weeds	Historic fire	-21.2549	119.8308
S24-ET08	19/03/21	Relevé and habitat site	Stony plain	Grevillea and acacia over Triodia	5-10 degrees (gentle slope)	Scree	Orange brown	Scree	60-79%	Yes	Exposed sandstone bedrock	10% cover, 2 cm depth	Very Good	none	Long unburnt	-21.2676	119.8414
S25-ET09	19/03/21	Relevé and habitat site	Sandy/loamy plain	Denser grevillea stand with acacia and shrub layer. Dense Triodia.	negligible (flat plain)	Sand	Orange brown	n/a	none	No		10% cover, 2-5 cm depth	Good	Weeds (Buffel grass)	Long unburnt	-21.2702	119.8444
S26-ET10	19/03/21	Relevé and habitat site	Stony plain	Undulating stony plain with exposed bedrock. Acacia, Grevillea, over shrubs and Triodia	5-10 degrees (gentle slope)	no soil (stones)	n/a	Quartz	80-100%	Yes	Quartz gravel sitting on top of sedimentary bedrock	Negligable	Good	none	Historic fire	-21.2885	119.8556
S27-ET11	19/03/21	Relevé and habitat site	Sandy/loamy plain	Alluvial plain with extensive Buffel grass infestation. Grevillea and acacia shrubs (largely burnt). Buffel grass ground cover.	negligible (flat plain)	Loam	Brown	Calcrete	0-19%	No		Negligable	Degraded	Recent fire, weeds (heavy buffel grass infestation)	Recent (within 12 months)	-21.3086	119.8603
S28-ET12	19/03/21	Relevé and habitat site	Medium drainage	Corymbia lined creek with Buffel Grass.	5-10 degrees (gentle slope)	Scree	Brown	Scree	60-79%	No		Negligable	Poor	Recent fire, weeds	Recent (within 12 months)	-21.3097	119.8592
S29-BG01	19/03/21	Relevé and habitat site	Major Drainage	Eucalyptus canopy over grevillea mixed shrub, grasses and sedges.	negligible (flat plain)	Loam	Brown	Gravel	40-59%	No		10% cover, 2-5 cm depth	Good	Weeds (buffel grass) and cattle grazing	Recent (within 12 months)	-21.2122	119.7734
S30-ET13	19/03/21	Relevé and habitat site	Hill crest / hill slope	Bare slatey rock with small Triodia. Emergent Corymbia (burnt).	40-50 degrees (very steep)	Scree	Orange brown	Scree	80-100%	No		Negligable	Poor	Recent fire	Recent (within 12 months)	-21.3100	119.8591
S31-ET14	19/03/21	Relevé and habitat site	Medium drainage	Corymbia lined drainage channel. Mixed shrubs. Triodia and Buffel grass ground cover.	negligible (flat plain)	Loam	Orange brown	Calcrete	0-19%	Yes	Breakaway section of bedrock	10% cover, 2 cm depth	Good	Weeds	Long unburnt	-21.3179	119.8499
S32-ET15	19/03/21	Relevé and habitat site	Stony plain	Acacia, mixed shrubs, Triodia.	5-10 degrees (gentle slope)	no soil (gravel)	Orange brown	Gravel	80-100%	No		10% cover, 2-5 cm depth	Very Good	none	Long unburnt	-21.3268	119.8574
S35-GAP01	20/03/21	Relevé and habitat site	Medium drainage	Alluvial drainage infested with Buffel grass. Canopy periodic Corymbia. Mixed acacia dense shrub layer. Buffel grass, Triodia longiceps.	negligible (flat plain)	Loam	Very dark brown	Gravel	0-19%	No		10% cover 5-10 cm depth	Good	Weeds	Historic fire	-21.2049	119.7667
S36-GAP02	20/03/21	Relevé and habitat site	Sandy/loamy plain	Acacia bivenosa, A. trachycarpa, and Acacia pyrifolia over Triodia longiceps.	negligible (flat plain)	Clay-loam	Orange	Small stones	20-39%	No		Negligable	Very Good	Feral animals	Long unburnt	-21.2050	119.7664
S37-GAP03	21/03/21	Relevé and habitat site	Stony plain	Acacia shrubland with Triodia and Corchorus.	10-20 degrees (moderate)	Scree	Orange brown	Scree	80-100%	No		Negligable	Very Good	Historic fire	Historic fire	-21.2232	119.7769

Appendix IX – Fauna habitat sites in the Big Schist pipeline corridor

Site name	Survey date	Site type	Broad fauna habitat	Field notes on habitat	Slope	Soil type	Soil colour	Rock type	Rock_cover	Rock outcropping	Outcrop description	Leaf Litter	Vegetation condition	Notes on disturbance	Fire History	Latitude	Longitude
S38-GAP04	21/03/21	Relevé and habitat site	Major Drainage	Wide drainage line with alluvial soil. Corymbia, Eucalyptus, Melaleuca canopy. Dense mixed shrub. Buffel grass ground cover	negligible (flat plain)	Loam	Brown	No rocks	none	No		10% cover, 10-20 cm depth	Good	Weeds, cattle grazing	Long unburnt	-21.2244	119.7782
S39-GAP05	21/03/21	Relevé and habitat site	Major Drainage	Tall white eucalypts in drainage channel with alluvial soil, Melaleucas and Acacias, Buffel grass	negligible (flat plain)	Loam	Brown	No rocks	none	No		30% cover, 2 cm depth	Good	Weeds	Long unburnt	-21.2280	119.7803
S40-GAP06	21/03/21	Relevé and habitat site	Sandy/loamy plain	Sparsely wooded Triodia plain. Emergent Corymbia, Acacia.	negligible (flat plain)	Clay-loam	Brown	Small stones	0-19%	No		Negligable	Very Good	Unburnt	Long unburnt	-21.2482	119.7997
S41-TN100	21/03/21	Relevé and habitat site	Major Drainage	Eucalypts in stony creek line with mixed ground cover. Lots of sedges and native grass, relatively little Buffel grass.	5-10 degrees (gentle slope)	Sand	Orange brown	Boulders	20-39%	Yes	Sandstone breakouts on edge and middle of drainage	10% cover, 2-5 cm depth	Very Good	Weeds	Long unburnt	-21.2096	119.7244
S42-TN101	21/03/21	Relevé and habitat site	Minor drainage	Drainage line with standing water. Vegetation recently burnt. Eucalypts over acacia, grasses and sedges.	5-10 degrees (gentle slope)	Sand	Orange brown	Gravel	40-59%	Yes	Exposed bedrock	Negligable	Good	Recent fire	Recent (within 12 months)	-21.2089	119.7239
S43-Hab	21/03/21	Fauna habitat site	Stony plain	Open Acacia shrub over Triodia hummock grassland	negligible (flat plain)	no soil (stones)	Orange brown	Small stones	60-79%	Yes	Exposed bedrock	Negligable	Very Good	none	Long unburnt	-21.3257	119.8546

Appendix X - Acoustic Recorders (SM4) and Camera Traps deployed in the survey area

Device type	Device number	Site name	Date deployed	Date retrieved	Broad fauna habitat	Latitude	Longitude
SM4 - Bat	SM4BAT-FS-0043	Site 1 (SM4-0043)	17/03/2021	21/03/2021	Hills and rises	-21.2507	119.8165
SM4 - Bat	SM4BAT-FS-8168	Site 2 (SM4-8168)	17/03/2021	19/03/2021	Major drainage	-21.2122	119.7733
SM4 - Bat	SM4BAT-FS-6479	Site 3 (SM4-6479)	17/03/2021	21/03/2021	Major drainage	-21.2096	119.7243
SM4 - Bat	SM4BAT-FS 8168	Site 4 (SM4-8168)	19/03/2021	21/03/2021	Hill crest / hill slope	-21.3105	119.8589
SM4 - Night Parrot	SM4A-4818	Site 5 (SM4-4818)	17/03/2021	19/03/2021	Minor drainage	-21.2122	119.7733
SM4 - Night Parrot	SM4A-4818	Site 6 (SM4-4818)	20/03/2021	22/03/2021	Major drainage	-21.2514	119.8086
Camera Trap	MDC-06	MDC-06	17/03/2021	21/03/2021	Hills and rises	-21.2508	119.8166
Camera Trap	MDC-30	MDC-30	17/03/2021	21/03/2021	Hills and rises	-21.2507	119.8163
Camera Trap	MDC-39	MDC-39	17/03/2021	21/03/2021	Hills and rises	-21.2507	119.816
Camera Trap	MDC-29	MDC-29	17/03/2021	21/03/2021	Minor drainage	-21.249	119.8237
Camera Trap	MDC-32	MDC-32	17/03/2021	21/03/2021	Hills and rises	-21.2493	119.8237
Camera Trap	MDC-10	MDC-10	17/03/2021	21/03/2021	Stony plain	-21.2503	119.826
Camera Trap	MDC-04	MDC-04	17/03/2021	21/03/2021	Stony plain	-21.2501	119.8258
Camera Trap	MDC-08	MDC-08	17/03/2021	21/03/2021	Major drainage	-21.228	119.7802
Camera Trap	MDC-28	MDC-28	17/03/2021	21/03/2021	Major drainage	-21.2278	119.7801
Camera Trap	MDC-12	MDC-12	17/03/2021	21/03/2021	Major drainage	-21.2114	119.7733
Camera Trap	MDC-22	MDC-22	17/03/2021	21/03/2021	Major drainage	-21.2122	119.7733
Camera Trap	MDC-26	MDC-26	17/03/2021	21/03/2021	Major drainage	-21.2096	119.7245
Camera Trap	MDC-17	MDC-17	17/03/2021	21/03/2021	Major drainage	-21.2096	119.7243

Appendix XI – Flora taxa recorded during the survey from each broad vegetation type

Family	Taxon Name	Status [1]	Broad vegetation type code [2]							
			A	B	C	D	E	F	G	Opp
Amaranthaceae	**Aerva javanica*	s11			1		3			
Amaranthaceae	*Amaranthus undulatus*				1	1	1			
Amaranthaceae	*Gomphrena cunninghamii*				6	1	1		1	
Amaranthaceae	*Ptilotus astrolasius*				1					
Amaranthaceae	*Ptilotus auriculifolius*			1	5		2	2	1	
Amaranthaceae	*Ptilotus calostachyus*		1		1					
Amaranthaceae	*Ptilotus sp.*						2			
Apocynaceae	**Calotropis procera*	s22(2)								1
Apocynaceae	*Gymnema erectum*						1			
Asteraceae	*Pluchea ferdinandi-muelleri*			1		1				
Boraginaceae	*Heliotropium crispatum*				2		3	1		
Boraginaceae	*Heliotropium cunninghamii*			1	2		2	2		1
Boraginaceae	*Trichodesma zeylanicum*					1	1			1
Caryophyllaceae	*Polycarpaea holtzei*									1
Caryophyllaceae	*Polycarpaea longiflora*				3					
Caryophyllaceae	*Portulaca oleracea*									1
Cleomaceae	*Arivela viscosa*			1	7	2	3	3		
Combretaceae	*Terminalia circumalata*					2				
Convolvulaceae	*Bonamia pilbarensis*		1		5			1		
Convolvulaceae	*Evolvulus alsinoides var. villosicalyx*				1					
Convolvulaceae	*Polymeria ambigua*				2		3	1		
Cucurbitaceae	*Cucumis variabilis*				1					
Cyperaceae	*Bulbostylis barbata*		1		2		1	1	1	
Cyperaceae	*Cyperus hesperius*				1					
Cyperaceae	*Cyperus vaginatus*					5	2	1		
Cyperaceae	*Fimbristylis dichotoma*		1		1					
Cyperaceae	*Fimbristylis simulans*						1			1
Euphorbiaceae	*Adriana tomentosa var. tomentosa*						1			
Euphorbiaceae	*Euphorbia australis var. subtomentosa*						1			
Euphorbiaceae	*Euphorbia careyi*				1	1	1			1
Euphorbiaceae	*Euphorbia tannensis subsp. rremophila*				1		1			

Family	Taxon Name	Status [1]	Broad vegetation type code [2]							
			A	B	C	D	E	F	G	Opp
Euphorbiaceae	*Euphorbia trigonosperma*				2	3	2			
Fabaceae	**Vachellia farnesiana*	weed				2				
Fabaceae	*Acacia acradenia*		2		1		1			
Fabaceae	*Acacia ancistrocarpa*			1						
Fabaceae	*Acacia bivenosa*		2	1		2	1			
Fabaceae	*Acacia colei*									1
Fabaceae	*Acacia coriacea subsp. pendens*					2				
Fabaceae	*Acacia eriopoda*									1
Fabaceae	*Acacia inaequilatera*		6	2	7		1	2	1	
Fabaceae	*Acacia maitlandii*									1
Fabaceae	*Acacia orthocarpa*		1							
Fabaceae	*Acacia ptychophylla*		1				2			
Fabaceae	*Acacia pyrifolia var. pyrifolia*			2	1	3	2			
Fabaceae	*Acacia synchronicia*		3							
Fabaceae	*Acacia trachycarpa*			1		4	2			
Fabaceae	*Cajanus pubescens*						2			
Fabaceae	*Crotalaria cunninghamii subsp. sturtii*				1					
Fabaceae	*Crotalaria medicaginea var. neglecta*		1	1	1	2	2	1		
Fabaceae	*Indigofera ? monophylla*		1		1					
Fabaceae	*Indigofera colutea*			1			1	1		
Fabaceae	*Indigofera linifolia*			1			2			
Fabaceae	*Indigofera monophylla*		1		7		5	2		
Fabaceae	*Indigofera trita*						1			
Fabaceae	*Indigofera trita subsp. trita*		1							1
Fabaceae	*Rhynchosia minima*			3	3	1	2	1		
Fabaceae	*Senna artemisioides subsp. helmsii*			1						
Fabaceae	*Senna artemisioides subsp. oligophylla*						2			
Fabaceae	*Senna glutinosa subsp. pruinosa*		2		1		1			1
Fabaceae	*Senna venusta*			1	1	1	2	2		
Fabaceae	*Sesbania cannabina*					1		1		
Fabaceae	*Tephrosia rosea var. ? rosea*						1			
Fabaceae	*Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601)*				1			1		

Family	Taxon Name	Status [1]	Broad vegetation type code [2]							
			A	B	C	D	E	F	G	Opp
Fabaceae	*Tephrosia sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)*		1		1	1				1
Goodeniaceae	*Dampiera candicans*		1				1			
Goodeniaceae	*Goodenia microptera*							1		
Goodeniaceae	*Goodenia muelleriana*				1			1		1
Goodeniaceae	*Goodenia stobbsiana*						1	1		1
Goodeniaceae	*Scaevola amblyanthera var. centralis*						3			
Lauraceae	*Cassytha capillaris*						1			
Malvaceae	*Corchorus parviflorus*		5	3	6	2	5			
Malvaceae	*Gossypium australe*				2	1	1	2		
Malvaceae	*Hibiscus austrinus var. austrinus*		1	1	5	1	3	1		
Malvaceae	*Hibiscus coatesii*				1					
Malvaceae	*Hibiscus sturtii var. campylochlamys*				1					
Malvaceae	*Melhania oblongifolia*									1
Malvaceae	*Sida rohlenaea subsp. rohlenae*						2			
Malvaceae	*Triumfetta maconochieana*				1					
Molluginaceae	*Trigastrotheca molluginea*		1		2		1	1	1	1
Moraceae	*Ficus aculeata var. indecora*						1			
Myrtaceae	*Corymbia hamersleyana*		1	1	3	2	6	2	1	
Myrtaceae	*Eucalyptus victrix*	FP				5				
Myrtaceae	*Melaleuca argentea*	OP				1	1			
Myrtaceae	*Melaleuca glomerata*	FP				2				
Nyctaginaceae	*Boerhavia gardneri*		1	1	6	1	4	2		
Onagraceae	*Ludwigia perennis*							1		
Phyllanthaceae	*Flueggea virosa subsp. melanthesoides*					2				
Phyllanthaceae	*Notoleptopus decaisnei*			1	1	3	6	1		
Phyllanthaceae	*Phyllanthus maderaspatensis*					2	1			
Plantaginaceae	*Stemodia grossa*					2		1		
Poaceae	**Cenchrus ciliaris*	s11		2	1	5	6	1		
Poaceae	**Cynodon dactylon*	S11						1		
Poaceae	*Aristida contorta*						1			
Poaceae	*Chrysopogon fallax*						1			
Poaceae	*Cymbopogon ambiguus*				4			2		
Poaceae	*Dactyloctenium radulans*			1						

Family	Taxon Name	Status [1]	Broad vegetation type code [2]							
			A	B	C	D	E	F	G	Opp
Poaceae	*Enneapogon caerulescens*				1		2			
Poaceae	*Eragrostis cumingii*					1				
Poaceae	*Eragrostis eriopoda*			1				1		
Poaceae	*Eragrostis tenellula*			1		1	1			
Poaceae	*Eriachne aristidea*				1					
Poaceae	*Eriachne ciliata*								1	1
Poaceae	*Eriachne mucronata*				1	1	2	2		
Poaceae	*Eriachne pulchella subsp. pulchella*		2		2			1		1
Poaceae	*Paraneurachne muelleri*		1				1	1		
Poaceae	*Perotis rara*						1			
Poaceae	*Sporobolus australasicus*		1		2	2	3	1		
Poaceae	*Themeda triandra*						2	1		
Poaceae	*Triodia brizoides*				3					
Poaceae	*Triodia epactia*		5	2	3	1	4	2		
Poaceae	*Triodia longiceps*		1	1		2	1			
Poaceae	*Triodia wiseana*		4	1	5	1	3	1	1	
Poaceae	*Yakirra australiensis var. australiensis*							1		
Portulaceae	*Portulaca conspicua*						1			
Portulaceae	*Portulaca oleracea*			1	1			1		
Proteaceae	*Grevillea pyramidalis subsp. leucadendron*		4	3	1			1		
Proteaceae	*Grevillea wickhamii subsp. hispidula*		4	2	3		3	2		
Proteaceae	*Hakea lorea subsp. lorea*			1		1				
Rubiaceae	*Dolichocarpa crouchiana*				2		1		1	1
Sapindaceae	*Atalaya hemiglauca*					5				
Solanaceae	*Solanum diversiflorum*			1			1	1		1
Violaceae	*Afrohybanthus aurantiacus*						5	1		
Zygophyllaceae	*Tribulus hirsutus*				4		2	1		
Zygophyllaceae	*Tribulus platypterus*				1				1	
Zygophyllaceae	*Tribulus suberosus*				2					

Footnotes:

1 = Status:

s11 Introduced taxon (weed) listed on the WAOL as Permitted – s11
s22(2) Introduced taxon (weed) listed on the WAOL as Declared Pest s22(2) Exempt
FP Facultative phreatophyte
OP Obligate phreatophyte

2 = Vegetation codes and broad vegetation types:

- *A Acacia inaequilatera over Triodia epactia and T. wiseana on stony plain*
- *B Grevillea pyramidalis and Acacia species over Triodia species or *Cenchrus ciliaris on sandy loam plain*
- *C Acacia inaequilatera and Grevillea wickhamii over Indigofera monophylla over Triodia wiseana, Triodia brizoides and Arivela viscosa on hills and rises*
- *D Eucalyptus victrix and Corymbia hamersleyana with Melaleuca species over *Cenchrus ciliaris and Triodia longiceps on major drainage*
- *E Corymbia hamersleyana and Acacia pyrifolia with occasional Melaleuca argentea over *Cenchrus ciliaris and Triodia epactia on medium drainage*
- *F Indigofera monophylla over Arivela viscosa and Triodia epactia on minor drainage*
- *G Acacia inaequilatera and Corymbia hamersleyana over Triodia wiseana on hill crests and slopes*

Opp = Opportunistic records

Appendix XII – Vertebrate fauna species recorded during the survey

Family	Scientific name	Common name	Status [1]		Record type [2]		
			BCA	EPBC	OPP	MDC	SM4
Birds							
Columbidae	*Geophaps plumifera*	Spinifex pigeon			2	1	
Columbidae	*Phaps chalcoptera*	Common bronzewing			1	2	
Columbidae	*Geopelia cuneata*	Diamond dove			4	1	
Turnicidae	*Turnix velox*	Little button-quail			1		
Accipitridae	*Aquila audax*	Wedge-tailed eagle			1		
Meropidae	*Merops ornatus*	Rainbow bee-eater			1		
Alcedinidae	*Dacelo leachii*	Blue-winged kookaburra			2		
Falconidae	*Falco cenchroides*	Nankeen kestrel			1		
Falconidae	*Falco berigora*	Brown falcon			1		
Falconidae	*Falco hypoleucos*	Grey falcon	VU		1		
Cacatuidae	*Nymphicus hollandicus*	Cockatiel			2		
Cacatuidae	*Eolophus roseicapilla*	Galah			2		
Psittaculidae	*Melopsittacus undulatus*	Budgerigar			9	1	
Maluridae	*Malurus leucopterus*	White-winged fairy-wren			1		
Maluridae	*Amytornis striatus whitei*	Pilbara Grasswren				1	
Meliphagidae	*Gavicalis virescens*	Singing honeyeater			3		
Meliphagidae	*Ptilotula keartlandi*	Grey-headed honeyeater			1		
Meliphagidae	*Ptilotula penicillata*	White-plumed honeyeater			1		
Meliphagidae	*Manorina flavigula*	Yellow-throated miner			4		
Pardalotidae	*Pardalotus rubricatus*	Red-browed Pardalote			2		
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned babbler			1		
Campephagidae	*Coracina novaehollandiae*	Black-faced cuckoo-shrike			3		
Oreoicidae	*Oreoica gutturalis*	Crested bellbird			1		
Artamidae	*Cracticus nigrogularis*	Pied butcherbird			1		
Artamidae	*Artamus cinereus*	Black-faced woodswallow			4		
Corvidae	*Corvus orru*	Torresian crow			1		
Corvidae	*Corvus coronoides*	Australian Raven			3		
Monarchidae	*Grallina cyanoleuca*	Magpie-lark			2		
Estrildidae	*Emblema pictum*	Painted finch			2		
Estrildidae	*Taeniopygia guttata*	Zebra finch			4		
Alaudidae	*Mirafra javanica*	Horsfield's bushlark			2		
Locustellidae	*Cincloramphus cruralis*	Brown songlark			2		
Locustellidae	*Cincloramphus mathewsi*	Rufous songlark			1		
Locustellidae	*Poodytes carteri*	Spinifexbird			7		

Family	Scientific name	Common name	Status [1]		Record type [2]		
			BCA	EPBC	OPP	MDC	SM4
Mammals							
Dasyuridae	*Dasyurus hallucatus*	Northern Quoll	EN	EN		1	
Macropodidae	*Osphranter robustus*	Euro			2		
Muridae	*Zyzomys argurus*	Common Rock-rat				5	
Rhinonycteridae	*Rhinonicteris aurantia (Pilbara)*	Pilbara Leaf-nosed Bat	VU	VU			1
Megadermatidae	*Macroderma gigas*	Ghost Bat	VU	VU			2
Emballonuridae	*Taphozous hilli*	Hill's Sheath-tailed Bat					2
Molossidae	*Chaerephon jobensis*	Greater Northern Free-tailed Bat					1
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat					4
	Scotorepens greyii	Little Broad-nosed Bat					4
	Vespadelus finlaysoni	Finlayson's Cave Bat					4
Felidae	*Felis catus*	Cat				1	
Bovidae	*Bos taurus*	European Cattle				2	
Reptiles							
Agamidae	*Ctenophorus caudicinctus*	Western Ring-tailed Dragon				2	
Agamidae	*Gowidon longirostris*	Long-nosed Dragon				1	
Scincidae	*Ctenophorus sp.*	(Ctenophorus species)			1		
Scincidae	*Ctenotus sp.*	(Ctenotus species)			1	3	
Varanidae	*Varanus acanthurus*	Spiny-tailed Goanna				1	
Varanidae	*Varanus giganteus*	Perentie				1	
Varanidae	*Varanus panoptes*	Yellow-spotted monitor			1		
Varanidae	*Varanus pilbarensis*	Northern Pilbara Rock Goanna				1	

Footnotes:

1 = Status:

BCA Western Australian Biodiversity Conservation Act 2016
EPBC Federal Environment Protection and Biodiversity Conservation Act 1999
EN Endangered under the BCA or EPBC Act
VU Vulnerable under the BCA or EPBC Act

2 = Record type:

OPP Opportunistic sighting
MDC Camera trap (Swift Enduro)
SM4 Acoustic recorder (SM4 Songbird)

Appendix XIII SM4 Analysis (Bat Call 2021)

Big Schist Pipeline Corridor, Pilbara WA,

Acoustic Survey of Bat and Night Parrot Activity, March 2021.

Prepared for Rapallo Environmental

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Issue 1
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Document Revision History

Issue	Date	Revision History
A	14 May 2021	Initial draft for Rapallo review
1	9 June 2021	First formal issue

Summary
Bat and Night Parrot (*Pezoporus occidentalis*) presence is reported for six sites for the Big Schist Pipeline Corridor, in the Pilbara, WA. Rapallo carried out an echolocation-based survey in March 2021. Four sites were surveyed for all bats present including Ghost bat social and ultrasonic calls. Two were surveyed using acoustic detectors set to record Night Parrot and Ghost bat social calls. Bat Call WA has reviewed the recordings made and provided species lists for the bats present.

Seven species of echolocating bats were confirmed present including the Pilbara leaf-nosed bat (*Rhinonicteris aurantia* - PLNb) and the Ghost bat (*Macroderma gigas* – PGb) that are listed as vulnerable under both state and commonwealth legislation. PLNb presence was detected at one site. PGb was detected at two sites. All call times were consistent with foraging visits and none indicated nearby diurnal roosting sites. This result is consistent with the known population and dispersal of both species in the district.

No Night Parrot calls were detected.

Habitats
The sites for the survey were chosen by Rapallo. Details of the sites are presented in Table 1. The bat sites included drainage lines, and a stony slope. The locations are shown in relation to local features in Figure 1.

Timing, Moon Phase and Weather
The echolocation survey was conducted between 17th to 21st March 2021.

The sampling evenings were hot and dry with minimum overnight temperatures between 20 and 25^{O}C. No rain fell during the survey. The moon was between new and first quarter.

Survey Team
Sites were chosen and detectors placed by Rapallo ecologists. Bob Bullen of Bat Call WA completed analysis of audio and echolocation recordings.

Sampling
The bat survey consisted of completing a total of twelve overnight ultrasonic bat sound recordings, beginning at twilight, at four locations within the survey area. A total of four acoustic survey nights were completed at two sites for Night Parrot. The recordings were "continuous" (Hyder *et al.* 2010) made using ultrasonic SM4BAT-FS and acoustic SM4A SongMeter (both by Wildlife Acoustics Inc., USA) detectors. The audio settings used followed the manufacturer's recommendations contained in the user manuals.

For the ultrasonic recordings, once reformatted as .wav files, COOL EDIT 2000 (now available as AUDITION from Adobe Systems Inc.) was used to display each sequence for identification. Calls were identified manually. Only good quality call sequences were used. Details of calls analysed are provided in Table 2 as recommended by Australasian Bat Society (ABS 2006). Reference data for the species identified are available in Bullen and McKenzie 2002, McKenzie and Bullen 2003 and McKenzie and Bullen 2009.

For the acoustic recordings, each was reviewed both manually and using an automatic scan technique for Night Parrot calls. Candidate calls were compared with the author's confirmed reference calls from two Western Australian arid zone locations.

Survey Limitations

The sites surveyed were accessible on foot and the detectors, using omnidirectional microphones, were set on the ground with the microphone vertical. Species are unlikely to be under-represented as a result.

Bat species density away from cave or adit entrances is impossible to estimate from echolocation records. Bat activity is therefore substituted as an approximate guide to the relative numbers of each species using the study area.

Results of bat fauna survey
An assemblage of seven echolocating bat species was confirmed as present at the study sites including both the PLNb and PGb, Table 4. Species activity levels were low to high, which is expected for the study area habitat and the times of year.

PLNb detections
PLNb presence was detected at one site. The single late-night call was consistent with foraging visits and did not indicate a nearby diurnal roosting site. This result is consistent with the known population and dispersal of PLNb in the district. Known diurnal roosts are at the Klondyke Queen and Bow Bells historical underground mines.

PGb detections
PGb presence was detected at two sites. All call times were consistent with late night foraging visits and none indicated nearby diurnal roosting sites. This result is consistent with the known population and dispersal of PGb in the district. Known diurnal roosts are at the Klondyke Queen and Bow Bells historical underground mines.

Common bat species detections
Five common species, *Chaerephon jobensis, Chalinolobus gouldii, Scotorepens greyi, Taphozous hilli* and *Vespadelus finlaysoni* dominated bat presence in the area.

Taxonomy presented herein is after Reardon *et al.* (2014) and Jackson and Groves (2015).

Results of Night Parrot survey.
No Night Parrot calls were detected.

References

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Table 1: Microbat site specific details. Coordinates are Zone 50K

	Date	Recording Time & SM unit	Habitat	Easting	Northing
Site 1 (SM4-0043)	17 to 20 Mar 21	Four overnight recordings using SM4BAT-FS-0043 recording at 384 kbps	Minor drainage line	792313	7647504
Site 2 (SM4-8168)	17 to 18 Mar 21	Two overnight recordings using SM4BAT-FS-8168 recording at 384 kbps	Major drainage line	787902	7651842
Site 3 (SM4-6479)	17 to 20 Mar 21	Four overnight recordings using SM4BAT-FS-6479 recording at 384 kbps	Drainage line	782817	7652221
Site 4 (SM4-8168)	19 to 20 Mar 21	Two overnight recordings using SM4BAT-FS 8168 recording at 384 kbps	Hillcrest, hillslope	796589	7640800

Table 2: Night Parrot site specific details.

	Date	Recording Time & SM2 unit	Habitat	Easting	Northing
Site 5 (SM4-4818)	17 to 18 Mar 21	Two overnight recordings using SM4A-4818 recording at 44 kbps	Major drainage line	787902	7651842
Site 6 (SM4-4818)	20 to 21 Mar 21	Two overnight recordings using SM4A-4818 recording at 44 kbps	Thin woodland over long unburnt Triodia dominated stony plain	791488	7647440

Note 1: Coordinates are Zone 50K

Table 3: Summary of Echolocation call characteristics for microbat species present.

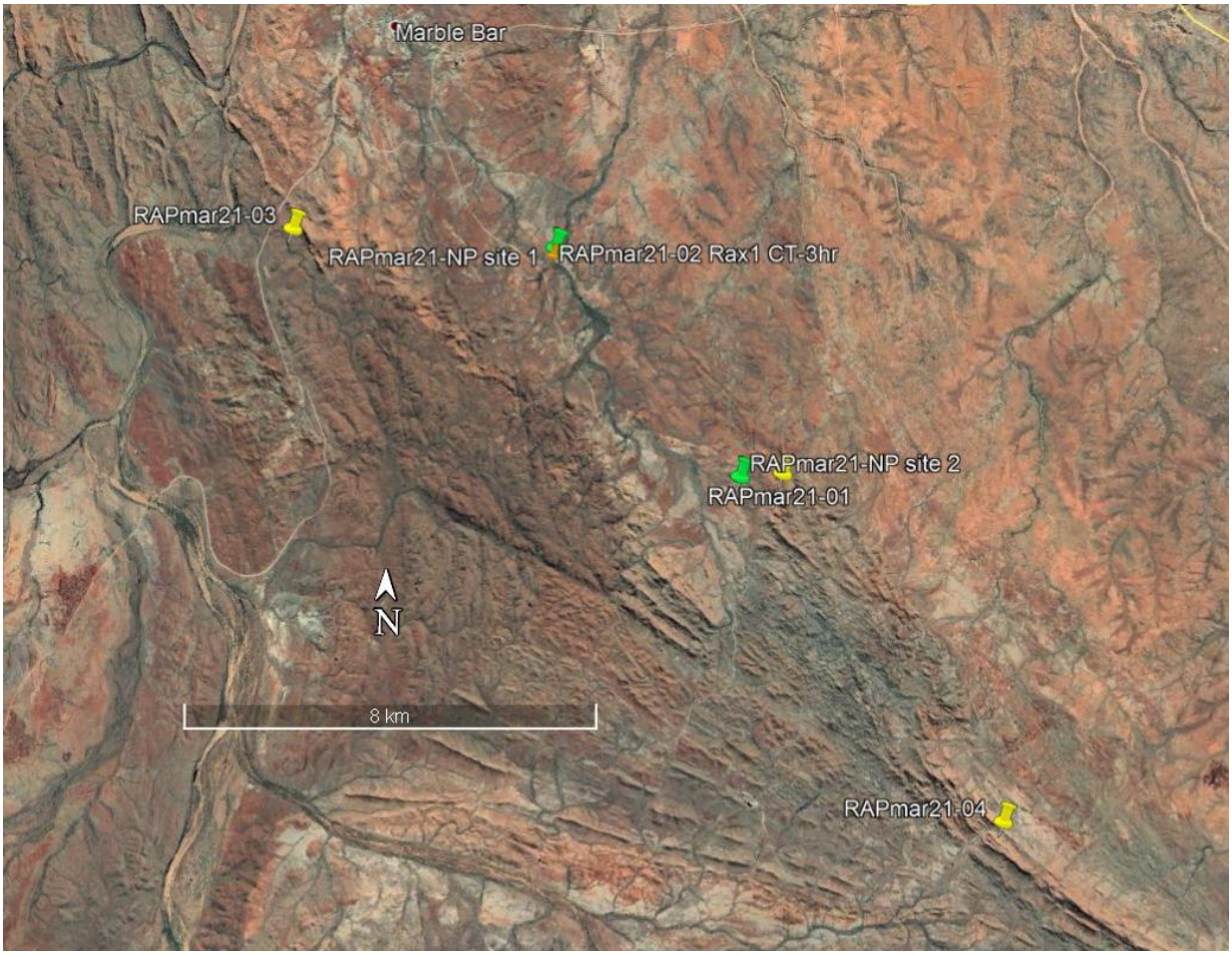
Genus species Authority	Common name	Typical F_{peak} kHz Note 1	Ave. Q Note 1	Typical Duration msec	Typical Call Shape
Chaerephon jobensis (Miller 1902)	Northern free-tailed bat	22	5	8 - 15	Shallow FM
Chalinolobus gouldii (Grey 1841)	Gould's wattled bat	32	10	7 - 11	FM
Rhinonicteris aurantia (Gray 1845)	Pilbara leaf-nosed bat	120	30	5 - 8	CF
Scotorepens greyii (Gray 1843)	Little broad-nosed bat	38	10	7 - 13	FM
Taphozous hilli Thomas 1915	Hills sheath-tailed bat	26	14	9 - 18	CF– shallow FM
Vespadelus finlaysoni (Kitchener, Jones and Caputi 1987)	Inland cave bat	55	14	4 - 8	FM

Note 1: Fpeak and Q are defined in McKenzie and Bullen 2003, 2009.
Note 2: Taxonomy follows Jackson and Groves (2015). *O. lumsdenae* was recently *Mormopterus beccarii*.

Table 4: Survey microbat lists presented by site.

Site	*Chaerephon jobensis*	*Chalinolobus gouldii*	*Macroderma gigas*	*Rhinonicteris aurantia*	*Scotorepens greyii*	*Taphozous hilli*	*Vespadelus finlaysoni*
Site 1		Yes			Yes	Yes	Yes
Site 2		Yes		1 call	Yes		Yes
Site 3	Yes	Yes	1 call		Yes		Yes
Site 4		Yes	1 call		Yes	Yes	Yes

Figure 1. Survey sites in relation to features in the study area. Yellow pins denote sites where microbat calls were recorded but no PLNb were detected. Orange pins denote sites where PLNb were recorded. Green pins denote sites where acoustic detectors were placed to record Night Parrot and Ghost bat social calls.



Appendix XIV – Summary of flora relevé data

Site name	Scientific name	Status	Height (m)	Cover (%)
S04-TN01	*Acacia bivenosa*		1.3	0.5
	Acacia inaequilatera		2.5	5
	Acacia synchronicia		1.6	0.5
	Boerhavia gardneri		0.4	0.1
	Corchorus parviflorus		0.9	0.1
	Eriachne pulchella subsp. pulchella		0.1	0.05
	Grevillea pyramidalis subsp. leucadendron		2	0.2
	Grevillea wickhamii subsp. hispidula		2.5	0.2
	Sporobolus australasicus		0.1	0.05
	Triodia epactia		0.6	30

Site name	Scientific name	Status	Height (m)	Cover (%)
S05-TN02	**Cenchrus ciliaris*	weed	0.6	1.5
	Acacia inaequilatera		1	0.5
	Acacia ptychophylla		1	3
	Afrohybanthus aurantiacus		0.3	0.01
	Boerhavia gardneri		0.3	0.05
	Corchorus parviflorus		0.6	0.1
	Corymbia hamersleyana		6	2
	Dampiera candicans		0.5	0.01
	Enneapogon caerulescens		0.1	0.01
	Grevillea wickhamii subsp. hispidula		1	0.1
	Indigofera monophylla		0.5	2
	Notoleptopus decaisnei		0.1	0.02
	Rhynchosia minima		0.2	0.1
	Scaevola amblyanthera var. centralis		0.4	0.3
	Senna artemisioides subsp. oligophylla		0.5	0.1
	Senna glutinosa subsp. pruinosa		1.8	0.2
	Sida rohlenaea subsp. rohlenae		0.4	0.01
	Sporobolus australasicus		0.1	0.01
	Triodia epactia		0.8	25
	Triodia wiseana		0.4	0.5

Site name	Scientific name	Status	Height (m)	Cover (%)
S06-TN03	Acacia inaequilatera		2.5	2
	Acacia synchronicia		1.3	1
	Triodia wiseana		0.4	25

Site name	Scientific name	Status	Height (m)	Cover (%)
S07-TN04	**Aerva javanica*	weed	0.5	2
	**Cenchrus ciliaris*	weed	0.5	1
	Acacia pyrifolia var. pyrifolia		3	5
	Afrohybanthus aurantiacus		0.4	0.01
	Arivela viscosa		0.5	15
	Boerhavia gardneri		0.3	0.1
	Bulbostylis barbata		0.1	0.02
	Corchorus parviflorus		0.2	0.02
	Corymbia hamersleyana		5	1
	Eriachne mucronata		0.3	0.3
	Euphorbia trigonosperma		0.4	0.01
	Gomphrena cunninghamii		0.2	0.1
	Gossypium australe		1.1	4
	Grevillea wickhamii subsp. hispidula		3	3
	Gymnema erectum		0.4	0.01
	Heliotropium crispatum		0.4	0.01
	Hibiscus austrinus var. austrinus		0.5	0.01
	Indigofera colutea		0.2	0.1
	Indigofera linifolia		0.2	0.1
	Indigofera monophylla		0.4	0.1
	Notoleptopus decaisnei		0.2	0.01
	Polymeria ambigua		0.1	0.3
	Ptilotus auriculifolius		0.4	0.1
	Ptilotus sp.		(blank)	(blank)
	Rhynchosia minima		0.2	0.1
	Senna artemisioides subsp. oligophylla		0.5	0.01
	Senna venusta		0.5	0.1
	Sporobolus australasicus		0.2	0.01
	Tephrosia rosea var. ? rosea		0.4	0.02
	Tribulus hirsutus		0.2	0.1
	Triodia epactia		0.3	0.1

Site name	Scientific name	Status	Height (m)	Cover (%)
S09-TN05	*Acacia inaequilatera*		2.5	4
	Arivela viscosa		0.5	15
	Bonamia pilbarensis		0.1	0.1
	Fimbristylis dichotoma		0.2	0.1
	Indigofera monophylla		0.2	5
	Ptilotus auriculifolius		0.3	0.3
	Triodia wiseana		0.3	5

Site name	Scientific name	Status	Height (m)	Cover (%)
S11-TN06	*Acacia inaequilatera*		3	1
	Amaranthus undulatus		0.5	1
	Arivela viscosa		0.9	10
	Boerhavia gardneri		0.2	0.1
	Bonamia pilbarensis		0.1	0.01
	Crotalaria cunninghamii subsp. sturtii		0.5	0.01
	Cucumis variabilis		0.1	0.1
	Dolichocarpa crouchiana		0.3	0.1
	Euphorbia careyi		0.1	0.01
	Euphorbia tannensis subsp. rremophila		0.5	0.1
	Evolvulus alsinoides var. villosicalyx		0.1	0.01
	Gomphrena cunninghamii		0.2	0.1
	Heliotropium cunninghamii		0.2	0.01
	Hibiscus austrinus var. austrinus		0.5	0.2
	Indigofera monophylla		0.6	10
	Ptilotus auriculifolius		0.6	0.1
	Tribulus hirsutus		0.4	0.1
	Triodia wiseana		10	5

Site name	Scientific name	Status	Height (m)	Cover (%)
S13-TN07	*Acacia inaequilatera*		0.5	1
	Arivela viscosa		1	20
	Bonamia pilbarensis		0.05	0.01
	Corymbia hamersleyana		-	-
	Eriachne mucronata		0.2	0.4
	Goodenia stobbsiana		0.5	0.05
	Gossypium australe		1	1
	Grevillea wickhamii subsp. hispidula		0.4	0.5
	Heliotropium cunninghamii		0.2	0.01
	Indigofera monophylla		0.6	5
	Ptilotus auriculifolius		0.5	0.02
	Senna venusta		0.3	0.01
	Triodia epactia		0.2	1

Site name	Scientific name	Status	Height (m)	Cover (%)
S14-TN08	*Acacia inaequilatera*		3.5	3
	Arivela viscosa		0.7	9
	Boerhavia gardneri		0.2	0.5
	Bonamia pilbarensis		0.05	0.1
	Corchorus parviflorus		0.2	0.5
	Dolichocarpa crouchiana		0.1	0.01
	Gomphrena cunninghamii		0.2	0.1
	Gossypium australe		0.6	0.2
	Heliotropium crispatum		0.3	0.5
	Indigofera monophylla		0.3	7
	Ptilotus auriculifolius		0.5	0.5
	Rhynchosia minima		0.2	0.1
	Tribulus hirsutus		0.5	0.1
	Tribulus platypterus		0.5	0.1
	Triodia epactia		0.2	10
	Triodia wiseana		0.2	0.2

Site name	Scientific name	Status	Height (m)	Cover (%)
S15-TN09	**Cenchrus ciliaris*	weed	0.8	20
	Amaranthus undulatus		0.3	0.01
	Atalaya hemiglauca	Facultative phreatophyte	3	1
	Cyperus vaginatus		0.4	0.1
	Eragrostis cumingii		0.4	0.01
	Eragrostis tenellula		0.3	0.1
	Eucalyptus victrix	Facultative phreatophyte	9	20
	Euphorbia trigonosperma		0.4	0.01
	Flueggea virosa subsp. melanthesoides		4.5	8
	Notoleptopus decaisnei		0.1	0.01
	Rhynchosia minima		0.1	0.1
	Terminalia circumalata		3	1

Site name	Scientific name	Status	Height (m)	Cover (%)
S16-TN10	*Acacia inaequilatera*		3	0.1
	Acacia pyrifolia var. pyrifolia		3	5
	Arivela viscosa		0.9	20
	Boerhavia gardneri		0.3	0.01
	Bonamia pilbarensis		0.02	0.01
	Bulbostylis barbata		0.1	0.01
	Corymbia hamersleyana		5	1
	Euphorbia trigonosperma		0.3	0.01
	Grevillea pyramidalis subsp. leucadendron		0.2	0.01
	Indigofera monophylla		0.3	0.1
	Polymeria ambigua		0.1	0.1
	Portulaca oleracea		0.1	0.01
	Ptilotus auriculifolius		0.3	0.1
	Senna venusta		0.2	0.01
	Tribulus hirsutus		0.1	0.01
	Triodia epactia		0.1	10

Site name	Scientific name	Status	Height (m)	Cover (%)
S17-ET01	*Acacia inaequilatera*		4.5	4
	Afrohybanthus aurantiacus		0.2	0.01
	Arivela viscosa		0.6	5
	Boerhavia gardneri		0.2	0.1
	Bulbostylis barbata		0.1	0.05
	Corymbia hamersleyana		4	1
	Crotalaria medicaginea var. neglecta		0.5	0.1
	Cymbopogon ambiguus		0.5	0.1
	Eragrostis eriopoda		0.5	0.3
	Eriachne pulchella subsp. pulchella		0.2	0.3
	Goodenia microptera		0.3	0.05
	Goodenia muelleriana		0.3	0.01
	Gossypium australe		0.5	0.1
	Grevillea pyramidalis subsp. leucadendron		0.7	0.3
	Grevillea wickhamii subsp. hispidula		0.8	0.2
	Heliotropium crispatum		0.3	0.01
	Heliotropium cunninghamii		0.2	0.1
	Hibiscus austrinus var. austrinus		0.5	0.01
	Indigofera colutea		0.2	0.01
	Indigofera monophylla		0.7	2.5
	Notoleptopus decaisnei		0.1	0.1
	Paraneurachne muelleri		0.5	0.3
	Polymeria ambigua		0.1	0.5
	Portulaca oleracea		0.1	0.01
	Ptilotus auriculifolius		0.6	0.4
	Rhynchosia minima		0.3	0.1
	Senna venusta		0.8	0.5
	Solanum diversiflorum		0.3	0.02
	Sporobolus australasicus		0.1	0.1
	Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601)		0.2	0.01
	Themeda triandra		0.5	0.2
	Tribulus hirsutus		0.2	0.01
	Trigastrotheca molluginea		0.2	0.1
	Triodia epactia		0.2	4
	Triodia wiseana		0.2	1
	Yakirra australiensis var. australiensis		0.05	0.1

Site name	Scientific name	Status	Height (m)	Cover (%)
S18-ET02	*Acacia inaequilatera*		1.8	3
	Arivela viscosa		0.5	0.1
	Bonamia pilbarensis		0.1	0.01
	Corchorus parviflorus		0.9	3
	Cymbopogon ambiguus		0.7	0.01
	Eriachne aristidea		0.2	0.01
	Eriachne pulchella subsp. pulchella		0.2	0.1
	Gomphrena cunninghamii		0.2	0.01
	Goodenia muelleriana		0.3	0.01
	Grevillea wickhamii subsp. hispidula		1.8	3
	Hibiscus austrinus var. austrinus		0.5	0.01
	Hibiscus coatesii		0.7	0.01
	Indigofera monophylla		0.6	3
	Ptilotus astrolasius		0.5	0.1
	Ptilotus calostachyus		0.5	0.01
	Tephrosia sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)		0.2	0.01
	Tribulus suberosus		0.9	0.02
	Trigastrotheca molluginea		0.2	0.01
	Triodia ? brizoides		0.5	30

Site name	Scientific name	Status	Height (m)	Cover (%)
S19-ET03	*Acacia acradenia*		2.5	0.2
	Boerhavia gardneri		0.3	0.01
	Corchorus parviflorus		1.2	3
	Corymbia hamersleyana		6	2
	Cymbopogon ambiguus		0.5	0.5
	Eriachne pulchella subsp. pulchella		0.2	0.1
	Euphorbia trigonosperma		0.1	0.01
	Gomphrena cunninghamii		0.2	0.01
	Grevillea wickhamii subsp. hispidula		3	0.5
	Hibiscus austrinus var. austrinus		0.5	0.01
	Indigofera ? monophylla		1	0.1
	Indigofera monophylla		1.1	5
	Polycarpaea longiflora		0.2	0.01
	Rhynchosia minima		0.2	0.1
	Trigastrotheca molluginea		0.2	0.01
	Triodia ? brizoides		0.8	5
	Triodia epactia		1	5

Site name	Scientific name	Status	Height (m)	Cover (%)
S20-ET04	*Acacia inaequilatera*		4	2
	Arivela viscosa		0.5	0.01
	Boerhavia gardneri		0.2	0.02
	Bulbostylis barbata		0.1	0.01
	Corchorus parviflorus		1	0.3
	Cymbopogon ambiguus		0.6	0.1
	Cyperus hesperius		1	0.1
	Gomphrena cunninghamii		0.2	0.1
	Gossypium australe		1.1	0.5
	Hibiscus austrinus var. austrinus		1.1	1
	Hibiscus sturtii var. campylochlamys		0.5	0.1
	Polycarpaea longiflora		0.2	0.01
	Rhynchosia minima		0.2	0.1
	Senna glutinosa subsp. pruinosa		2	2
	Sporobolus australasicus		0.1	0.01
	Tribulus suberosus		1	0.1
	Triodia wiseana		0.5	20
	Triumfetta maconochieana		0.6	0.1

Site name	Scientific name	Status	Height (m)	Cover (%)
S21-ET05	*(not collected - no idea)*		0.3	0.01
	**Aerva javanica*	weed	1	0.1
	**Cenchrus ciliaris*	weed	0.6	1
	Acacia inaequilatera		2.5	3
	Arivela viscosa		0.6	1
	Boerhavia gardneri		0.3	0.1
	Corchorus parviflorus		1.1	1
	Corymbia hamersleyana		6.5	1
	Crotalaria medicaginea var. neglecta		0.5	0.1
	Cymbopogon ambiguus		0.6	0.3
	Enneapogon caerulescens		0.3	0.01
	Eriachne mucronata		0.5	0.5
	Gomphrena cunninghamii		0.2	0.01
	Grevillea wickhamii subsp. hispidula		3	3
	Heliotropium crispatum		0.3	0.01
	Heliotropium cunninghamii		0.2	0.1
	Hibiscus austrinus var. austrinus		0.5	0.1
	Indigofera monophylla		0.6	0.2
	Notoleptopus decaisnei		0.3	0.01
	Polycarpaea longiflora		0.3	0.01
	Polymeria ambigua		0.4	0.01
	Ptilotus auriculifolius		0.4	0.01
	Sporobolus australasicus		0.2	0.01
	Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601)		0.1	0.01
	Tribulus hirsutus		0.2	0.01
	Triodia ? brizoides		0.6	0.1
	Triodia wiseana		0.6	5

Site name	Scientific name	Status	Height (m)	Cover (%)
S22-ET06	*Acacia acradenia*		1.1	0.1
	Acacia inaequilatera		5	3
	Corchorus parviflorus		(blank)	(blank)
	Eriachne pulchella subsp. pulchella		0.1	0.01
	Grevillea pyramidalis subsp. leucadendron		1	0.1
	Indigofera trita subsp. trita		0.2	0.01
	Tephrosia sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)		0.05	0.01
	Trigastrotheca molluginea		0.2	0.01
	Triodia wiseana		0.4	30

Site name	Scientific name	Status	Height (m)	Cover (%)
S23-ET07	**Aerva javanica*	weed	0.5	0.1
	**Cenchrus ciliaris*	weed	0.6	1.5
	Acacia acradenia		3	3
	Adriana tomentosa var. tomentosa		1.2	0.1
	Afrohybanthus aurantiacus		0.3	0.01
	Amaranthus undulatus		0.3	0.01
	Aristida contorta		0.3	0.01
	Arivela viscosa		0.7	0.1
	Cajanus pubescens		1.2	3
	Cassytha capillaris		cr	0.2
	Corchorus parviflorus		0.5	0.1
	Corymbia hamersleyana		6.5	3
	Crotalaria medicaginea var. neglecta		0.7	0.3
	Cyperus vaginatus		0.8	0.1
	Enneapogon caerulescens		0.3	0.1
	Eriachne mucronata		0.5	3
	Euphorbia careyi		0.2	0.1
	Euphorbia tannensis subsp. rremophila		0.3	0.01
	Euphorbia trigonosperma		0.4	0.01
	Ficus aculeata var. indecora		2	1
	Fimbristylis simulans		0.2	0.01
	Goodenia stobbsiana		0.5	0.01
	Heliotropium crispatum		0.6	0.02
	Heliotropium cunninghamii		0.2	0.01
	Hibiscus austrinus var. austrinus		0.5	0.01
	Indigofera monophylla		0.6	0.2
	Indigofera trita		0.7	0.1
	Melaleuca argentea	Obligate phreatophyte	7	1.5
	Notoleptopus decaisnei		0.2	0.05
	Paraneurachne muelleri		0.5	2
	Phyllanthus maderaspatensis		0.4	0.01
	Polymeria ambigua		0.2	0.1
	Ptilotus auriculifolius		0.6	0.1
	Ptilotus sp.		0.2	0.1
	Scaevola amblyanthera var. centralis		0.5	0.01
	Solanum diversiflorum		0.2	0.01
	Themeda triandra		0.7	0.1
	Tribulus hirsutus		0.3	0.01
	Triodia epactia		0.5	0.2
	Triodia wiseana		0.5	5

Site name	Scientific name	Status	Height (m)	Cover (%)
S24-ET08	*Acacia inaequilatera*		3	0.5
	Corchorus parviflorus		1	0.1
	Crotalaria medicaginea var. neglecta		0.1	0.01
	Grevillea pyramidalis subsp. leucadendron		3	2.5
	Grevillea wickhamii subsp. hispidula		3	2
	Hibiscus austrinus var. austrinus		0.7	0.1
	Indigofera monophylla		0.9	0.1
	Paraneurachne muelleri		0.5	0.2
	Triodia epactia		0.6	20

Site name	Scientific name	Status	Height (m)	Cover (%)
S25-ET09	**Cenchrus ciliaris*	weed	0.6	0.5
	Acacia inaequilatera		3	1.5
	Boerhavia gardneri		0.3	0.1
	Corchorus parviflorus		1	7
	Eragrostis eriopoda		0.4	0.3
	Grevillea pyramidalis subsp. leucadendron		2.5	4
	Grevillea wickhamii subsp. hispidula		3	3.3
	Rhynchosia minima		0.3	0.1
	Triodia epactia		1	25

Site name	Scientific name	Status	Height (m)	Cover (%)
S26-ET10	*Acacia acradenia*		1.5	1
	Acacia inaequilatera		3	5
	Corchorus parviflorus		1.5	7
	Corymbia hamersleyana		(blank)	1
	Dampiera candicans		0.4	0.1
	Grevillea pyramidalis subsp. leucadendron		2.5	1
	Grevillea wickhamii subsp. hispidula		2.5	1.5
	Ptilotus calostachyus		0.5	0.02
	Triodia epactia		0.5	5
	Triodia wiseana		0.3	15

Site name	Scientific name	Status	Height (m)	Cover (%)
S27-ET11	**Cenchrus ciliaris*	weed	0.5	35
	Arivela viscosa		0.8	2
	Crotalaria medicaginea var. neglecta		1	0.5
	Dactyloctenium radulans		0.2	2
	Eragrostis tenellula		0.2	0.02
	Grevillea pyramidalis subsp. leucadendron		2.5	1
	Heliotropium cunninghamii		0.2	0.1
	Indigofera colutea		0.2	0.1
	Indigofera linifolia		0.3	0.01
	Notoleptopus decaisnei		0.4	0.01
	Pluchea ferdinandi-muelleri		1	0.2
	Portulaca oleracea		0.1	0.01
	Ptilotus auriculifolius		0.5	0.01
	Rhynchosia minima		0.3	0.1
	Senna venusta		0.2	0.1
	Solanum diversiflorum		0.4	0.01

Site name	Scientific name	Status	Height (m)	Cover (%)
S28-ET12	**Aerva javanica*	weed	0.7	0.01
	**Cenchrus ciliaris*	weed	0.6	15
	Afrohybanthus aurantiacus		0.4	0.01
	Arivela viscosa		0.6	0.3
	Boerhavia gardneri		0.2	0.01
	Cajanus pubescens		0.5	2
	Corymbia hamersleyana		4.5	7
	Crotalaria medicaginea var. neglecta		0.5	0.2
	Dolichocarpa crouchiana		0.1	0.1
	Eragrostis tenellula		0.3	0.3
	Grevillea wickhamii subsp. hispidula		0.4	1
	Heliotropium crispatum		0.5	0.1
	Heliotropium cunninghamii		0.2	0.1
	Hibiscus austrinus var. austrinus		0.3	0.1
	Indigofera linifolia		0.2	0.1
	Indigofera monophylla		0.5	2
	Notoleptopus decaisnei		0.3	0.05
	Perotis rara		0.2	0.01
	Senna venusta		0.3	0.1
	Sida rohlenaea subsp. rohlenae		0.5	0.1
	Themeda triandra		0.5	(blank)
	Trichodesma zeylanicum		0.5	0.1

Site name	Scientific name	Status	Height (m)	Cover (%)
S29-BG01	**Cenchrus ciliaris*	weed	0.5	15
	Acacia coriacea subsp. pendens		5	0.5
	Acacia pyrifolia var. pyrifolia		2.2	2
	Acacia trachycarpa		3	7
	Arivela viscosa		0.5	0.1
	Atalaya hemiglauca	Facultative phreatophyte	1.6	0.1
	Corchorus parviflorus		0.5	0.1
	Cyperus vaginatus		0.8	1
	Eucalyptus victrix	Facultative phreatophyte	10	20
	Euphorbia trigonosperma		0.2	0.01
	Melaleuca glomerata	Facultative phreatophyte	2.5	0.1
	Phyllanthus maderaspatensis		0.5	0.1
	Stemodia grossa		0.7	0.01
	Triodia longiceps		1	5

Site name	Scientific name	Status	Height (m)	Cover (%)
S30-ET13	*Acacia inaequilatera*		3	2
	Bulbostylis barbata		0.1	0.01
	Corymbia hamersleyana		2.5	0.5
	Dolichocarpa crouchiana		0.1	0.01
	Eriachne ciliata		0.2	0.01
	Gomphrena cunninghamii		0.1	0.01
	Ptilotus auriculifolius		0.4	0.02
	Tribulus platypterus		0.4	0.1
	Trigastrotheca molluginea		0.2	0.01
	Triodia wiseana		0.2	15

Site name	Scientific name	Status	Height (m)	Cover (%)
S31-ET14	**Cenchrus ciliaris*	weed	0.5	10
	Acacia bivenosa		1.5	3
	Acacia ptychophylla		1.3	3
	Acacia trachycarpa		1.8	6
	Chrysopogon fallax		0.8	5
	Corchorus parviflorus		0.9	0.1
	Corymbia hamersleyana		3.5	4
	Indigofera monophylla		1.1	0.5
	Notoleptopus decaisnei		0.3	0.01
	Scaevola amblyanthera var. centralis		0.3	0.1
	Trigastrotheca molluginea		0.2	0.1
	Triodia epactia		1	10
	Triodia wiseana		0.7	5

Site name	Scientific name	Status	Height (m)	Cover (%)
S32-ET15	*Acacia bivenosa*		1.8	0.4
	Acacia ptychophylla		1.1	7
	Acacia synchronicia		2.5	0.2
	Grevillea wickhamii subsp. hispidula		3	0.4
	Indigofera ? monophylla		1	0.1
	Senna glutinosa subsp. pruinosa		1.8	0.1
	Triodia epactia		0.4	0.1
	Triodia longiceps		0.7	25
	Triodia wiseana		0.6	5

Site name	Scientific name	Status	Height (m)	Cover (%)
S35-GAP01	**Cenchrus ciliaris*	weed	0.5	20
	Acacia pyrifolia var. pyrifolia		2.5	3
	Acacia trachycarpa		2.5	15
	Afrohybanthus aurantiacus		0.3	0.01
	Boerhavia gardneri		0.2	0.1
	Corchorus parviflorus		0.5	0.1
	Corymbia hamersleyana		9	3
	Cyperus vaginatus		0.7	0.1
	Euphorbia australis var. subtomentosa		0.2	0.01
	Notoleptopus decaisnei		0.2	0.01
	Portulaca conspicua		0.01	0.1
	Sporobolus australasicus		0.2	0.1
	Triodia longiceps		1.1	5

Site name	Scientific name	Status	Height (m)	Cover (%)
S36-GAP02	*Acacia bivenosa*		1.8	5
	Acacia pyrifolia var. pyrifolia		2.2	5
	Acacia trachycarpa		1.8	5
	Corchorus parviflorus		1	0.1
	Triodia longiceps		0.8	20

Site name	Scientific name	Status	Height (m)	Cover (%)
S37-GAP03	*Acacia inaequilatera*		1.8	0.1
	Acacia orthocarpa		2.5	5
	Bonamia pilbarensis		0.02	0.01
	Bulbostylis barbata		0.1	0.1
	Corchorus parviflorus		1	2
	Fimbristylis dichotoma		0.2	0.1
	Senna glutinosa subsp. pruinosa		2	0.1
	Triodia epactia		0.6	25

Site name	Scientific name	Status	Height (m)	Cover (%)
S38-GAP04	**Cenchrus ciliaris*	weed	0.8	20
	**Vachellia farnesiana*	weed	2.5	0.2
	Acacia bivenosa		2	20
	Acacia trachycarpa		4	1.5
	Atalaya hemiglauca	Facultative phreatophyte	5	1
	Corchorus parviflorus		0.4	0.01
	Corymbia hamersleyana		6	8
	Crotalaria medicaginea var. neglecta		0.5	0.1
	Cyperus vaginatus		0.6	0.4
	Eucalyptus victrix	Facultative phreatophyte	9	5
	Hakea lorea subsp. lorea		4.2	0.1
	Melaleuca argentea	Obligate phreatophyte	4	2
	Notoleptopus decaisnei		0.2	0.01
	Pluchea ferdinandi-muelleri		1.1	2
	Senna venusta		0.5	0.1
	Sporobolus australasicus		0.1	0.01
	Tephrosia sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)		0.2	0.01
	Triodia longiceps		0.5	0.4
	Triodia wiseana		0.3	0.1

Site name	Scientific name	Status	Height (m)	Cover (%)
S39-GAP05	**Cenchrus ciliaris*	weed	0.5	30
	**Vachellia farnesiana*	weed	0.5	0.1
	Acacia bivenosa		1.9	1
	Acacia pyrifolia var. pyrifolia		1.3	1
	Acacia trachycarpa		3	6
	Atalaya hemiglauca	Facultative phreatophyte	4.5	2
	Corymbia hamersleyana		5	1
	Crotalaria medicaginea var. neglecta		0.4	0.5
	Cyperus vaginatus		0.7	0.2
	Eucalyptus victrix	Facultative phreatophyte	12	20
	Euphorbia careyi		0.3	0.2
	Melaleuca glomerata	Facultative phreatophyte	3.5	1.5
	Notoleptopus decaisnei		0.1	0.01
	Sporobolus australasicus		0.2	0.01

Site name	Scientific name	Status	Height (m)	Cover (%)
S40-GAP06	*Acacia ancistrocarpa*		1.8	0.2
	Acacia inaequilatera		2	4
	Acacia pyrifolia var. pyrifolia		1.8	0.1
	Corchorus parviflorus		1	0.2
	Corymbia hamersleyana		3	1
	Grevillea pyramidalis subsp. leucadendron		2	1
	Grevillea wickhamii subsp. hispidula		1.8	0.1
	Hakea lorea subsp. lorea		1.3	0.1
	Hibiscus austrinus var. austrinus		1	0.2
	Rhynchosia minima		0.3	0.1
	Senna artemisioides subsp. helmsii		1	0.1
	Triodia epactia		0.7	0.5
	Triodia wiseana		0.6	25

Site name	Scientific name	Status	Height (m)	Cover (%)
S41-TN100	**Cenchrus ciliaris*	weed	0.6	5
	Acacia coriacea subsp. pendens		3.5	0.1
	Acacia pyrifolia var. pyrifolia		3.5	5
	Acacia trachycarpa		2.5	3
	Arivela viscosa		0.8	7
	Atalaya hemiglauca	Facultative phreatophyte	3.5	0.5
	Boerhavia gardneri		0.3	0.1
	Cyperus vaginatus		1	8
	Eriachne mucronata		0.7	5
	Eucalyptus victrix	Facultative phreatophyte	12	20
	Euphorbia trigonosperma		0.4	0.01
	Flueggea virosa subsp. melanthesoides		1.5	1
	Gomphrena cunninghamii		0.2	0.01
	Gossypium australe		1	10
	Hibiscus austrinus var. austrinus		0.3	0.1
	Phyllanthus maderaspatensis		0.3	0.01
	Sesbania cannabina		1	0.01
	Stemodia grossa		0.8	0.1
	Terminalia circumalata		5	1
	Trichodesma zeylanicum		0.4	0.01
	Triodia epactia		0.7	1

Site name	Scientific name	Status	Height (m)	Cover (%)
S42-TN101	**Cenchrus ciliaris*	weed	0.5	2
	**Cynodon dactylon*	weed	0.2	0.5
	Arivela viscosa		0.6	5
	Boerhavia gardneri		0.2	0.1
	Cymbopogon ambiguus		0.6	0.1
	Cyperus vaginatus		0.6	2
	Eriachne mucronata		0.5	0.1
	Ludwigia perennis		0.6	1
	Sesbania cannabina		0.6	0.1
	Stemodia grossa		0.6	5

Assessment of the Ten Clearing Principles

Potential Impact on a High Level of Biological Diversity

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

The reconnaissance flora and vegetation survey of the Big Schist pipeline corridor recorded 125 flora taxa from 30 different families. These included 120 native taxa and 5 introduced taxa (weeds). The most well-represented families were Fabaceae (32 taxa), Poaceae (23 taxa) and Malvaceae (9 taxa) (Rapallo 2021a).

The vegetation of the corridor comprises a variation of spinifex (*Triodia* spp.) grasslands, mostly on stony or sandy/loam plains or on stony hills and rises, with an overstorey of mixed shrubs and low trees dominated by *Acacia inaequilatera*, *Grevillea wickhamii*, *Grevillea pyramidalis*, and *Corymbia hamersleyana*. Major, medium, and minor creek lines intersect the plains, with the major and medium creek lines supporting a variety of groundwater dependent flora species (Rapallo 2021a).

The vegetation of the corridor is not highly diverse with a total of seven vegetation types that are known and can be expected to occur outside of the corridor (Rapallo 2021a). The Pilbara bioregion is not known for a high level of biological diversity, in terms of flora and vegetation in comparison to other parts of Western Australia such as the northern sandplains region in the vicinity of Eneabba.

The proposal is not at variance with this principle.

Potential Impact to any Significant Habitat for Indigenous Fauna

b. *Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.*

Fauna habitat loss as a direct result of land clearing is a primary impact on terrestrial fauna. Clearing for the pipeline will be low impact and restricted to a narrow corridor, potentially affecting seven broad fauna habitats. All habitats are represented outside of the corridor, throughout the region and in conservation estate.

Of the seven broad fauna habitats recorded within the corridor, the Major Drainage habitat and Sandy/Loam Plain habitat are ranked as “High” significance for vertebrate fauna due to the potential to provide core habitat for species of conservation significance. The remainder are of “Moderate” significance, either due to the possibility of foraging/dispersal habitat, or habitats primarily supporting priority or migratory species (Rapallo 2021a).

Sandy/Loam Plain Habitat

The Sandy/Loam Plain habitat was assessed as “High” significance due to the potential for Greater bilby and Brush-tailed mulgara breeding, foraging and dispersal habitat. The Greater bilby is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) and *Biodiversity Conservation Act* 2016 (BC Act). The Brush-tailed mulgara is listed as Priority 4 by the Department of Biodiversity, Conservation and Attractions (DBCA). Both species are rated as “Highly Likely” to occur on the corridor (Rapallo 2021a).

There are Greater bilby records proximal to the corridor from 2014 in the DBCA threatened species database, however the database does not indicate type of record or source (DBCA 2020). No evidence of Greater bilby was recorded during the current survey; nor was the species detected via targeted searches for the Warrawoona Gold Project (Biologic 2019).

Greater bilbies are recorded as having low site fidelity and high mobility (Southgate *et al.* 2007); males regularly move three to five kilometres between burrows on consecutive days; and have been recorded moving up to 15 km in a few weeks (Southgate & Possingham 1995).

Brush-tailed mulgara has been recorded from the Sandy Plain habitat of the Warrawoona Gold Project (Biologic 2019). Mulgara can use multiple burrow systems within a home-range and changing these frequently (Körtner *et al.* 2008).

Sandy/Loam Plain habitat provides breeding, shelter, foraging, dispersal habitat for the Spectacled hare-wallaby (DBCA Priority 4) and supporting habitat (dispersal and foraging habitat) for Grey falcon (Vulnerable under the BC Act and EPBC Act), Pilbara leaf-nosed bat, and Ghost bat (both listed as vulnerable under the EPBC Act and BC Act). Sandy/Loam Plain habitat contains some suitable areas of habitat for the Night parrot listed as Endangered under the BC Act and EPBC Act. Night parrot was not recorded on the corridor via acoustic recorder) (Rapallo 2021a).

Local populations of Greater bilby and Brush-tailed mulgara may be temporarily impacted by clearing of any active burrows. Clearing activities will be managed to avoid burrows to minimise impacts to such species. Neither Greater bilby nor Brush-tailed mulgara would be restricted to the Sandy/Loam Plain habitat of the corridor.

A total of 63 ha of the corridor (23%) comprises Sandy/Loam Plain habitat and a substantial amount of Sand Plain habitat is known to occur outside the corridor to the south of the Warrawoona Gold Project (Biologic 2019). The habitat type is widespread in the broader landscape, and not restricted to the corridor (Rapallo 2021a; Biologic 2019). Fauna occurring in the region are therefore unlikely to be substantially impacted by the proposal, from a regional perspective.

Major Drainage Habitat

The Major Drainage habitat provides a range of microhabitats and a stable source of food and water, within vast landscape of relatively resource-poor spinifex plains (How *et al.* 1991; Rapallo 2021a). More specifically, nectivorous avifauna benefit from the flowering plants and hollow-nesting species make use of the large eucalypts that line the banks (Burbidge *et al.* 2010)). Mammal, reptile and amphibian fauna may also congregate around permanent water pools (How *et al.* 1991).

Due to the widespread availability of microhabitats, such as leaf litter accumulations, large trees, hollows, and semi-permanent/permanent water sources, the Major Drainage habitat provides foraging and dispersal habitat for Northern quoll, Pilbara leaf-nosed bat, Pilbara olive python, Peregrine falcon, Northern brushtail possum and potentially where there is sufficient moisture: Gane's blind snake. Grey falcon may utilise the Major Drainage habitat for nesting and foraging (Rapallo 2021a).

Until habitat preferences are further defined for Ghost bat it is assumed that the Major Drainage habitat is also utilised in some capacity by Ghost bat (Rapallo 2021a).

- Northern quoll is listed as Endangered under the EPBC act and the BC Act
- Pilbara leaf-nosed bat is listed as Vulnerable under the EPBC Act and BC Act
- Ghost bat is listed as Vulnerable under the EPBC Act and BC Act

- Grey falcon is listed as Vulnerable under the BC Act
- Pilbara olive python is listed as Vulnerable under the EPBC Act and BC Act
- Peregrine Falcon is listed as Other Specially Protected Fauna under the BC Act
- Northern Brushtail Possum is listed as Vulnerable under the BC Act
- Gane's blind snake (DBCA Priority 1)

Migratory bird species can use drainage systems as conduits for movement throughout an otherwise arid landscape (Storr 1984, Bamford *et al.* 2008).

Due to lack of permanent pools and large artificial water bodies there is limited habitat for migratory birds within the Major Drainage habitat of the Big Schist corridor. Migratory species assessed as "Possible infrequent visitors" on the corridor include:

- Common greenshank
- Wood sandpiper
- Glossy ibis
- Oriental plover

Local populations of Northern quoll, Pilbara leaf-nosed bat, Pilbara olive python, Peregrine falcon, Northern brushtail possum, Gane's blind snake and Grey Falcon are not anticipated to be impacted by the clearing of a narrow corridor of Major Drainage habitat beyond temporary displacement and direct short-term impact from machinery because this habitat does not contain critical or preferred breeding habitat for the majority of these species. Northern quoll, Pilbara olive python and Peregrine falcon breeding habitat is located within the Rocky breakaway habitat of the Warrawoona Gold Project and within ridge lines to the north east and will not be impacted by the proposal. The Rocky breakaway habitat is extensive and predominately intact with only 0.8 ha of this habitat approved for clearance within the Warrawoona Gold Project (EPBC 2019/8584).

Both Gane's blind snake and the Northern Brushtail Possum have a patchy distribution and are infrequently recorded (Rapallo 2021a).

The Pilbara leaf-nosed bat will potentially forage over most habitats within the corridor with Major Drainage containing most significant foraging habitats due to the small creek line pool and turkeys nest dam at the northern extent of the corridor. However, it is noted that there are other permanent pools and much larger artificial water bodies within the creek lines of the region (Rapallo 2021b). Pilbara leaf-nosed bat breeding habitat is located within the old workings proximal to the Warrawoona Gold project and will not be impacted by the proposal.

Ghost bat breeding habitat is located within the old workings proximal to the Warrawoona Gold project and will not be impacted by the proposal. Ghost bat will potentially forage over most habitats of the corridor (Rapallo 2021a).

The Grey falcon uses Major Drainage habitats for breeding; however it is noted that this habitat is not restricted to the corridor and the species has not been recorded nesting on the corridor to date.

A total of 9 ha of the corridor (3%) comprises Major Drainage habitat. The habitat type is widespread in the broader landscape, and the affected areas are contiguous with surrounding occurrences of Major Drainage habitat (Rapallo 2021a). Fauna occurring within this habitat type are therefore unlikely to be substantially impacted by the proposal.

Minor Drainage and Medium Drainage provides potential dispersal and foraging habitat for Pilbara olive python , Ghost bat, Pilbara Leaf-nosed bat, Peregrine falcon, Grey Falcon, Oriental plover (Migratory BC/EPBC Act) and, where there is sufficient moisture, also for Gane's blind snake (Rapallo 2021a).

Hillcrest/ Hillslope and Hills and Rises habitat provides supporting habitat (dispersal and foraging habitat) for Ghost bat, Pilbara Leaf-nosed bat and Northern quoll and breeding, shelter, foraging, dispersal habitat for the Long-tailed dunnart (DBCA Priority 4) and Western Pebble-mound mouse (DBCA Priority 4). Hillcrest/ Hillslope and Hills and Rises habitat contains potential habitat for *Ctenotus uber johnstonei* (DBCA Priority 2) (Rapallo 2021a).

Stony Plain, the dominant habitat within the corridor (113 ha, 42%) provides breeding, shelter, foraging, and dispersal habitat for the priority listed Western Pebble-mound mouse and Spectacled hare-wallaby and supporting habitat (dispersal and foraging habitat) for Grey falcon, Pilbara leaf-nosed bat, and Ghost bat. Stony Plain provides potential *Ctenotus nigrilineatus* habitat (Rapallo 2021a). Stony Plain contains some suitable areas of habitat for the Night parrot listed as Endangered under the BC Act and EPBC Act. Acoustic recorders placed on the corridor did not detect the Night parrot (Rapallo 2021a).

Given that the habitats are represented outside of the corridor, throughout the region and in conservation estate, and primarily represent foraging and dispersal habitat of listed threatened species rather than breeding habitat of listed threatened species of high site fidelity; with management, clearing within the corridor is unlikely to be at variance to this clearing principle.

Management will include clearing protocols as per Warrawoona Gold Project Environmental Procedures and internal preclearance surveys (Greater bilby and Brush-tailed mulgara) as per the Calidus Significant Species Management Plan referred to in Ministerial Statement 1150.

Potential Impact to any Rare Flora

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

No threatened flora, listed under the EPBC Act or BC Act, have been recorded from the Big Schist pipeline corridor (Rapallo 2021a). None of the threatened flora species listed for the Pilbara are expected to occur within the corridor, due to a lack of suitable habitat and/or a distribution that does not overlap with the corridor.

Although not recorded on the corridor four species were assessed as "Highly Likely" to occur on the corridor. These were *Eragrostis crateriformis* (DBCA Priority 3), *Heliotropium murinum* (DBCA Priority 3*), Euphorbia clementii* (DBCA Priority 3), *Ptilotus mollis* (DBCA Priority 4) (Rapallo 2021a).

Eragrostis crateriformis (DBCA Priority 3) occurs throughout the Warrawoona Gold Project, recorded from minor drainage lines and sheet flow areas of red sandy clay (Woodman 2020) and stony plain habitat (Rapallo 2021). This ephemeral grass occurs over a range of approximately 1,370 km in Western Australia, from near Onslow in the west to near Balgo Hills in the Tanami Desert in the east. It also occurs in the Northern Territory. There are 51 records of this taxon in Western Australia, representing approximately 30 populations. Three of these populations occur in the DBCA managed Millstream-Chichester National Park and DBCA managed Ex Meentheena Station (Woodman 2020, ALA 2021, Western Australian Herbarium 2021,DBCA 2020b). *Eragrostis crateriformis* is not restricted to the habitats of the corridor

and removal of individual plants would not alter the local or regional conservation status of this species should the pipeline corridor be unable to avoid individuals.

Heliotropium murinum (DBCA Priority 3), grows on red sand, plains, or brown light clay or sand over ironstone. *Heliotropium murinum* occurs within the Warrawoona Gold Project and has been recorded from other nearby localities (Woodman 2020, (Rapallo 2021a). The species occurs over a range of approximately 150 km from Woodstock Reserve in the west to DBCA managed Ex Meentheena Station in the east. There are 17 location records of this taxon in Western Australia representing approximately 12 populations (including the records from the Warrawoona Gold Project). One population occurs in the DBCA-managed Ex Meentheena Station (Woodman 2020, ALA 2021, Western Australian Herbarium 2021,DBCA 2020b). *Heliotropium murinum* is locally common with 890 plants recorded from 160 point locations within the Warrawoona Gold Project (Woodman 2020). *Heliotropium murinum* is not restricted to the habitats of the corridor, and removal of individual plants will not alter the local or regional conservation status of this species should the pipeline infrastructure be unable to avoid individuals.

Euphorbia clementii (DBCA Priority 3), grows on gravelly hillsides, stony grounds, and along drainage lines on red, orange sandy loams, or stony areas. The species occurs within the Warrawoona Gold Project and has been recorded from other nearby localities (Woodman 2020, (Rapallo 2021a). This taxon is endemic to Western Australia with the main range of its distribution extending over 190 km from Wodgina in the west to northeast of Marble Bar. There are 35 location records of *Euphorbia clementii* in Western Australia representing approximately 18 populations, none of which occur in DBCA-managed tenure (Woodman 2020, ALA 2021, Western Australian Herbarium 2021,DBCA 2020b).

Euphorbia clementii was recorded from a long unburnt stony undulating plain of red-brown sandy clay loam on the Warrawoona Gold Project . (Woodman 2020) found this habitat to be atypical for the species as this taxon is typically a fire-responder (and relatively short-lived) but may germinate in response to physical disturbance. Woodman (2020) hypothesised that the record on the Warrawoona Gold Project may have been transported, given the nearby historical disturbance evident in aerial photography and long unburnt nature of the vegetation. The taxon was not observed in more recently burnt areas of typical habitat (sandy or stony plains) (Woodman 2020). *Euphorbia clementii* was not recorded on the recently burnt areas or disturbed areas of the corridor where if present it would have been readily identifiable as it typically occurs in large numbers (Woodman 2020).

Euphorbia clementii is not restricted to the habitats of the corridor, and removal of individual plants will not alter the local or regional conservation status of this species should the pipeline infrastructure be unable to avoid individuals.

Ptilotus mollis (DBCA Priority 4) grows on stony hills and screes. The species occurs within the Warrawoona Gold Project on rocky hill tops and slopes of the main range (consisting of granite, chert and mafic schist) or smaller outcroppings of mafic schist immediately adjacent to the main range (to the south) and has been recorded from other nearby localities (Woodman 2020, Rapallo 2021a). *Ptilotus mollis* is endemic to Western Australia occurring over a range of approximately 640 km from Cane River Conservation Park in the west (65 km south-west of Pannawonica) to near Karlamilyi National Park in the east (270 km south-east of Marble Bar). There are 39 location records of this taxon in Western Australia, representing approximately 28 populations (including the records from the Warrawoona Gold Project). Three of these populations occur within DBCA conservation estate, Cane River Conservation Park and Karijini National Park (Woodman 2020, ALA 2021, Western Australian Herbarium 2021,DBCA 2020b). *Ptilotus mollis* is locally common (2534 plants have been recorded from 350 locations within the

Warrawoona Gold Project) (Woodman 2020) , and removal of individual plants will not alter the local or regional conservation status of this species should the pipeline infrastructure be unable to avoid individuals.

Two species were assessed as "Likely" to occur on the survey area *Josephinia sp.* Woodstock (A.A. Mitchell PRP 989) (DBCA Priority 1)*, Heliotropium muticum* (DBCA Priority 3) (Rapallo 2021a).

Josephinia sp. Woodstock (DBCA Priority 1) grows on sheet flow or drainage lines, on red sandy (granitic) plains. This taxon is known from seven records across four localities (Ashburton, Chichester, Fortescue and Hamersley IBRA sub-regions) and is not currently known from any DBCA-managed conservation reserves (Woodman 2020, ALA 2021, Western Australian Herbarium 2021,DBCA 2020b). The species has been recorded from the Warrawoona Gold Project from a loamy minor drainage line and despite a comprehensive targeted survey of all potential habitat on the Warrawoona Gold Project, no additional locations have been recorded and the original plant recorded in 2019 could not be relocated despite intensive grid searching of the known location at 5 metre intervals (Woodman 2020). *Josephinia* sp. Woodstock, although rarely recorded is not restricted to the habitats of the corridor, and removal of individual plants would not alter the local or regional conservation status of this species should the pipeline infrastructure be unable to avoid individuals.

Heliotropium muticum (DBCA - Priority 3) grows on flat terrain, low in the landscape, flood plains and sand plains. Soil types where this species has been recorded included (very gritty) skeletal red brown granitic soil, clay loams, and sand. The species is endemic to the Pilbara and occurs between Port Hedland/Wickham south to Coonarrie Creek and west to Marble Bar (Western Australian Herbarium 1998, Woodman Environmental 2020, Atlas of Living Australia 2021),DBCA 2020b). *Heliotropium muticum* growth is triggered by fire with an estimated population of approximately 1,300 to 2,500 individuals at Pilgangoora (MMWC 2016) and 20 individuals located at North Star (Ecologia 2012). *Heliotropium muticum* is not restricted to the habitats of the corridor, and removal of individual plants would not alter the local or regional conservation status of this species should the pipeline infrastructure be unable to avoid individuals.

No flora listed as threatened flora, under the EPBC Act or BC Act will be impacted by clearing for the corridor. Based on habitat, and local records, clearing within the corridor does have the potential to impact several priority taxa however none of these species are recognised as threatened, nor are they restricted to the local area or the region. Given the narrow clearing parcel required for a pipeline, and that much of the clearing involves upgrading existing tracks rather than the establishment of new tracks, clearing activities will not result in the complete loss of these taxa from the local area, and will not impact regional populations.

The proposal is not at variance with this principle.

Potential Impact on any Threatened Ecological Communities

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.*

Search results of DBCA Threatened and Priority Ecological Community (TEC/PEC) database search (DBCA 2020b) indicates that no TECs are known to occur within or near the corridor.

Rapallo (2021a) found no known locations of listed significant vegetation, as listed by the AWE (EPBC Act) or otherwise listed by the DBCA, occurring within 40 km of the corridor (DBCA 2020a; AWE 2020). Only two TECs are known from the *Pilbara* Region (TEC 46 -Themeda Grasslands and TEC 78 Ethel Gorge Aquifer Stygobiont Community DBCA 2018c). Both TECs are associated with the Hamersley Range area, and therefore it is highly unlikely that either of these TECs would occur within the corridor.

A review of the published TEC and PEC listings for Western Australia (DBCA 2020a); DBCA 2018c) against the descriptions of the vegetation types in Rapallo (2021a) identified no vegetation types in the corridor representing listed TECs or PECs as listed by DBCA or the AWE.

The proposal is not at variance with this principle.

Potential Impact on any Native Vegetation Remnant in an Area that has been Extensively Cleared

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.

Review of the DBCA State-Wide Vegetation Statistics data (DBCA 2018c) showed that all three vegetation system-associations intersected by the survey area (Abydos Plain 93, George Ranges 82, and George Ranges 587) still have more than 99% of their original extent remaining (DBCA 2018d) and would be considered 'least concern' (DER 2014).

The corridor is located outside of the 'agricultural area' (Intensive Land Use zone) where remnant vegetation has been extensively cleared DBCA 2018d). The corridor is not located within an significant remnant of native vegetation in an area which has been extensively cleared.

The proposal is not at variance with this principle.

Potential Impact on any Watercourse and/or Wetland

f. Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

The corridor crosses tributaries of the Coongan River in five locations. The pipeline corridor design will pass flows across the roadway by means of floodways, culverts or a combination of both to reduce risk of crossing flooding and minimise the time the corridor will be out of commission during a flood event. The presence of these floodways / culverts will ensure that there are minimal impacts to the upstream and downstream flow regimes of these drainage lines.

If channel capacities are exceeded, short-term ponding may occur over the corridor with potential scour and road degradation. During a large rainfall event, the background mobilisation of natural sediments in the catchments is expected to be significant, and any increase in sediment loads from the erosion of the corridor would likely be minor in comparison.

With management clearing within the corridor is unlikely to alter the hydrological and ecological values of the Coongan River tributaries and ultimately the Coongan River.

The proposal is at variance with this principle.

Potential to Cause Appreciable Land Degradation

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

Because the topography of the corridor is generally flat for much of its length and given much of the clearing involves upgrade to existing tracks, significant land degradation is unlikely to occur. The Macroy, Talga, Granitic, Boolgeeda, Capricorn, and Rocklea land systems are not particularly prone to degradation or erosion. The creeks that the corridor crosses are typically gravelly rather than sandy banked and do not fall within the River land system that is susceptibility to erosion is high or very high if vegetative cover is removed (Van Vreeswyk *et al.* 2004). it is considered that erosion can be managed through appropriate engineering controls and progressive rehabilitation, and appreciable land degradation from clearing for a pipeline is unlikely to occur if such measures are undertaken.

There is potential for clearing to result in the establishment and or spread of weeds. Given the extent to which weeds have established in the Pilbara, especially along drainage lines, existing weeds within the corridor and the current pastoral land use, eradication of existing weeds within the corridor is not a feasible option. Effort will be focussed on preventing the establishment of previously unrecorded weeds and reducing the spread of existing weeds as per Warrawoona Gold Project Environmental Procedures.

With management, the proposal is unlikely to be at variance with this principle.

Potential Impact on Adjacent or Nearby Conservation Areas

h. Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

The corridor is located on Eginbah Pastoral lease and unallocated crown land. No conservation areas are located in the immediate vicinity of the corridor.

The proposal is not at variance with this principle.

Potential Deterioration in Water Quality

i. Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

The creek lines that intersect the Big Schist pipeline are shallow and contain primarily facultative phreatophytic taxa, with only one obligate phreatophyte (*Melaleuca argentea*) recorded. The one pool within Minor Drainage observed in March 2021 after significant summer rainfall was small and unlikely to be permanent. Provided that clearing within creek lines is managed and minimised via the Warrawoona Gold Project Environmental Procedures, clearing of vegetation for a pipeline will not impact the quality of surface or underground water greater than the impacts currently experienced from cattle grazing .

There is a low potential for minor impacts to the quality of surface water as a result of sedimentation or the release of hydrocarbons during pipeline construction. However, the likelihood of this occurring and the significance of this impact can be managed utilising the controls and management measures in place via the Warrawoona Gold Project Environmental Procedures.

The proposal is not at variance with this principle.

Potential to Cause or Exacerbate Flooding

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

The creeks flow intermittently following periods of intense rainfall. Clearing within the corridor would not be expected to cause or increase the frequency or intensity of flooding.

The proposal is not at variance with this principle.

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