

Telfer Gas Pipeline and Nifty Gas Lateral

2020 Fauna Assessment Summary Report



Top: Greater Bilby (*Macrotis lagotis*) recorded during the survey. Bottom: the Telfer Gas Pipeline route (left), active Bilby burrow (right).

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EXECUTIVE SUMMARY

APA Group operates pipelines connecting the Telfer and Nifty mines to the Pilbara Pipeline System at Port Hedland, in northern Western Australia. To maintain the pipeline corridors, APA conducted “Line of Sight” clearing activities along the length of the Telfer Gas Pipeline and Nifty Gas Lateral during May, June and July 2020. Clearing activities were implemented under two Clearing Permits (CPS 8396/1 and CPS 8399/1, issued by the Department of Mines, Industry Regulation and Safety) and managed to minimise impacts to fauna, particularly those species of conservation significance. As clearing activities have the potential to impact threatened fauna, clearing permits CPS 8396/1 and CPS 8399/1, required the management and protection of locally occurring fauna and their associated shelter. Under Condition 7 (of CPS 8396/1 and CPS 8399/1), impacts to four threatened taxa (the Greater Bilby, Brush-tailed Mulgara, Great Desert Skink, and Dampierland Plain Slider) required management during clearing. Kingfisher Environmental was commissioned by APA to conduct pre-clearance fauna surveys along the pipeline corridors, and to maintain, or relocate fauna from, significant shelter sites.

Clearance fauna surveys were conducted prior to and during clearing activities and carried out with reference to technical guidance and a fauna management plan developed in consultation with the Department of Biodiversity, Conservation and Attractions (DBCA) and APA. While surveying focused on four focal species, targeted searches, pitfall trapping, and the use of motion-activated cameras, enabled a large fauna assemblage to be recorded, including several additional species of conservation significance. A total of 145 vertebrate fauna species were recorded during the field surveys, comprising one amphibian, 53 reptile, 71 bird, 13 native mammal and seven introduced mammal species. Two of the four focal species of conservation significance were recorded (Greater Bilby and Brush-tailed Mulgara).

Seven species of conservation significance were recorded during the 2020 field surveys. Three species listed under the EPBC Act (Greater Bilby, Northern Quoll and Ghost Bat), three DBCA Priority species (Brush-tailed Mulgara, Spectacled Hare-Wallaby and Western Pebble-mound Mouse) and one locally significant fauna species (Bush Stone-curlew) were recorded:

1. Greater Bilby (EPBC Vulnerable): detected on camera and burrows, tracks, scats and diggings widely recorded along the pipeline routes;
2. Northern Quoll (EPBC Endangered): tracks and scats recorded at three locations;
3. Ghost Bat (EPBC Vulnerable): individuals observed and scats recorded at three locations;
4. Brush-tailed Mulgara (DBCA Priority 4): tracks and scats recorded;
5. Western Pebble-mound Mouse (DBCA Priority 4): old mounds recorded at five locations;
6. Spectacled Hare-wallaby (DBCA Priority 4): likely tracks recorded at two locations;
7. Bush Stone-curlew (locally significant): individuals recorded at two locations and tracks widely recorded.

The Great Desert Skink (EPBC Vulnerable) was not recorded during the 2020 field surveys and was not detected during the pipeline’s initial construction in 2004. As the Great Desert Skink inhabits distinctive and large burrow systems, the species was considered unlikely to occur within the pipeline corridor at the time of clearing. Similarly, the Dampierland Plain Slider (DBCA Priority 2) was also not recorded during the 2020 field surveys. The species lives predominantly underground, and occurs in the region at the southern extreme of its range.

Disturbances to fauna were minimised during clearing, and all burrows identified with the potential to support the Greater Bilby and Brush-tailed Mulgara were retained and protected from disturbance. Additional fauna (e.g. skinks, legless lizards, geckoes) identified during pre-clearance surveys, were relocated by hand immediately prior to clearing. In total, 38 burrows of the Greater Bilby were protected from impact, with disturbance free buffers (radius of 10 metres) established during clearing.

While the surveys ensured minimal disturbance to four focal taxa, additional species of conservation significance were also detected. Regionally significant records of additional threatened and declining taxa were recorded adjacent to the pipeline corridor, some of which may warrant further investigation. This includes the Spectacled Hare-wallaby, with tracks attributable to the species recorded south of Mijijimaya. Additionally, records of the Western Pebble-mound mouse, Northern Quoll and Ghost Bat come from areas where they are poorly documented and near range extremes. As the pipeline routes avoided most rocky habitats, and disturbances to large trees were avoided, impacts to such fauna appear to have been minimal during clearing activities.

The pre-clearance surveys and fauna management during clearing ensured compliance with clearing permits issued by DMIRS (CPS 8396/1 and CPS 8399/1). The surveys ensured disturbances to conservation significant fauna were minimised, detected some additional species of significance, and maintained APA's strong commitment to environmental management. This document describes the survey methodology and techniques utilised during fauna surveying and management, following protocols developed by the Department of Biodiversity, Conservation and Attractions and Kingfisher Environmental.

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1. INTRODUCTION

APA Group (APA) operates two gas pipelines connecting Port Hedland to the Telfer and Nifty mines in northern Western Australia (Figure 1). The Telfer Gas Pipeline (TGP, commissioned in 2004) extends from the Pilbara Pipeline System at Port Hedland to the Telfer gold-copper mine in the East Pilbara Region of Western Australia (spanning a distance of 443 km). The Nifty Gas Lateral (NGL, spanning 45 km, commissioned 2005) links the TGP to the Nifty Copper Mine, 350 km east of Port Hedland. The TGP lies within both the Pilbara and Great Sandy Desert Bioregions of Western Australia and also crosses a small portion of the Little Sandy Desert Bioregion at its terminus (Interim Biogeographic Regionalisation for Australia, IBRA 7). The NGL is located wholly within the Great Sandy Desert Bioregion. Both pipelines traverse through habitat supporting several fauna species of conservation significance (Figure 1).

To maintain the pipeline corridors, APA submitted a proposal to conduct “Line of Sight” clearing activities (maintenance of the line of sight between pipeline markers) as required by AS2285, to the Department of Mines, Industry Regulation and Safety (DMIRS). APA proposed to clear a 6 m wide (maximum) strip of vegetation along the length of the pipeline corridors (approximately 443 km for the Telfer Gas Pipeline, and 45 km for the Nifty Gas Lateral) and to maintain the existing access track adjacent to the pipeline routes. Clearing proposed to disturb rehabilitated vegetation as the pipeline corridors were previously cleared during the initial pipeline construction (completed during December 2004).

APA was subsequently granted two Clearing Permits (CPS 8396/1 – Nifty Gas Pipeline and CPS 8399/1 – Telfer Gas Pipeline, DMIRS 2020) to conduct the clearing. However, to minimise impacts to threatened fauna, both clearing permits required fauna management, as outlined under Condition 7 of CPS 8396/1 and CPS 8399/1. Pre-clearance fauna surveys were required for four focal threatened species. Additionally, fauna relocation and management was required during any clearing activities. The details of Condition 7 of CPS 8396/1 and CPS 8399/1 are listed below.

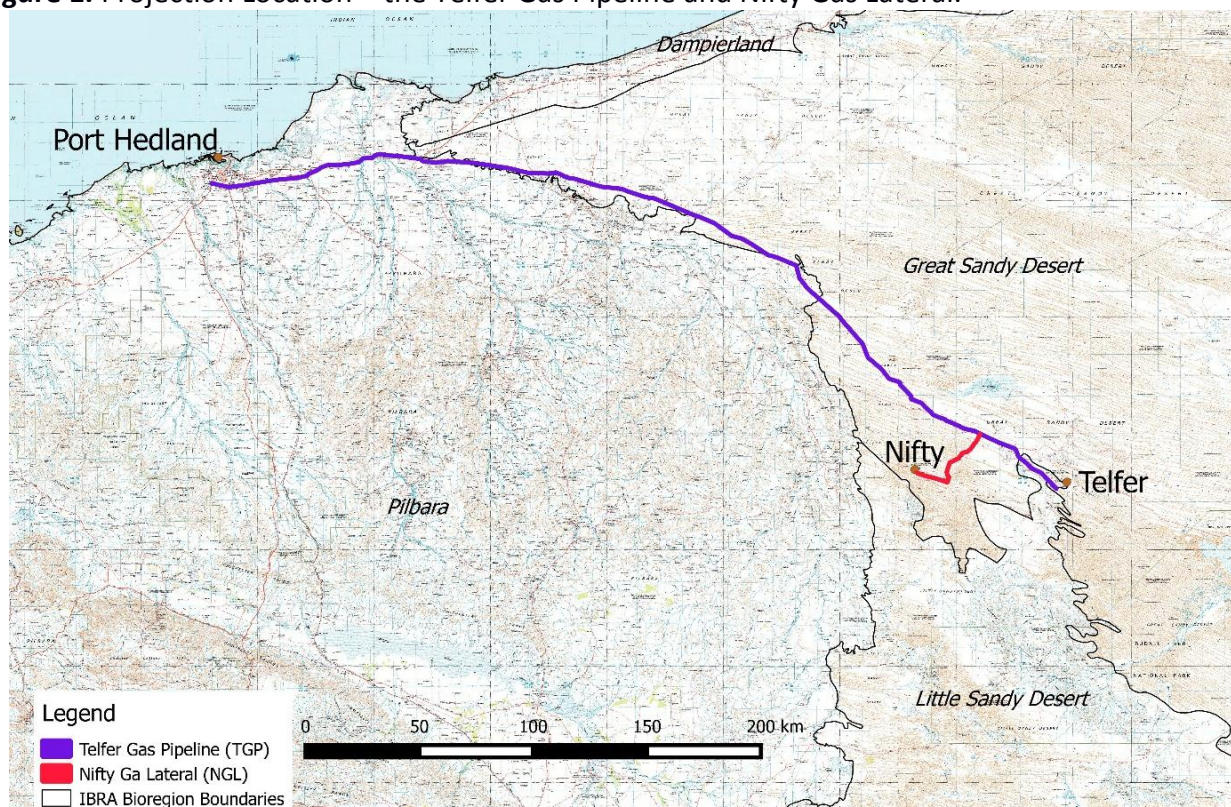
- A. Within two weeks prior to undertaking any clearing authorised under this Permit, the Permit Holder shall engage a fauna specialist to undertake clearance surveys for Greater Bilby (*Macrotis lagotis*), Mulgara (*Dasyercus* species), Dampierland Plain Slider (*Lerista separanda*) and Great Desert Skink (*Liopholis kintorei*).
- B. Where Greater Bilby, Mulgara, Dampierland Plain Slider and/or Great Desert Skink burrows are identified under Condition 7(a), the Permit Holder shall engage a fauna specialist to determine if the burrow is occupied.
- C. Within two weeks prior to undertaking any clearing authorised under this Permit, the Permit Holder shall engage a fauna specialist to relocate any Greater Bilby, Mulgara, Dampierland Plain Slider and/or Great Desert Skink found under Condition 7(a) and 7(b) of this permit.
- D. The Permit Holder shall engage a fauna spotter to traverse the project area ahead of clearing machinery, at the time of clearing and alert machinery operators to avoid Greater Bilby, Mulgara, Dampierland Plain Slider and/or Great Desert Skink injury or mortality.
- E. Where any Greater Bilby, Mulgara, Dampierland Plain Slider and/or Great Desert Skink are identified and relocated under Condition 7(a), 7(b), 7(c) and 7(d) of this Permit, the Permit Holder shall include the following in a report submitted to the CEO:
 - a. the location of any evidence of Greater Bilby, Mulgara, Dampierland Plain Slider and/or Great Desert Skink recorded using a Global Positioning System (GPS) unit set

- to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
- b. the type of evidence recorded under Condition 7(e)(i), e.g., fauna individuals, burrows, scats, tracks;
- c. the location and date where any Greater Bilby, Mulgara, Dampierland Plain Slider and/or Great Desert Skink were relocated using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
- d. the name of the fauna specialist that relocated the Greater Bilby, Mulgara, Dampierland Plain Slider and/or Great Desert Skink under Condition 7(c); and
- e. a copy of the fauna licence authorising the relocation of the Greater Bilby, Mulgara, Dampierland Plain Slider and/or Great Desert Skink under Condition 7(c).

Kingfisher Environmental (Kingfisher) was commissioned by APA to conduct the pre-clearance surveys of both pipeline routes and to ensure project compliance under Condition 7 of both CPS 8396/1 and CPS 8399/1. The survey area for the pre-clearance and clearance surveys corresponded to the proposed clearing footprint, plus the immediate surrounding area, to account for secondary disturbances to adjacent habitats or shelter. The proposed clearing footprint included a 6 m wide strip along the pipeline corridor to allow for “line of sight” clearing, plus an approximately 3 m wide strip incorporating the existing pipeline access track, immediately adjacent to the pipeline.

As part of the project’s fauna management, and to minimise impacts to threatened fauna, Kingfisher was also commissioned to develop a fauna management plan (Kingfisher Environmental 2020). This report builds on the fauna management plan, details the methodology and results of the pre-clearance fauna surveys and discusses the presence and management of threatened fauna.

Figure 1. Projection Location – the Telfer Gas Pipeline and Nifty Gas Lateral.



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2. BACKGROUND

2.1 Regional Description

The Interim Biogeographic Regionalisation of Australia (IBRA) has identified 26 bioregions in Western Australia. Bioregions are classified on the basis of climate, geology, landforms, vegetation and fauna (Thackway and Cresswell, 1995). IBRA Bioregions are affected by a range of different threatening processes and have varying levels of sensitivity to impact (EPA, 2004). The Telfer Gas Pipeline (TGP) lies within both the Pilbara and Great Sandy Desert Bioregions of Western Australia and also crosses a small portion of the Little Sandy Desert Bioregion at its terminus (Interim Biogeographic Regionalisation for Australia, IBRA 7; see Figure 1).

Pilbara Bioregion

The TGP extends across the Roebourne and Chichester Subregions of the Pilbara Bioregion (Pilbara 1, IBRA, 2008). The Roebourne Plains subregion comprises:

“coastal plains with a grass savannah of mixed bunch and hummock grasses, and dwarf shrub steppe of *Acacia stellaticeps* or *A. pyrifolia* and *A. inaequilatera*. Uplands are dominated by *Triodia* hummock grasslands. Ephemeral drainage lines support *Eucalyptus victrix* or *Corymbia hamersleyana* woodlands. Samphire, *Sporobolus* and mangal occur on marine alluvial flats and river deltas. Resistant linear ranges of basalts occur across the coastal plains, with minor exposures of granite (Kendrick and McKenzie, 2001).”

Kendrick and McKenzie (2001) describe the Chichester Subregion as:

“the northern section of the Pilbara Craton. Undulating Archaean granite and basalt plains include significant areas of basaltic ranges. Plains support a shrub steppe characterised by *Acacia* (spp.) shrublands over *Triodia* (spp.) hummock grasslands, while *Eucalyptus leucophloia* tree steppes occur on ranges. The climate is semi-desert-tropical and receives 300 mm of rainfall annually.”

Great Sandy Desert Bioregion

The TGP also extends across the McLarty and MacKay Subregions of the Great Sandy Desert Bioregion (GSD01 and GSD02, IBRA, 2008). The Great Sandy Desert bioregion is characterised by red sand plains, dunefields and remnant rocky outcrops. Vegetation is predominantly spinifex grasslands, low woodlands and shrubs (McKenzie *et al.*, 2003). The McLarty and MacKay Subregions are described as:

“tree steppe grading to shrub steppe; comprising open hummock grassland of *Triodia pungens* and *Triodia schinzii* with scattered trees of *Owenia reticulata* and Bloodwoods, and shrubs of *Acacia*, *Grevillea wickhamii* and *G. refracta*, on Quaternary red longitudinal sand dune fields overlying Jurassic and Cretaceous sandstones of the Canning and Armadeus Basins. Gently undulating lateritised uplands support shrub steppe such as *Acacia pachycarpa* shrublands over *Triodia pungens* hummock grass. Calcrete and evaporite surfaces are associated with occluded palaeo-drainage systems that traverse the desert; these include extensive salt lake chains with samphire low shrublands, and *Melaleuca glomerata* - *M. lasiandra* shrublands (Kendrick, 2001).”

Little Sandy Desert

The terminal 23 km of the TGP occurs within the Rudall Subregion (LSD1) of the Little Sandy Desert Bioregion. The Little Sandy Desert bioregion is characterised by dunefields and low ranges. Vegetation is mainly a shrub steppe of acacia over spinifex (McKenzie *et al.*, 2003). The Rudall Subregion contains extensive *Triodia* hummock grasslands on hills and surrounding plains; with

River Gum (*Eucalyptus camaldulensis*) communities along drainage lines and bunch grasslands on alluvial deposits associated with ranges (Kendrick, 2001).

A number of significant vertebrate fauna species occur within the Roebourne, Chichester, McLarty, MacKay and Rudall Subregions (McKenzie *et al.*, 2003, DBCA, 2020). These include:

- Greater Bilby (*Macrotis lagotis*);
- Northern Marsupial Mole (*Notoryctes caurinus*);
- Brush-tailed Mulgara (*Dasycercus blythi*);
- Western Pebble-mound Mouse (*Pseudomys chapmani*);
- Great Desert Skink (*Liopholis kintorei*);
- Night Parrot (*Pezoporus occidentalis*);
- Princess Parrot (*Polytelis alexandrae*);
- Grey Falcon (*Falco hypoleucos*);
- Northwestern Coastal Ctenotus (*Ctenotus angusticeps*);
- Pin-striped Finesnout Ctenotus (*Ctenotus nigrilineatus*);
- Pilbara Olive Python (*Liasis olivaceus barroni*);
- Dampierland Plain Slider (*Lerista separanda*);
- Bush Stone-curlew (*Burhinus grallarius*);
- Peregrine Falcon (*Falco peregrinus*);
- Ghost Bat (*Macroderma gigas*);
- Pilbara Leaf-nosed Bat (*Rhinonictoris aurantius*);
- Black-flanked Rock-wallaby (*Petrogale lateralis*);
- Spectacled Hare-wallaby (*Lagorchestes conspicillatus leichardti*); and
- Lakeland Downs Mouse (*Leggadina lakedownensis*).

2.2 Conservation Significance

Biodiversity in Western Australia is protected, managed and assessed under international, national and state agreements, legislation and policy. Fauna of conservation significance include those species listed under federal or state legislation (*Environment Protection and Biodiversity Conservation Act 1999*, the EPBC Act; and the Western Australian *Biodiversity Conservation Act 2016*, the BC Act) species listed as Priority Fauna by the Department of Biodiversity Conservation and Attractions (DBCA), species listed as threatened or declining in biodiversity publications and species considered locally significant (due to restrictions in range or sensitivities to threatening processes; Woinarski *et al.*, 2017). Categories of conservation significance described in detail in Appendix 1.

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Schedule 1 of the Commonwealth EPBC Act contains a list of species that are considered Critically Endangered, Endangered, Vulnerable, Extinct, Extinct in the wild and Conservation Dependent. These categories are described in Appendix 1. The significance levels for fauna used in the EPBC Act are those recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN). Under the provisions of the EPBC Act, proposed actions which have the potential to have a significant impact on a matter of national environmental significance must be referred to the Commonwealth Minister for the Environment and Energy for a decision as to whether an assessment is required under the provisions of that Act (EPA, 2004). The EPBC Act also has lists of migratory species that are recognised under international treaties such as the China Australia Migratory Bird Agreement (CAMBA), the Japan Australia Migratory Bird Agreement (JAMBA) and the Bonn Convention (The Convention on the Conservation of Migratory Species of Wild Animals).

Biodiversity Conservation Act 2016 (BC Act)

Threatened and specially protected fauna are listed under Part 2 of the *Biodiversity Conservation Act 2016*. Similar to the EPBC Act, fauna are listed as Critically Endangered, Endangered, Extinct or Extinct in the Wild under the category of Threatened Fauna. Fauna can also be listed as Specially Protected Fauna, including those species listed under international agreements (such as CAMBA and JAMBA), or species listed as migratory, of special conservation interest or species otherwise in need of special protection. Threatened fauna listings are updated under the Threatened Fauna and Specially Protected Fauna Notice listed under Part 2 of the Biodiversity Conservation Act 2016 (last updated: 11/09/2018). Categories of conservation significance are described in detail in Appendix 1.

Priority Fauna

In Western Australia, the DBCA has produced a supplementary list of Priority Fauna for species that are possibly threatened but do not meet the criteria for listing under the Biodiversity Conservation Act or are otherwise data deficient. These species are added to the Priority Fauna 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. 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, are placed in Priority 4. These species are considered to require regular monitoring.

Other Fauna of Conservation Significance

The EPA's objective for protection of terrestrial fauna is to maintain representation, diversity, viability and ecological function at the species, population and assemblage level (EPA, 2016). The preservation of biodiversity at the genetic level is also highlighted as a key ecological value (EPA, 2002). As a result, species that are at their limit of distribution and/or occur in restricted, outlying or relictual populations, are considered to be of conservation significance. Additionally, some species listed as threatened or declining in biodiversity publications may not be listed under legislation or considered Priority by DBCA. Therefore, an additional category of conservation significance is listed here, covering those species considered locally significant (due to restrictions in range, published declines or sensitivities to threatening processes; Woinarski *et al.*, 2017). Species that are sensitive to impacts such as habitat fragmentation, may also be classed as conservation significant.

2.3 Desktop Assessments: Telfer Gas Pipeline and Nifty Gas Lateral

Kingfisher prepared the desktop fauna assessments for the TGP and NGL during 2019 (Kingfisher, 2019a, b). The desktop fauna assessments were conducted with reference to guidelines and technical guidance published by the Western Australian EPA on fauna surveys and environmental protection, and Commonwealth biodiversity legislation (e.g. EPA, 2016a; 2016b; 2018). The desktop assessments included a review of literature and a search of relevant databases to document the fauna assemblage expected to occur along the pipeline corridors. Those species of conservation significance considered likely to occur were detailed and a habitat assessment of four focal species was conducted (Greater Bilby, *Macrotis lagotis*; Brush-tailed Mulgara, *Dasyercus blythi*; Western Pebble-mound Mouse, *Pseudomys chapmani*; Great Desert Skink, *Liopholis kintorei*).

Both pipeline corridors were previously cleared during 2004, however due to the age of disturbance, extensive rehabilitation has since occurred, and the areas contain native vegetation suitable to support a diverse fauna assemblage. Extensive *Triodia* hummock grasslands and *Acacia* shrublands occur along parts of the pipeline corridor (Newcrest, 2018). Hart, Simpson and Associates (2001) describe the fauna habitats occurring along the pipeline routes:

1. Spinifex sandplains: supporting a diverse open shrubland over *Triodia* hummock grasslands;
2. Pindan sandplain: a small area occurs in the north and has similarities with the adjacent sandplains and is contiguous in both soil and vegetation;
3. Drainage lines intersperse the sandplains, including rivers and alluvial soils;
4. Granite outcrops;
5. Stony hills and valleys: mainly in the Shay Gap area, otherwise relatively small, isolated; and
6. Extensive swale and sand dune systems of the Great Sandy Desert: these areas are extensive in the east and are only broken by small areas of other habitat.

The desktop review identified 389 fauna species potentially occurring in the region (listed in Appendix 2). This comprised 11 frog, 129 reptile, 194 bird, 45 native mammal and 10 introduced mammal species (see Appendix 2). A total of 168 fauna species have been recorded from the miscellaneous lease containing the pipeline (lease L45/110; DBCA, 2020). Several significant fauna species have been previously recorded within or adjacent (within 10 km) to the pipeline corridor. These included:

- Greater Bilby (EPBC Vulnerable), several records along the TGP;
- Brush-tailed Mulgara (DBCA Priority 4), several records along the TGP and NGL;
- Dampierland Plain Slider (DBCA Priority 2), several records along the TGP;
- Northern Quoll (EPBC Endangered), recorded along the TGP and NGL;
- Northern Marsupial Mole (DBCA Priority 4), recorded along the TGP and NGL; and
- Spectacled Hare-wallaby (DBCA Priority 4), recorded along the TGP.

While varying in extent, habitats suitable to support several significant taxa were considered likely to occur along both pipeline routes. Large areas of sandplain were considered potentially suitable for the Brush-tailed Mulgara and Greater Bilby. Conversely, minimal rocky habitat (suitable for the Western Pebble-mound Mouse and Northern Quoll) was recognised, with only a few stony slopes and hills considered likely to occur along the pipeline corridor routes. Due to a lack of local records, the Great Desert Skink's status along the pipeline corridor was considered uncertain. While potential habitat exists, the species has a restricted and declining occurrence and was not recorded during initial construction of the pipelines, despite high numbers of reptile captures within the pipeline trench (MBS, 2006; DBCA, 2020).

3. CONSERVATION SIGNIFICANT FAUNA

3.1 Greater Bilby

The Greater Bilby (*Macrotis lagotis*) is listed as Vulnerable under the EPBC and BC Acts and also internationally as Vulnerable on the IUCN Red List of Threatened Species (IUCN, 2014). The species formerly occurred across much of arid and semi-arid Australia, utilising a wide range of habitats (DBCA, 2017). However, its range has contracted to northern Australia and in Western Australia, the Bilby persists within the Gibson, Little Sandy and Great Sandy Deserts, and parts of the Pilbara, Dampierland, Central Kimberley and Ord-Victoria Plains Bioregions (DBCA, 2017). Within the Pilbara and Great Sandy Deserts, the Bilby favours hummock grassland (spinifex) growing on sandplains and dunes, drainage systems, salt lake systems and other alluvial areas (DBCA, 2017).

The Greater Bilby is highly mobile and can have large foraging ranges. Home ranges in sandy deserts are usually temporary and may shift in response to changes in food availability (Van Dyck and Strahan, 2008). Adult females have been known to move up to 1.5 km between burrows on consecutive days; while adult males regularly move 2–3 km and up to 5 km between burrows on consecutive days (J. Turpin, pers. obs.).

In the Pilbara, the Greater Bilby typically occurs on spinifex and acacia dominated sandplains, approximately east of a line extending south of Karratha (DBCA, 2017). Suitable habitat includes level or undulating plains (including watercourses and dune systems), with a substrate suitable for burrowing (cracking clay, soil or sand). Suitable vegetation includes hummock grasslands (spinifex), with low shrublands, usually dominated by Acacia (DPaW, 2017). Populations within the Pilbara and Great Sandy Desert appear vulnerable to decline with several local extinctions noted (DPaW, 2017). Population monitoring in the Pilbara is conducted by the DBCA, with monitoring plots located in the vicinity of both the TGP and Nifty (DPaW, 2017). Monitoring has revealed an association with particular Acacia species, (typically those that form monospecific stands) that provide resources in the form of cossid larvae (grubs) on which the Greater Bilby feeds (DPaW, 2017). This includes *Acacia stellaticeps*, *A. bivenosa*, *A. trachycarpa*, *A. colei*, *A. melleodora*, *A. dictyophleba*, *A. tumida* and *A. monticola*. Six of these species have been recorded along the TGP (Hart, Simpson and Associates, 2001).

The Greater Bilby has been previously recorded along the TGP route (Appendix 2; DBCA, 2020). Records exist near Port Hedland, Nifty and Telfer, and an extensive population has been detected along the TGP between Goldsworthy and Shay Gap (part of the DBCA monitoring program, DBCA, 2020).

3.2 Brush-tailed Mulgara

The Brush-tailed Mulgara (*Dasycercus blythi*) is listed by the Department of Biodiversity, Conservation and Attractions as Priority 4. It occurs across much of Western Australia, favouring spinifex grasslands on granitic red sands. While the species generally occurs in sandplains dominated by Spinifex (*Triodia* spp.) it does also occur within Acacia shrublands with a spinifex understorey (J. Turpin, pers. obs.). The Brush-tailed Mulgara has been recorded from the spinifex grasslands of both the coastal and inland Pilbara and through the Great Sandy Desert (DBCA, 2020; J. Turpin, pers. obs.).

The Brush-tailed Mulgara has been reported to decline with the removal of native vegetation associated with fire (Nano *et al.*, 2008), however, this has been linked to elevated predation

pressure rather than the removal of habitat. The Brush-tailed Mulgara has been shown to survive fire and persist in the subsequent, sparsely vegetated habitats (Thompson and Thompson, 2007).

The Brush-tailed Mulgara has been previously recorded near Port Hedland and Nifty (DBCA, 2020), and also adjacent to the TGP near Yarrie (Atlas of Living Australia, 2020; Appendix 2). Records exist along the pipeline corridor near Port Hedland (TGP) and Nifty (NGL; DBCA, 2020). The superficially similar Crest-tailed Mulgara (*Dasyercus cristicauda*) is not currently considered likely to occur along the pipeline corridors (Woinarski and Burbidge, 2016).

3.3 Great Desert Skink

The Great Desert Skink (*Liopholis kintorei*) is listed as Vulnerable under the EPBC and BC Acts. It has a poorly known and apparently declining distribution (TSSC, 2016). Historically the species has been recorded from widely scattered localities across central Australia (McAlpin, 2001) including several records from the Great Sandy Desert (ALA, 2020). However, its range appears to have significantly contracted, with recent surveys failing to detect the species in the Gibson and Great Victoria Deserts (McAlpin, 2001; Pearson *et al.*, 2001). In Western Australia, the species is currently known from few and scattered locations (within the Tanami and Gibson Deserts, Kiwirrkurra Indigenous Protected Area, Ngaanyatjarra Indigenous Protected Area and Karlamilyi National Park; TSSC, 2016). The decline of the Great Desert Skink has been attributed to altered fire regimes and predation by introduced predators (Moore *et al.*, 2015).

The Great Desert Skink occupies a variety of habitat types across arid central and western Australia, generally occurring on hummock grass sandplains characterised by a dominant cover of Spinifex grasses (*Triodia* species). In the Tanami Desert and parts of the Great Sandy Desert, it also inhabits paleodrainage lines characterised by giant termite mounds and ti-tree (*Melaleuca sp.*) shrubs (TSSC, 2016). The species has been recorded from several sites in the Karlamilyi (Rudall River) National Park (DBCA, 2020), approximately 120 km south-east of the pipeline's Telfer terminus. There are no known populations within the vicinity of the pipeline corridors and the species was not recorded despite the high capture rates associated with the pipeline's construction (MBS, 2006; DBCA, 2020). However, due to the presence of apparently suitable habitat and the species highly scattered and cryptic occurrence, there is potential (albeit low) that an undetected population occurs in the vicinity of the pipeline. However, based on current records, the pipeline lies outside the species known distribution (DBCA, 2020).

3.4 Dampierland Plain Slider

The Dampierland Plain Slider (*Lerista separanda*) is listed as Priority 2 by DBCA. It has a restricted distribution, known from few records on the Dampier Peninsula and extending into the Great Sandy Desert (DBCA, 2020). The TGP lies at the species southern known range extreme, where it has been recorded (Appendix 2) including near Nimingarra and Mijjimaya (DBCA, 2020). Like many *Lerista* spp., it is fossorial, inhabiting sand dunes and sand plains, associated with spinifex hummock grasslands.

4. FAUNA MANAGEMENT and RELOCATION

4.1 Approach

This document has been prepared with reference to guidelines and technical guidance published by the Western Australian EPA and the Department of Biodiversity, Conservation and Attractions (DBCA) (EPA, 2016a, b; 2020; DBCA, 2017; DBCA, 2018a, b). It also draws heavily upon the previous experiences of Kingfisher staff, particularly Jeff Turpin and Ray Lloyd. Reference was also given to publications on local biodiversity (Turpin *et al.*, 2016; Turpin *et al.*, 2018) and national survey and referral guidelines (DoTE, 2016). DBCA has developed guidelines for fauna management during clearing activities and these were heavily consulted prior to the commencement of surveys:

- “Guidelines for surveys to detect the presence of bilbies, and assess the importance of habitat in Western Australia” (DBCA, 2017);
- “Guidelines for pre-clearing searches to locate resident bilbies” (DBCA, 2018a);
- “Guidelines for relocation of bilbies prior to vegetation clearing” (DBCA, 2018b).

The 2020 surveys along the TGP and NGL included three components to align with a scope of works provided by APA. This comprised a:

- Pre-clearance (targeted) fauna survey along the pipeline corridors, in accordance with regulatory requirements (DBCA, 2018 a, b). Surveying focused on the presence of the four focal species (Greater Bilby, Brush-tailed Mulgara, Dampierland Plain Slider, Great Desert Skink) while also considering other conservation significant fauna;
- Targeted surveying ahead of clearing machinery at the time of clearing, as per Condition 7(c) of the Clearing Permits CPS 8396/1 and CPS 8399/1; and
- Relocation, management and (if required) monitoring, of fauna prior to disturbance.

The clearing of vegetation along the pipeline corridor had the potential to disturb shelters (burrows) of the Greater Bilby, Brush-tailed Mulgara and Great Desert Skink. Pre-clearance surveys aimed to detect the presence and extent of the target species along the pipeline corridors (particularly their shelters), and whether the target species (and their associated shelters) were likely to be disturbed by clearing. This information then guided the type of fauna management required during clearing, in accordance with DBCA guidelines (DBCA, 2018a, b).

The DBCA has developed a series of management protocols, guiding fauna relocation and management during clearing (DBCA, 2018a, b). The following steps are recommended for fauna relocation and are discussed below:

- Pre-clearance surveys to locate burrows;
- Occupancy determination of burrows;
- Fauna relocation, either by displacement (encouraging fauna to abandon burrows), or by capture and release;
- Fauna spotters present to guide fauna management during clearing; and
- Monitoring of displaced or relocated fauna after disturbance.

4.2 Pre-clearance Surveys

Pre-clearing searches are undertaken to locate resident individuals and shelter sites within proposed development. The results of pre-clearance surveys then guide the fauna management and translocation required during clearing. The management of significant areas, such as burrows, will depend on the species present, timing of clearing and proximity to disturbance proposed (DBCA, 2017).

4.3 Occupancy of Shelter Sites

Bilbies and Mulgara utilise many burrows within a home range. A single bilby may have up to 18 burrows within its home range and can create new burrows or rework old burrows at any time (DBCA, 2018a). Not all burrows are occupied and the same burrows may not be occupied on successive nights. Therefore, any burrow found during pre-clearance surveys needs to be examined for signs of occupancy. This can often be informed by tracks and recent excavation, and/or the use of remote cameras. Remote cameras should be located at the burrow entrances for a minimum of three nights to confirm burrow occupancy (by a target species or additional taxa; DBCA, 2018b). Where significant shelter sites (burrows of target fauna) are located within the clearing footprint area, a burrow assessment is undertaken. Burrows are classified as:

- Unoccupied
 - a. burrow collapsed and/or lacking a round entrance or cavity (blocking the entrance to target fauna without additional digging), and there is no evidence that other vertebrates are making use of the burrow; or
 - b. vegetation and cobwebs across the entrance and there is no evidence that any vertebrates are making use of the burrow.
- Potentially occupied
 - a. the burrow is open (i.e. round entrance and depth characteristics adequate to house a target species); and/or
 - b. fresh sign of target taxa is present at the site (tracks, scats, diggings).
- Occupied
 - a. fresh tracks or evidence of target species entering burrow;
 - b. use by target species as determined by motion camera.

The status of burrow occupancy will then dictate the type of fauna management required.

4.4 Burrow Management

To minimise the impacts of clearing to threatened fauna, significant shelter sites (burrows) require management, which differs according to occupancy status. The management of burrows according to occupancy is detailed in the fauna management plan (Kingfisher, 2020) and includes:

- Burrow avoided by clearing activities: no further action;
- Burrow unoccupied (prior to clearing): burrow exposed, then filled, inspected;
- Burrow potentially occupied: monitoring to determine occupancy;
- Burrow occupied: fauna displacement conducted over three nights;
- Burrow occupied: capture and release, after displacement (over 4 nights); and
- Post relocation monitoring.

Any fauna management will be influenced by the initial pre-clearance survey results, as species presence and burrow occupancy will need to be determined immediately prior to clearing. If burrows are able to be avoided (by clearing activities) or burrows are classified as unoccupied, no further monitoring is required. Inactive (unoccupied) burrows are recommended to be temporarily excluded, thus making it unsuitable for use by any vertebrates but enabling any remaining fauna to escape for at least one night before clearing activities commence (DBCA, 2018b).

If a burrow is potentially occupied, monitoring of the burrow needs to be conducted. Monitoring is required where the burrow is open (i.e. round entrance and depth characteristics adequate to house a bilby), with or without a sand apron, and/or fresh bilby sign is present at site (DBCA, 2018b).

If occupied burrows are located, displacement is undertaken as outlined by DBCA (2018b) and Kingfisher (2020). This includes a combination of monitoring (using motion cameras), partial excavation or exclusion, ongoing surveillance with follow-up surveying (DBCA, 2018b). In instances where the displacement of an occupied burrow has not been successful, capture and release may be appropriate to relocate fauna (DBCA, 2018; Kingfisher, 2020).

4.5 Handling protocols

Fauna interactions during capture, handling and relocation, are required to be in accordance with DBCA Standard Operating Procedures (DBCA, 2020) and the fauna management plan developed by Kingfisher (Kingfisher, 2020).

4.6 Management during Clearing

The following is recommended by DBCA (2018b) during clearing activities:

- A walk-through of the clearing area should be conducted immediately prior to clearing (either the day before or day clearing begins), to inspect previously filled burrows and ensure that no fauna has recolonised burrows, and no new burrows have been constructed;
- Clearing should commence at a maximum distance from any retained burrow and progressively work towards it and be conducted in a direction that allows fauna to move out of the impact area into adjacent vegetation that is not proposed to be cleared; and
- A fauna spotter present during the clearing to observe any fauna leaving other refuge areas. The spotter will guide machinery operators to prevent fauna harm, injury or mortality.

4.7 Management after Clearing

After clearing the following is recommended (DBCA, 2018b):

- Any remote cameras installed, will remain in-situ during the fauna displacement and clearing activities to monitor fauna movement;
- Secondary signs observed opportunistically within the area surrounding the development footprint will be recorded; and
- The cleared area will be inspected to determine if target fauna have recolonised the area.

4.8 Fauna Management Summary

To minimise the impacts of clearing to threatened fauna, significant shelter sites (burrows) require management, which differs according to the occupancy status of a burrow. When burrows supporting significant fauna are located, the following should be conducted (Kingfisher, 2020):

- Assessment to determine whether burrows can be avoided during clearing. If possible, the disturbance of burrows will be avoided;
- Assessment of burrow occupancy: via tracks, scats and motion cameras (over three nights);
- Exposing or temporary exclusion of animals (if burrows are unoccupied);
- Relocation of fauna via displacement (preferred) if occupied burrows require disturbance;
- Capture and release, to relocate individuals from occupied burrows;
- Unoccupied burrows filled and monitored to prevent recolonisation; and
- Additional pre-clearance searches and management if two weeks (or more) lapses between the fauna displacement and the clearing.

5. FIELD SURVEY METHODOLOGY

5.1 Scope

The survey comprised three parts to align with a scope of works provided by APA. This comprised:

- Pre-clearance (targeted) fauna survey along the pipeline corridors, two weeks ahead of scheduled clearing, in accordance with regulatory requirements. Survey focuses on the presence of the Greater Bilby, Brush-tailed Mulgara, Dampierland Plain Slider and Great Desert Skink;
- Targeted clearance surveys ahead of clearing machinery at the time of clearing as per Condition 7 (c) of the Clearing Permits CPS 8396/1 and CPS 8399/1; and
- Management of target species prior to disturbance and follow-up monitoring.

5.2 Personnel and Timing

The pre-clearance survey (i) was conducted from 27th April to 16th May 2020, aligning with a two-week period prior to the commencement of clearing (which commenced on the 16th May). The survey team comprised:

- Jeff Turpin (Supervising Zoologist, B.Sc. Zoology); and
- Joanna Riley (Zoologist, Ph.D., B.Sc. Zoology/Biochemistry).

Clearance surveys targeting the presence of the four focal species (and other taxa) were conducted concurrent to clearing activities. Clearance surveys were conducted from (ii) 16th May to 3rd June, (iii) 14th June to 7th July, and (iv) 18th July to 10th August 2020. The survey team comprised

- Jeff Turpin (Supervising Zoologist, B.Sc. Zoology), survey (iv);
- Ray Lloyd (Senior Zoologist, B.Sc. Hons. Zoology), surveys (ii and iii); and
- Bas van der Ploeg (Zoologist on several DBCA and Pilbara surveys), surveys (ii, iii, iv).

The management of significant fauna sites, particularly shelter sites for threatened fauna was also conducted during clearing activities. This report was prepared by Jeff Turpin and Joanna Riley.

5.3 Licencing

The field survey was conducted under the Department of Biodiversity, Conservation and Attractions (DBCA) Fauna Taking (Relocation) Licence (Regulation 28, Biodiversity Conservation Regulations 2018), FR28000123-3, and "Authorisation to Take or Disturb Threatened Species" (Section 40 of the Biodiversity and Conservation Act), TFA 2020-0054-2, licensed to J.M. Turpin, valid until 31/08/2020.

5.4 Survey Techniques

5.4.1 Field survey methods

The optimisation of detection is important when designing surveys for rare or cryptic fauna. Important considerations include sampling timing and duration, the location and frequency of sampling, the detectability of the target species and the modes of detection (e.g. the type of traps used). To successfully sample for and detect fauna along the pipeline corridors, a combination of fauna techniques were used. The field survey included a combination of:

1. Identification and assessment of significant fauna habitats (those suitable for the four target fauna species, and other species of conservation significance);

2. Pre-clearance target searches along the pipeline corridor (within suitable habitat) for:
 - Brush-tailed Mulgara: searches for the species distinctive burrows, scats, tracks;
 - Greater Bilby: searches for distinctive burrows, scats, tracks, diggings;
 - Great Desert Skink: searches for distinctive burrows, scats, tracks;
 - Dampierland Plain Slider: raking through loose soil and leaf-litter in suitable habitat.
3. Targeted surveying for the above four target species ahead of clearing machinery at the time of clearing;
4. Deployment of motion-sensitive cameras within areas of suitable habitat to confirm the presence of target fauna and at shelter sites to determine presence and occupancy:
 - Motion cameras were reviewed by zoologists during clearing activities to assess burrow occupancy and status immediately prior to clearing; and
 - Cameras were installed both during pre-clearance surveys and prior to clearing.
5. Systematic trapping: six pitfall trapping sites established, to sample for ground dwelling, fossorial fauna, and particularly to determine the presence of the Dampierland Plain Slider;
6. Documenting signs of target fauna (tracks, scats, burrows);
 - Where tracks/scats/shelters or other indicative traces were located, their GPS location, activity status (active or inactive), habitat type and extent were recorded.
7. Relocation of fauna and management of shelter sites prior to disturbance;
8. Assessment of other significant fauna including the Western Pebble-mound Mouse, Northern Quoll, Spectacled Hare-wallaby and Ghost Bat.

5.4.2 Targeted Searches

Targeted searches for the four focal species (Greater Bilby, Brush-tailed Mulgara, Dampierland Plain Slider and Great Desert Skink) were conducted within the vicinity of previous records and throughout habitat areas identified during the desktop assessments (Kingfisher, 2019a, b) and the field survey. The entire disturbance footprint was also searched on foot (ahead of machinery during clearing activities). Searches aimed to locate the distinctive burrows, scats and tracks of the Greater Bilby, Brush-tailed Mulgara and Great Desert Skink. Raking was also conducted within habitats deemed suitable to support the Dampierland Plain Slider (see Section 6.3.5 below). Targeted searches were conducted by two personnel, with one person traversing the proposed “line of sight” corridor and the second person traversing the access track and adjacent habitats proposed to be upgraded. Searching for evidence of significant fauna was therefore undertaken by conducting transect searches, traversing potentially suitable habitat. This included:

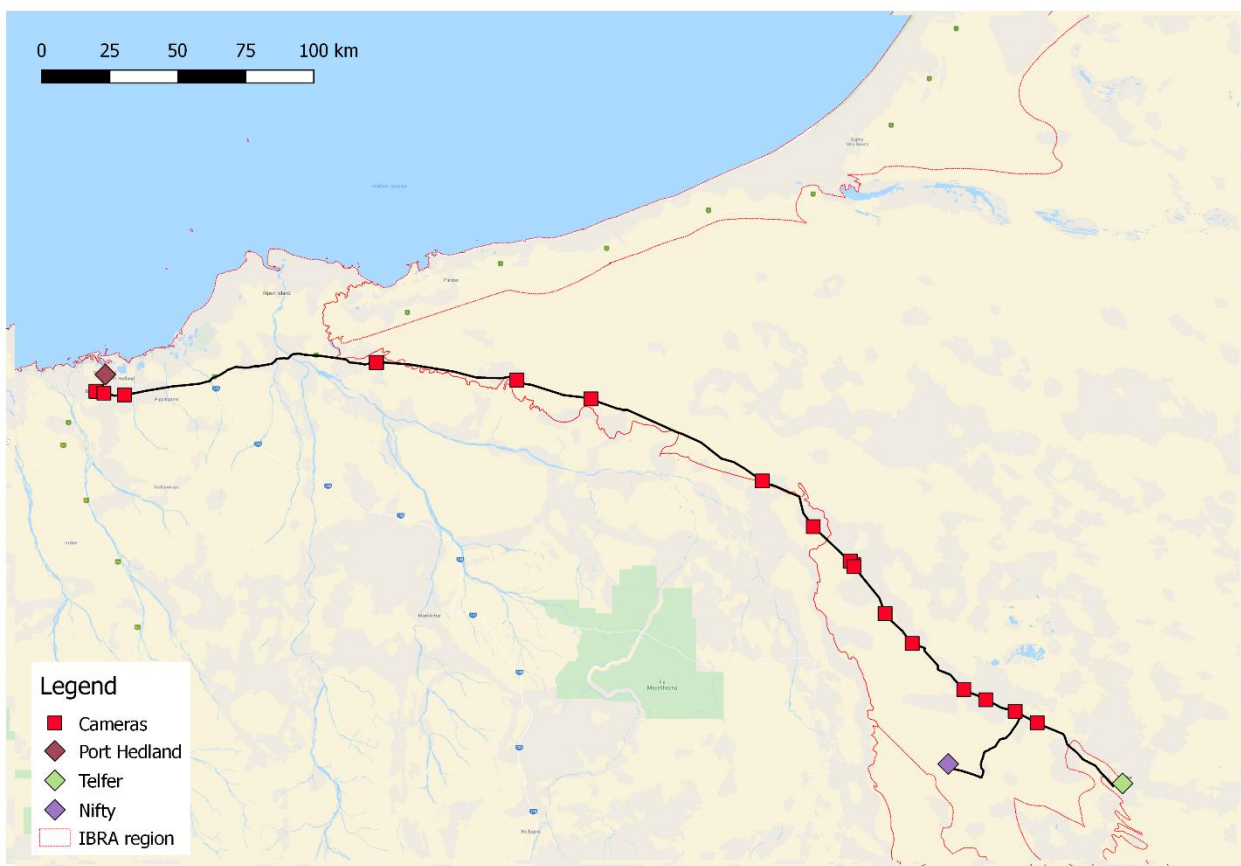
- Greater Bilby (*Macrotis lagotis*) – EPBC Vulnerable. Searches for the species distinctive tracks, diggings, burrows and scats were conducted within suitable habitat areas;
- Great Desert Skink (*Liopholis kintorei*) – EPBC Vulnerable. Inhabits spinifex sandplains and Mulga shrublands. Searches for the species distinctive burrows and scat latrines were undertaken within suitable sandplains;
- Brush-tailed Mulgara (*Dasyercus blythi*) – DBCA Priority 4. Inhabits spinifex sandplains. Searches for the species distinctive burrows, tracks, diggings and scats were undertaken within sandplains supporting spinifex and motion-activated cameras were deployed to assess the species presence; and
- Dampierland Plain Slider (*Lerista separanda*) – DBCA Priority 2. Inhabits spinifex sandplains and dunes. Raking through litter and surface sand was conducted in areas of habitat deemed suitable to support the species.

5.4.3 Motion-sensitive cameras

To accurately document the fauna assemblage present and to determine the presence of fauna including the Brush-tailed Mulgara, motion-activated cameras were placed throughout the survey area. A total of 25 Camera Sites were established each comprising one Reconyx (Hyperfire HC900) or Bushnell (Trophy Cam) Camera (Figure 3, Appendix 3). Camera installation specifications were identical at all sites and were consistent with DBCA guidelines.

Motion cameras were deployed in areas of suitable habitat aiming to confirm the presence of targeted fauna and to determine occupancy at shelter sites. As both the Brush-tailed Mulgara and Greater Bilby utilise a number of burrows throughout a home range, and populations can move over time (DBCA, 2018a), burrow occupancy was determined at the time of clearing. Five cameras were placed at active Greater Bilby burrows to determine activity, seven cameras were placed at burrows deemed inactive (to verify occupancy status), and 13 cameras were placed within those habitats deemed to have the potential to support significant fauna (such as the Brush-tailed Mulgara or Spectacled Hare-wallaby). Cameras placed at burrows were not baited, however those placed in broad habitats, aiming to sample fauna were baited with “universal bait”.

Figure 3. Motion-sensitive Cameras established along the pipeline.

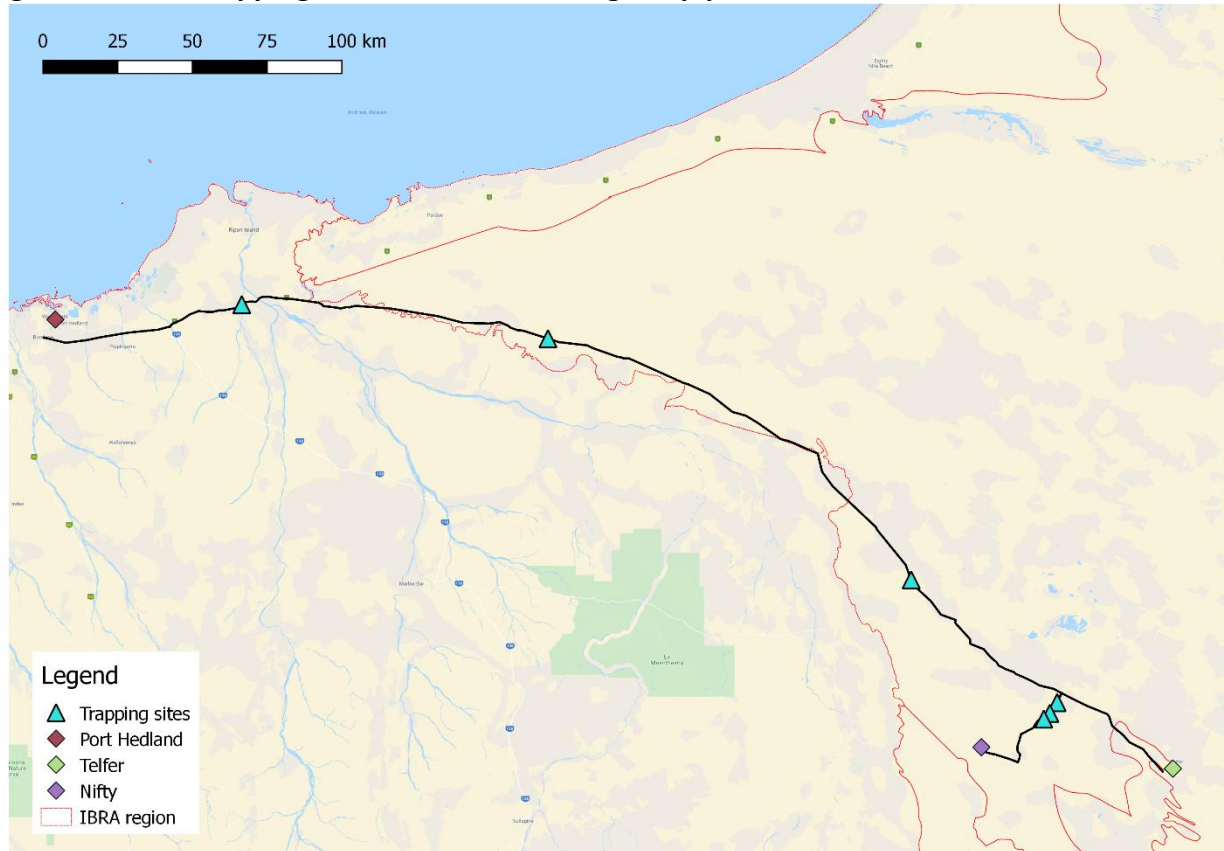


5.4.4 Systematic Trapping

Six pitfall trapping sites were established and sampled during the field surveys (Table 1). Each trapping site consisted of 15 pitfall traps (20 L buckets sunk into the ground and level with the ground surface) spaced approximately 20 m apart. Sampling was conducted over a total of 645 trap nights with survey effort and site descriptions summarised in Table 1 and depicted in Figure 4.

Table 1. Survey Effort at opportunistic trapping sites. Datum WGS 1984.

Site	Latitude	Longitude	# Traps	Habitat	Nights Sampled	Trap Nights	Survey date sampled			
							(i)	(ii)	(iii)	(iv)
1	-20.4305	120.1889	15	Dune	7	105	X	X		
2	-20.327	119.1964	15	Sandplain	14	210			X	
3	-21.5298	121.8399	15	Dune	8	120			X	
4	-21.5635	121.8155	15	Sandplain	2	30			X	
5	-21.5809	121.7959	15	Dune	2	30			X	
6	-21.1609	121.3662	15	Dune	10	150				X
Total			90		43	645				

Figure 4. Pitfall Trapping Sites established along the pipeline.

5.4.5 Hand Searching / Raking

Raking through leaf litter, loose sand and turning over logs, rocks, and other debris was conducted along the pipeline route. This was particularly done in areas deemed suitable to support the Dampierland Plain Slider, to determine the species' presence.

5.4.6 Fauna Relocation

Fauna recorded within the pipeline corridor were relocated, prior to and during clearing activities. The pipeline corridor was traversed ahead of clearing machinery and all fauna encountered were moved to adjacent, intact vegetation. This included a wide range of reptiles and ground dwelling mammals.

5.4.7 Management of Significant Shelter Sites

When located, burrows of the Greater Bilby or Brush-tailed Mulgara were assessed for activity and occupancy (see Section 4.5). Burrows were marked using a GPS, and also physically demarcated using flagging tape. During clearing activities, zoologists established a disturbance free buffer of 10

m around each burrow and were present to guide machinery around shelter sites to ensure the sites were not impacted. Vegetation within 10 m of a burrow was then trimmed by hand, ensuring burrows remained intact and were not impacted.

5.4.8 Opportunistic Surveying

At all times, observations of fauna were noted when they contributed to the accumulation of information on the local fauna assemblage.

5.5 Limitations

The EPA (2004; 2020) outlines a number of limitations that may arise during surveying. These survey limitations are discussed below in Table 2.

Table 2. Survey Limitations.

Limitation	Comment
Level of survey	Pre-clearance targeted Survey (including a desktop study, targeted searches for species of conservation significance, deployment of motion cameras, and opportunistic surveying, Figure 5). Targeted surveying was required under clearing permits.
Competency/experience of the survey team	The field personnel / authors have extensive fauna experience in the region and have published scientific papers on the region's fauna (e.g. Turpin, 2015, Turpin <i>et al.</i> , 2015; Turpin <i>et al.</i> , 2018).
Scope (Faunal groups sampled and methods employed)	Scope developed with APA to align with the requirements of Condition 7 of CPS 8396/1 and CPS 8399/1. Prior to the pre-clearance surveys, a fauna management plan (Kingfisher 2020) was developed in consultation with and endorsed by APA and the Department of Biodiversity, Conservation and Attractions. The field surveys focused on the four target species listed under CPS 8396/1 and CPS 8399/1, using a range of sampling techniques (target searches, motion cameras, pitfall trapping, raking, see Section 6.3). Due to a broad combination of sampling techniques, a wide range of fauna was recorded. Mammals, reptiles and birds were extensively sampled due to the nature of the survey. Motion cameras were installed to survey for larger mammals. Several species were recorded by trace evidence (tracks, burrows, shelters, nests). Due to the cool, dry conditions, frogs were generally inactive.
Proportion of fauna identified, recorded and/or collected.	All fauna observed were identified. All significant shelter sites recorded, were demarcated in the field and managed during clearing. Zoologists were present to guide machinery around significant shelter sites during clearing. Two of the target species were recorded and two remained undetected. This is attributable to either a lack of suitable habitat and the cool, dry conditions experienced. The Great Desert Skink was not previously known to occur along the pipeline corridor or its vicinity. It was not recorded during the 2020 surveys is in not expected to occur within the survey area. The Dampierland Plain Slider has the potential to occur, however, occurs in the region at the southern extreme of its range and due to the cool dry conditions experienced, may have been inactive during the field surveys.
Sources of information	Included previous fauna reports and databases (see Sections 2.3). The DBCA threatened species database held a number of records of threatened fauna for the local area, including the Greater Bilby, Brush-tailed Mulgara, Northern Quoll, Dampierland Plain Slider, Ghost Bat and Spectacled Hare-Wallaby. The Great Desert Skink was not listed on the DBCA database and was not previously known to occur along the pipeline corridor or its vicinity. It was not recorded during the 2020 surveys.
The proportion of the task achieved and further work	Survey complete. As disturbances to all significant shelter sites were avoided, no further follow-up monitoring is required.

Limitation	Comment
which might be needed.	
Timing/weather/season/cycle.	Field surveys conducted in May, June July and August 2020. Due to the cool, dry conditions, some reptiles were likely to have been inactive. The conditions experienced may have contributed to the lack of Dampierland Plain Slider records, however, the species may also be regionally uncommon as the survey area lies at the southern extreme of its range. Field surveys were timed to precede and also occur with clearing activities.
Disturbances (e.g. fire, flood, etc.) affecting survey results	No disturbances affected the survey results.
Survey intensity and proportion of survey achieved	Survey intensity was aligned with EPA and DBCA guidance (see Section 4). Targeted searches were performed by two personnel and suitably intensive to detect trace signs of conservation significant fauna.
Completeness (e.g. was relevant area fully surveyed).	The entire pipeline route was traversed. Targeted searches covered those areas deemed suitable to support significant fauna and also adjacent habitats. Where significant shelter sites were located, areas immediately adjacent to the pipeline were also inspected for the species presence.
Resources	All species identified to taxon level.
Remoteness and/or access problems.	Not applicable. The entire survey area was accessible by both vehicle and on foot.
Availability of contextual information on the region.	Regional information was available and was consulted. Authors have extensive experience in the region with several publications.
Data Analysis	Due to the limitations of camera imagery and the small size of some non-target fauna, some taxa were not identified to species level during the review of camera imagery and excluded from analysis.

Figure 5. Motion-activated Camera established along the pipeline corridor.



6. SURVEY RESULTS

6.1 Land Systems

The region's landforms and vegetation have been classified into "Land Systems", which are broadly mapped according to similarities in landform, soil, vegetation, and geology (van Vreeswyk *et al.*, 2004). These provide a broad indication of the fauna habitats present and are listed in Table 3. The occurrence of each unit within the survey corridor is also listed (minimal, moderate or extensive).

Table 3. Land Systems present within the Survey Area.

Land System	Landform and Vegetation	Occurrence
Uaroo	Broad sandy plains supporting shrubby hard and soft spinifex grasslands.	Extensive (> 50 km)
River	Active flood plains, major rivers and banks supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands.	Minimal (< 5 km)
Boolaloo	Granite hills, domes and tor fields and sandy plains with shrubby spinifex grasslands.	Minimal (< 5 km)
Macroy	Stony plains and occasional tor fields based on granite supporting hard and soft spinifex grasslands.	Minimal (< 5 km)
Mallina	Sandy surfaced alluvial plains supporting soft spinifex (and occasionally hard spinifex) grasslands.	Minimal (< 5 km)
Nita	Sandplains supporting shrubby spinifex grasslands with occasional trees.	Extensive (> 50 km)
Paradise	Alluvial plains supporting soft spinifex grasslands and tussock grasslands.	Moderate (≈ 20 km)
Boolgeeda	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands.	Minimal (< 5 km)
Capricorn	Hills and ridges of sandstone and dolomite supporting low shrublands or shrubby spinifex grasslands.	Minimal (< 5 km)
Horseflat	Gilgaied clay plains supporting tussock grasslands and minor grassy snakewood shrublands.	Minimal (< 5 km)
Callawa	Highly dissected low hills, mesas and gravelly plains of sandstone and conglomerate supporting soft and hard spinifex grasslands.	Moderate (5 - 10 km)
Little Sandy	Sandplains with linear and reticulate dunes supporting shrubby hard and soft spinifex grasslands.	Extensive (> 50 km)
Oakover	Breakaways, mesas, plateaux and stony plains of calcrete supporting hard spinifex grasslands.	Minimal (< 5 km)
Lochinvar	Stony plains and occasional sand dunes supporting hard spinifex (and occasionally soft spinifex) grasslands.	Moderate (≈ 30 km)
Robertson	Hills and ranges of sedimentary rocks supporting hard spinifex grasslands.	Minimal (< 5 km)

6.2 Fire History

Fire frequency and intensity influences vegetation and therefore the fauna assemblage present. Large areas along both the TGP and NGL have been burnt within the last five years and this influences the fauna habitats present. However, the Greater Bilby can forage extensively within recently burned areas (burned within the last two years, J. Turpin, pers. obs.) and the Brush-tailed Mulgara has been shown to survive fire and persist in the subsequent, sparsely vegetated habitats (Thompson and Thompson, 2007). A lack of vegetation also results in greater visibility in the search for burrow sites. However, species sensitive to fire (such as the Great Desert Skink) are considered unlikely to occur in recently burnt habitat (McAlpin, 2001). Extensive fires were particularly prevalent along the TGP and NGL during 2018 (Figure 2), resulting in large areas containing vegetation within early seral stages (Kingfisher, 2020).

6.3 Vertebrate Fauna Summary

A total of 145 vertebrate fauna species were recorded during the field surveys, comprising one amphibian, 53 reptile, 71 bird, 13 native mammal and seven introduced mammal species (see Appendix 2, Table 4). Three species listed under the EPBC Act (Greater Bilby, Northern Quoll and Ghost Bat), three DBCA Priority species (Brush-tailed Mulgara, Spectacled Hare-Wallaby and Western Pebble-mound Mouse) and one locally significant fauna species (Bush Stone-curlew) were recorded during the 2020 field surveys. This compliments a further six EPBC listed taxa, one DBCA Priority species and two locally significant species previously recorded within or near the pipeline corridor (within 5 km, Table 3; DBCA, 2020).

Table 4. Vertebrate Fauna Assemblage Recorded or Expected in the Survey Area.

Taxon	Fauna Assemblage Recorded			Potential Assemblage	Significant Fauna Recorded					
	Kingfisher 2020 Surveys	Previous pipeline records (2004)	DBCA threatened fauna database		2020 Records			2004 Records		
				Acts	DBCA Priority	Local	Acts	DBCA Priority	Local	
Frogs	1	6	0	11	0	0	0	0	0	0
Reptiles	53	53	2	129	0	0	0	0	0	0
Birds	71	98	29	194	0	0	1	5	0	1
Native Mammals	13	10	8	45	3	3	0	0	1	1
Introduced Mammals	7	2	0	10	0	0	0	0	0	0
Total	145	169	39	389	3	3	1	6	0	2

Note: Significant Fauna includes the EPBC, BC Acts (Acts), DBCA Priority Fauna (Priority) and locally significant species (local).

The assemblage recorded during the 2020 surveys compares similarly to that previously recorded along the pipeline corridor during initial pipeline construction (Table 4). A slightly higher proportion of birds and frogs were recorded during 2004 (possibly attributable to seasonal conditions), however reptiles were equivalent and more native mammals were recorded in 2020. While the 2020 field surveys aimed to detect species of conservation significance, opportunistic observations, pitfall trapping and the use of motion-activated cameras enabled a large fauna assemblage to be recorded (Table 5). Two of the four targeted species of conservation significance were recorded (Greater Bilby and Brush-tailed Mulgara), while a third had the potential to occur. These are discussed further below.

Table 5. The fauna assemblage recorded from the survey area during 2020.

Species Recorded	Field Observations	Camera Records	Trace Evidence	Pitfall Trapping	Total
Frogs	1	0	0	0	1
Reptiles	49	4	2	16	53
Birds	71	4	3	0	71
Native Mammals	2	6	10	1	13
Introduced Mammals	3	2	7	0	7
Total	126	16	22	17	145

6.4 Systematic Sampling Results

The results of the fauna sampling are summarized in Tables 5 and 6. A total of 17 species were recorded via the pitfall traps, comprising 16 reptile and one native mammal species. A further 49 species (all reptiles) were recorded opportunistically, during searching for conservation significant fauna or during fauna management during clearing.

Table 6. Fauna species recorded from trapping (sites 1 - 6) and opportunistic (O) survey sites.

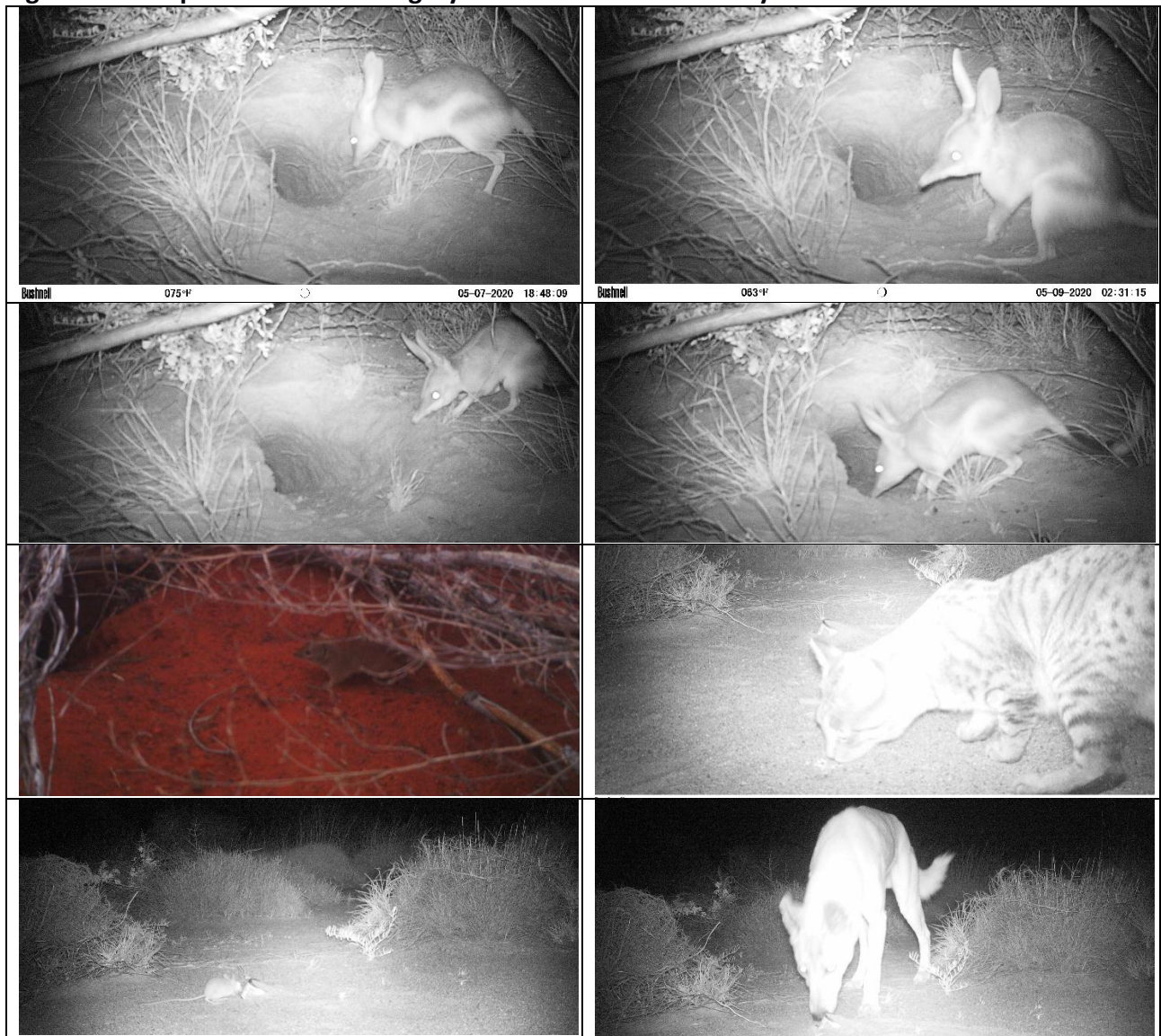
Species	1	2	3	4	5	6	O	Total
<i>Amphibolurus longirostris</i>							1	1
<i>Anilius grypys</i>							1	1
<i>Ctenophorus caudicinctus</i>							4	4
<i>Ctenophorus clayi</i>		1					2	3
<i>Ctenophorus isolepis</i>	2	4	2			2	33	43
<i>Ctenophorus nuchalis</i>	1						6	7
<i>Ctenotus brooksi</i>		1	3			1		5
<i>Ctenotus duricola</i>							2	2
<i>Ctenotus grandis</i>							7	7
<i>Ctenotus hanloni</i>							1	1
<i>Ctenotus helenae</i>							13	13
<i>Ctenotus pantherinus</i>		1	1			1	21	24
<i>Ctenotus piankai</i>							1	1
<i>Ctenotus saxatilis</i>							19	19
<i>Ctenotus serventyi</i>		2					6	8
<i>Ctenotus superciliaris</i>							1	1
<i>Cyclodomorphus melanops</i>			1				4	5
<i>Delma elegans</i>							1	1
<i>Delma nasuta</i>							3	3
<i>Delma pax</i>							1	1
<i>Diplodactylus laevis</i>							2	2
<i>Diporiphora paraconvergens</i>						1	1	2
<i>Diporiphora pindan</i>							10	10
<i>Eremiascincus musivus</i>	3							3
<i>Eremiascincus pallidus</i>					1	2		3
<i>Furina ornata</i>							1	1
<i>Gehyra media</i>							11	11
<i>Gehyra montium</i>							5	5
<i>Gehyra purpurascens</i>							5	5
<i>Gehyra variegata</i>							4	4
<i>Heteronotia binoei</i>						1	4	5
<i>Lerista bipes</i>	29	24	6		1	9	23	92
<i>Lerista clara</i>							1	1
<i>Lerista ips</i>		2	8		1	11	2	24
<i>Lialis burtonis</i>							1	1
<i>Liopholis striata</i>							11	11
<i>Litoria rubella</i>							1	1
<i>Lucasium stenodactylum</i>	1						4	5
<i>Moloch horridus</i>							5	5
<i>Morethia ruficauda</i>						1	9	10
<i>Notoscincus ornatus</i>				1			2	3
<i>Oedura fimbria</i>							1	1
<i>Pogona minor</i>							1	1
<i>Proablepharus reginae</i>							3	3
<i>Pseudechis australis</i>							1	1
<i>Pygopus nigriceps</i>							1	1
<i>Rhynchoedura ornata</i>							4	4
<i>Simoselaps anomalus</i>							1	1
<i>Sminthopsis youngsonii</i>	2							2
<i>Tiliqua multifasciata</i>							2	2
<i>Varanus acanthurus</i>							2	2
<i>Varanus eremius</i>							2	2
<i>Varanus giganteus</i>							1	1
<i>Varanus gouldii</i>							4	4
Total	38	35	21	1	3	29	251	379

6.5 Motion-activated Camera results

A wide range of fauna species were detected by camera, however, due to size limitations, some taxa were not identified to species level and were excluded from the analysis. This included small rodents such as *Pseudomys* which were assigned to genus level only. In total, 16 fauna species were recorded via the motion-activated cameras, comprising six native mammal, two introduced mammal, four reptile and four bird species (Table 5, see Figure 6). Six species, the Red Kangaroo, Spinifex Hopping Mouse, *Pseudomys* sp. (likely Sandy Inland Mouse), Dingo, Feral Cat and Little Button Quail dominated the assemblage detected. The motion-activated cameras also successfully detected a number of rare or cryptic taxa. Species of note included:

1. Greater Bilby: EPBC Vulnerable, recorded from five cameras, all placed near burrow entrances. Two sites were used extensively with the Bilby occurring over six weeks (from 9/05/2020 till 25/06/2020);
2. Little Red Kaluta (*Dasykaluta rosamondae*): recorded from one camera in the Great Sandy Desert, a region where this species is poorly recorded and on the extreme of its range;
3. Pheasant Coucal (*Centropus phasianinus*): recorded on the edge of the Great Sandy Desert, at the edge of the species' range; and
4. Fauna using Greater Bilby burrows, including *Pseudomys*, *Varanus gouldii* and *Varanus giganteus*.

Figure 6. Examples of Camera Imagery recorded from the survey area.



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6.6 Trace Evidence

A total of 22 species were recorded through trace evidence (scats, tracks, shelters, nests, see Table 5, Figures 7 and 8). The distinctive burrows, tracks, diggings and scats of the Greater Bilby were widely recorded. Scats and tracks attributable to the Northern Quoll, Brush-tailed Mulgara and Night Skink were located on sand plains and tracks of the Spinifex Hopping Mouse were recorded on sand dunes. The distinctive tracks of the Bush Stone-curlew, Australian Bustard, Crows (*Corvus* sp.), Red Kangaroo, Euro, Feral Cat, Dingo, Fox, Camel and Cattle were recorded throughout the survey area. Several Bilby scats were collected and forwarded to the Western Australian Museum.

Figure 7. Tracks of the Australian Bustard recorded along the pipeline corridor.



Figure 8. Feral Cat scats recorded along the pipeline corridor.



6.7 Fauna Relocation

Fauna were relocated during clearing by two zoologists, traversing the pipeline corridor in front of the clearing machinery. While larger species, mobile species (such as birds or varanids) moved away from the pipeline corridor during clearing, smaller species, such as skinks, geckoes and legless lizards were relocated by hand, immediately prior to clearing. A total of 224 animals were removed from the disturbance footprint prior to clearing and released within adjacent habitat of similar vegetation. This comprised 43 species of reptile, with *Ctenophorus isolepis*, *Ctenotus helena*, *Ctenotus pantherinus*, *Ctenotus saxatilis* and *Lerista bipes* among the dominant taxa relocated (Appendix 2).

Fauna relocation was considered as a component of managing and minimising impacts to the four focal species of conservation significance (particularly the Greater Bilby, Great Desert Skink and Brush-tailed Mulgara, Sections 1 and 4.5). However, while relocation removes animals from the clearing footprint, impacts associated with the trapping, handling and movement of fauna can still be present and require management (see Sections 4.5, 4.6, 4.7, 4.8). To minimise the impacts and disturbance to threatened fauna, clearing activities avoided the disturbances to all possible shelter sites. This included burrows of the Greater Bilby and Brush-tailed Mulgara identified during the pre-clearance surveys, and also burrows with the potential to support such fauna. Disturbance-free buffers were established around all Greater Bilby and Brush-tailed Mulgara burrows, and zoologists were present to divert machinery around shelters (burrows) during clearing. If required, vegetation within 10 m of a burrow site was trimmed by hand. As such, disturbances to threatened fauna were minimised and burrow sites retained. Consequently, the trapping, relocation and subsequent burrow monitoring and management of the Greater Bilby and Brush-tailed Mulgara under DBCA guidelines (see Section 4.5) was not required. The survey of and assessment of conservation significant fauna is discussed further in Section 8.

7. CONSERVATION SIGNIFICANT FAUNA

7.1 Conservation Significant Fauna Recorded or Expected within the Survey Area

Conservation significant fauna includes species listed under Commonwealth or State legislation, species listed as Priority Fauna by DBCA, species listed as declining in biodiversity publications and species considered locally significant (due to restrictions in range). Overall, thirty-nine species of conservation significance have been recorded from the region (sourced from regional database searches and previous surveys). These species are outlined in Table 7 along with their conservation status and expected occurrence in the survey area.

Seven species of conservation significance were recorded during the 2020 field surveys. These were:

1. Greater Bilby (EPBC Vulnerable): detected at five motion camera sites, burrows, tracks, scats and diggings widely recorded along the pipeline routes;
2. Northern Quoll (EPBC Endangered): tracks and scats recorded at three locations;
3. Ghost Bat (EPBC Vulnerable): individuals observed and scats recorded at three locations;
4. Brush-tailed Mulgara (DBCA Priority 4): tracks and scats recorded;
5. Western Pebble-mound Mouse (DBCA Priority 4): old mounds recorded at five locations;
6. Spectacled Hare-wallaby (DBCA Priority 4): likely tracks recorded at two locations;
7. Bush Stone-curlew (locally significant): individuals recorded at two locations and tracks widely recorded.

Additional species have been previously recorded or had the potential to occur within the pipeline corridors (DBCA, 2020; Table 7). These comprise wide-ranging species which may visit the survey area periodically (e.g. Peregrine Falcon, Grey Falcon, Migratory Waterbirds), cryptic fossorial species (e.g. Northern Marsupial Mole, Dampierland Plain Slider) and regionally occurring taxa with few local records (e.g. Short-tailed Mouse, Common Brushtail Possum, see Table 7).

While other species of conservation significance have been recorded in areas adjacent to the pipeline, due to a lack of habitat, several were considered unlikely to occur within the clearing footprint (Table 7). These included species associated with rocky habitats, which were largely avoided by the pipeline route (e.g. Pilbara Olive Python, Pilbara Leaf-nosed Bat, Long-tailed Dunnart) and highly nomadic, mobile species (e.g. Princess Parrot). The Great Desert Skink (EPBC Vulnerable), was not recorded during the field surveys, and due to a lack of local records is not considered to occur within the pipeline corridor.

Species of conservation significance occurring or considered likely to occur within the survey area are discussed below.

Table 7. Conservation significant fauna recorded from the surveys and region.

Common Name	Conservation Status			Local Records	Suitable Habitat within Pipeline Corridor	Occurrence in Project Area	Pipeline Records	
	EPBC	BC	Priority				2004	2020
REPTILES								
Pilbara Olive Python	VU	VU	-	Ord Ranges (5 km north)	Minimal – hills, outcrops, drainage lines	Minimal		
Great Desert Skink	VU	VU	-	No (Karlamilyi 120 km east)	Yes – spinifex dominated sandplains	Unlikely		
Pin-striped Ctenotus	-	-	P1	No (Regional records only)	Minimal	Unlikely		
<i>Lerista separanda</i>	-	-	P2	TGP	Yes – sand dunes and sandplains	Previously Recorded	X	
<i>Ctenotus angusticeps</i>	-	-	P3	Port Hedland (10 km north)	Mangroves, mudflats, coastal grasslands	Unlikely		
BIRDS								
Peregrine Falcon	-	OS	-	Port Hedland, Telfer	Yes – minimal breeding habitat (trees)	Visitor		
Grey Falcon	VU	VU	-	Port Hedland	Yes – minimal breeding habitat (trees)	Visitor		
Night Parrot	CR	EN	-	None	Minimal breeding habitat (large spinifex)	Potential (low)		
Oriental Pratincole	M	IA	-	Port Hedland	Grasslands, floodplains and open plains	Visitor		
Eastern Osprey	M	IA	-	Port Hedland	Minimal - minimal breeding habitat (trees)	Potential (low)		
Barn Swallow	M	IA	-	Port Hedland	Minimal	Potential (low)		
Oriental Plover	M	IA	-	Port Hedland	Yes – open plains	Visitor		
Australian Painted Snipe	EN	EN	-	East Strelley River	Minimal – wetlands, rivers	Potential (low)		
Migratory Waterbirds	M	IA	-	Port Hedland, De Grey River	Minimal – mudflats, drainages, wetlands	Potential (low)		
Princess Parrot	VU		P4	Lake Disappointment	Minimal - desert woodlands	Potential (low)		
Letter-winged Kite			P4	Port Hedland	Open Plains, drainage lines	Visitor		
Bush Stone-curlew			L	Shay Gap	Sandplains, drainage lines	Recorded		X
Barking Owl			L	De Grey River	Major Drainage lines	Previously Recorded	X	
MAMMALS								
Northern Quoll	EN	EN	-	TGP, NGL, Nifty, Telfer	Minimal – hills, outcrops, drainage lines	Recorded		X
Greater Bilby	VU	EN	-	TGP, NGL, Yarrie, Telfer	Yes – extensive sandplain habitat	Recorded	X	X
Ghost Bat	VU	VU	P4	Table Hill	Foraging – roosts in caves	Recorded		X
Pilbara Leaf-nosed Bat	VU	VU	-	Table Hill	Foraging – roosts in caves	Visitor (roosts in caves)		
Brush-tailed Mulgara	-	-	P4	TGP, NGL	Yes – extensively recorded along TGP, NGL	Recorded		X
Spectacled Hare-Wallaby	-	-	P4	TGP	Yes, recorded along TGP	Recorded	X	X
Pebble-mound Mouse	-	-	P4	Ord Ranges, Table Hill	Minimal – stony hills and slopes	Potential (high)		X
Lakeland Downs Mouse	-	-	P4	Pardoo, Goldsworthy	Yes (few local records) - plains, grasslands	Potential (moderate)		
Northern Marsupial Mole			P4	TGP and NGL, Telfer	Yes – however, generally subterranean	Previously Recorded	X	
Long-tailed Dunnart	-	-	P4	Sulphur Springs, Marble Bar	Minimal – hills, outcrops	Minimal		
Northern Brushtail Possum			L	Turner River	Minimal – drainage lines	Minimal		

* Conservation Status Codes: EPBC Act and BC Act listed species: E = Endangered, V = Vulnerable, M = Migratory, CE = Critically Endangered; OS = Specially Protected; DBCA Priority Species: P1 - 4 = Priority 1 – 4; CS3: L = Locally significant, due to distribution or habitat limitations.

7.2 Focal Species listed under CPS 8396/1 and CPS 8399/1

The four focal species requiring management under the clearing permits issued by DMIRS are discussed below. Two species, the Greater Bilby and Brush-tailed Mulgara, were recorded, while the Great Desert Skink was not located and was considered unlikely to occur within the clearing footprint. The Dampierland Plain Slider had the potential to occur, however due to the cool, dry, conditions experienced during surveying, may not have been active during the survey period. The four focal species are summarised below:

1. Greater Bilby (EPBC Vulnerable): widely detected along the pipeline corridor, with several active burrows located. Disturbances to all burrows were avoided during clearing;
2. Brush-tailed Mulgara (DBCA Priority 4): sparsely recorded along the pipeline corridor from trace evidence (tracks and scats). Some potential burrow systems were avoided by clearing activities;
3. Great Desert Skink (EPBC Vulnerable): not recorded during the field surveys and was not detected during the pipeline's initial construction. Due to a lack of local records, it is not considered to occur within the pipeline corridor;
4. Dampierland Plain Slider (DBCA Priority 4): potentially present within the pipeline corridor however was not recorded during surveying (either during targeted searches or within pitfall traps). Occurs in the region at the southern extreme of its range and due to the cool dry conditions experienced, may have been inactive during the field surveys.

7.2.1 Greater Bilby

The Greater Bilby was recorded at several locations along the TGP and NGL. Prior to the 2020 surveys the species was reported to occur adjacent to an approximately 100 km stretch of the pipeline corridor, from near Goldsworthy to Shay Gap (DBCA, 2020). A few scattered records occur near Telfer and Nifty, however the most recent of these was from 2002 (DBCA, 2020) and the species' persistence in the area was unknown to Telfer Environmental staff.

The Greater Bilby was widely recorded during the 2020 surveys, from both the TGP and NGL (Figures 9 – 14, Table 8, Appendices 4 and 5). The species was widely recorded from tracks and old diggings, which can persist in the landscape for several months after excavation, particularly those that are distinctively dug at the base of Acacia shrubs. A number of burrows were also recorded, in a range of states of activity, and both within and adjacent to the pipeline corridor. Burrows were assessed and classified according to the recommended criteria (DBCA, 2018b, see Section 4.4). Burrow occupancy was informed by the burrow structure, presence of debris within the entrance, presence of fresh tracks and/or recent excavation, and the use of motion cameras established near burrow entrances (for a minimum of three nights). Burrows were classified as either active (currently in use as part of an animal's home range, with the presence of fresh tracks, diggings or by the use of motion cameras) or inactive (burrow abandoned, with no signs of recent use). At the time of clearing, burrows were also considered either occupied (fresh tracks, diggings or records from motion cameras), unoccupied (burrow collapsed and/or lacking a round entrance or cavity, or vegetation and cobwebs across the entrance), or potentially occupied (intact burrow with a round entrance and fresh tracks or diggings present in the local area). Regardless of occupancy, disturbances to Greater Bilby burrows were avoided, with machinery diverted around burrows by the zoologists present on site. In total nine active burrows and 29 inactive burrows were recorded and avoided (Table 8).

The Greater Bilby was widely recorded during the 2020 surveys, with a number of significant records. Individuals were recorded from areas historically known to support the species (e.g. Shay

Gap) and also from vast areas of Great Sandy Desert for the first time (Figures 9 – 14). The species was recorded near previous records at Goldsworthy (fresh tracks, diggings, active burrows and scats collected), near Shay Gap and north of Telfer (DBCA, 2020). However, previously undocumented populations were recorded north of Eel Creek (active burrows, tracks, diggings and scats collected), near Mijjimaya (active burrows, tracks, diggings and scats collected), amongst sand dunes north of the Telfer Access Road (active burrows, tracks, and diggings) and along the Telfer Access Road (fresh tracks recorded). Table 8 summarises the burrows recorded, with all records depicted in Figure 9. Examples of Greater Bilby evidence are displayed in Figures 12 - 14.

Figure 9. Greater Bilby records along the TGP and NGL pipeline corridors and adjacent areas during 2020.

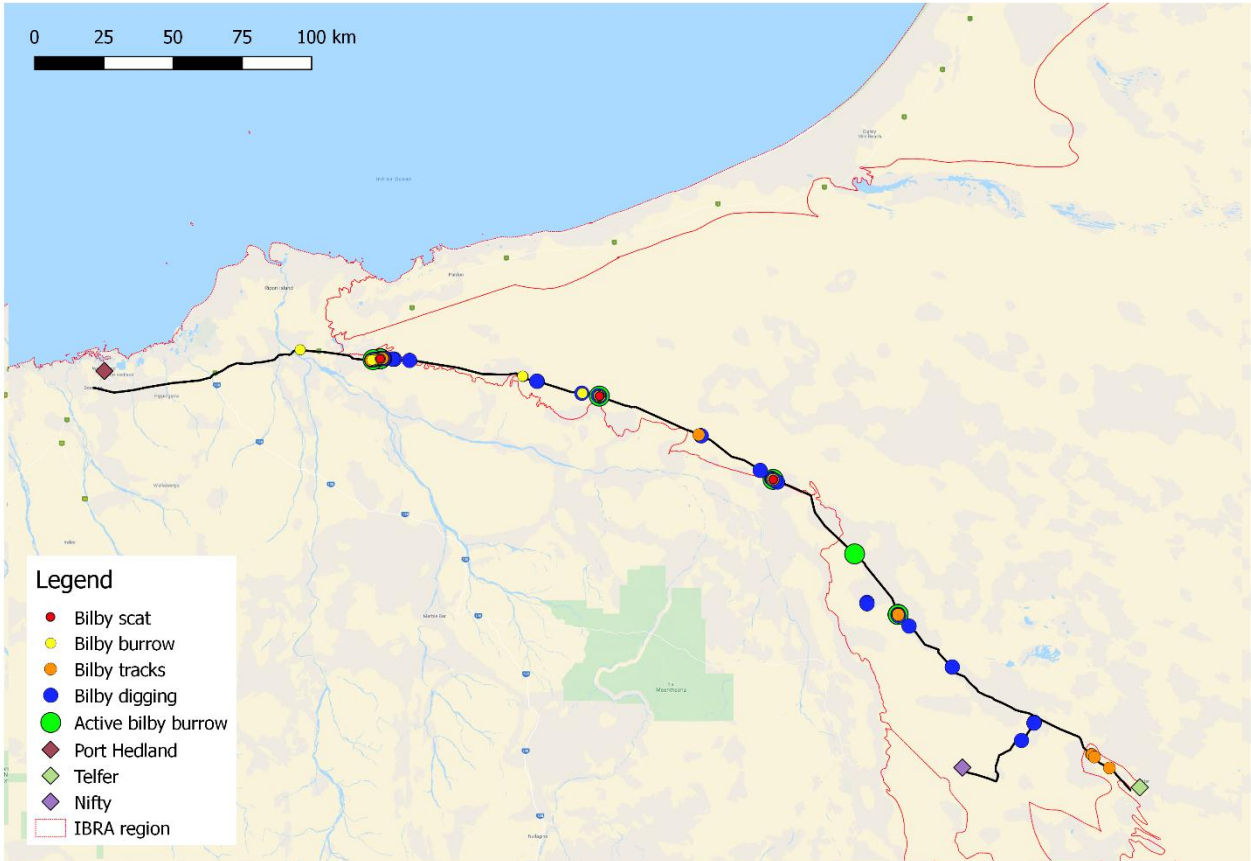


Figure 10. Greater Bilby recorded on camera at the entrance to an active burrow (20/05/2020).



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Figure 11. Greater Bilby recorded on camera at the entrance to an active burrow (10/06/2020).



Figure 12. Bilby tracks, diggings, scats and burrows recorded during the 2020 field surveys.



The Greater Bilby was recorded within a range of habitat types, varying from spinifex dominated sandplains, acacia shrublands on sandplains fringing low rocky hills, the broad swales between sand dunes and recently burnt sandplain (Figures 12, 13, 14, Appendix 5). The records represent new and significant populations, as some come from areas where the species was previously undocumented, or from areas where the species has not been recorded for many years (DBCA, 2020). While the Greater Bilby can be highly mobile, some individuals were recorded to persist along the pipeline corridor for over six weeks (on camera), and areas supporting fresh tracks in early May, still contained fresh sign in late July, 12 weeks later. Such records are indicative of resident, stable populations.

Where located, Greater Bilby burrows were clearly demarcated in the field to alert their presence to clearing operators (Figure 13). Zoologists were also present during clearing activities to divert machinery around Greater Bilby burrows. Where active burrows were located, disturbance free buffers of 10 metres were maintained around the burrows and if required, vegetation was trimmed by hand. As such, impacts to local populations were minimised and the need to translocate individuals was avoided, despite the presence of some active burrows. Prior to the 2020 surveys the species was reported to occur adjacent to an approximately 100 km stretch of the pipeline corridor, with few records since 2002 (DBCA, 2020). The species is now known to occur widely along both the TGP and NGL, with populations left relatively undisturbed by the clearing activities.

Figure 13. Greater Bilby burrow and demarcation to warn clearing machinery.



Figure 14. Active Bilby burrow monitored by motion-activated camera.



Table 8. Greater Bilby burrows recorded during the field surveys.

Type	Latitude	Longitude	Date	Occupancy	Comments
Active burrow	-20.7267	120.9317	07/05/2020	Occupied	Disturbance avoided
Active burrow	-21.1678	121.3689	09/05/2020	Occupied	Disturbance avoided
Active burrow	-21.1674	121.3688	09/05/2020	Occupied	Disturbance avoided
Active burrow	-20.4543	120.3237	17/05/2020	Occupied	Disturbance avoided
Active burrow	-20.9701	121.2167	30/07/2020	Occupied	Disturbance avoided
Active burrow	-20.3318	119.5582	30/05/2020	Occupied	Disturbance avoided
Active burrow	-20.3321	119.5568	30/05/2020	Occupied	Disturbance avoided
Active burrow	-20.3349	119.5321	31/05/2020	Occupied	Disturbance avoided
Active burrow	-20.334059	119.538116	11/06/2020	Potentially occupied	Disturbance avoided
Inactive burrow	-20.39013	120.05757	03/05/2020	Potentially occupied	Disturbance avoided
Inactive burrow	-20.390111	120.057434	03/05/2020	Potentially occupied	Disturbance avoided
Inactive burrow	-20.4530663	120.3215135	04/05/2020	Potentially occupied	Disturbance avoided
Inactive burrow	-20.4547554	120.3246685	04/05/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.4526055	120.3204927	04/05/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.4533461	120.3219723	04/05/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.4525989	120.3204775	04/05/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.444868	120.2640247	04/05/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.4556572	120.3270612	04/05/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.4539351	120.3232879	04/05/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.4545105	120.3242416	04/05/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.4537318	120.3226314	17/05/2020	Potentially occupied	Disturbance avoided
Inactive burrow	-20.4535591	120.3223192	17/05/2020	Potentially occupied	Disturbance avoided
Inactive burrow	-20.389896	120.057129	11/06/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.334059	119.538116	11/06/2020	Potentially occupied	Disturbance avoided
Inactive burrow	-20.334932	119.532082	11/06/2020	Potentially occupied	Disturbance avoided
Inactive burrow	-20.335756	119.528206	11/06/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.389874	120.05706	11/06/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.389561	120.056526	11/06/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.389479	120.056396	11/06/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.389395	120.056236	11/06/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.389353	120.056152	11/06/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.388914	120.055351	11/06/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.331825	119.558205	11/06/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.332111	119.556854	11/06/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.302681	119.277618	21/07/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.302761	119.277344	21/07/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.302818	119.27726	21/07/2020	Unoccupied	Disturbance avoided
Inactive burrow	-20.7255144	120.9307361	28/07/2020	Unoccupied	Disturbance avoided

Greater Bilby scats were collected from three locations and will be forwarded to the Western Australian Museum for future genetic analysis. The locations where Greater Bilby scats were collected are detailed below in Table 9.

Table 9. Greater Bilby scats collected during the field surveys.

Type	Latitude	Longitude	Date Collected	Comments
Greater Bilby Scat	-20.3322	119.5571	01/05/2020	Collected adjacent to foraging excavation
Greater Bilby Scat	-20.727	120.932	07/05/2020	Collected adjacent to foraging excavation
Greater Bilby Scat	-20.4544	120.3241	17/05/2020	Collected adjacent to foraging excavation

7.2.2 Brush-tailed Mulgara

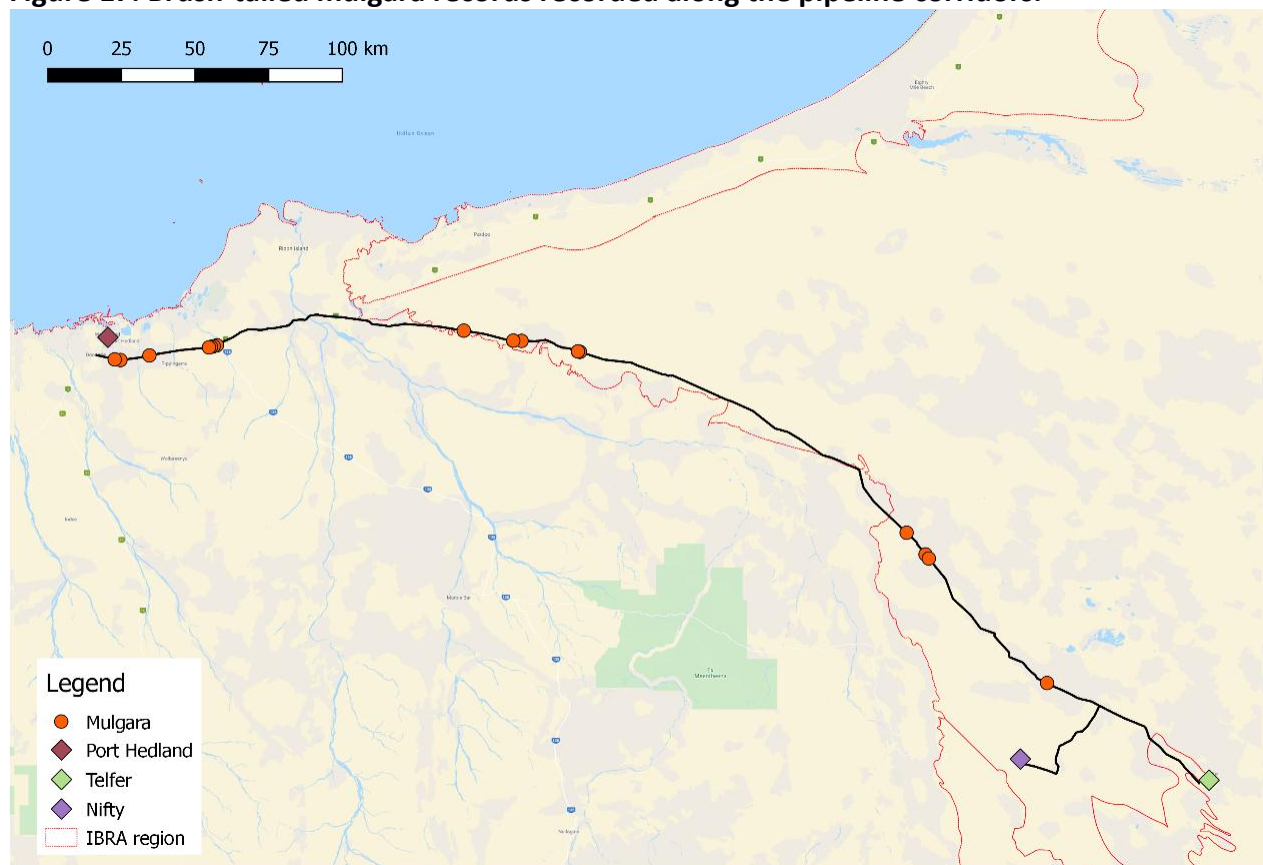
The Brush-tailed Mulgara was sparsely recorded along the TGP and NGL from potential trace evidence (see Figures 15 – 17). Tracks attributable to the species were recorded from several areas of spinifex dominated sandplain. Scats attributable to the species were also recorded from sandplain near Port Hedland (see Appendix 4). No occupied shelters of the Brush-tailed Mulgara were recorded within the pipeline corridor. Where potential Mulgara burrows were recorded within the pipeline corridor (Appendix 4), machinery was directed around to minimise any potential impacts.

Figure 15. Potential tracks of the Brush-tailed Mulgara recorded along the TGP.



Figure 16. Potential foraging hole of the Brush-tailed Mulgara along the TGP.



Figure 17. Brush-tailed mulgara records recorded along the pipeline corridors.

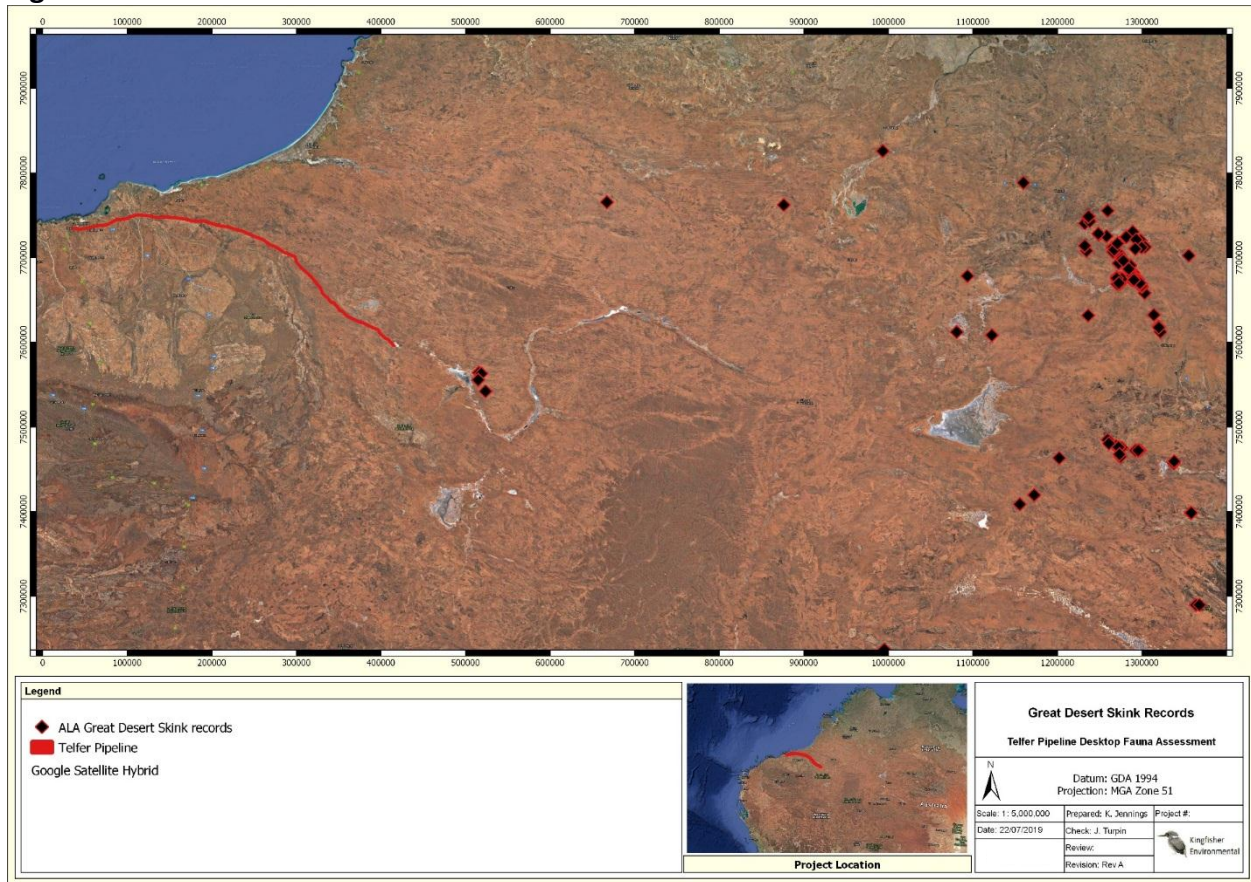
Mulgara tracks recorded along the TGP are categorised as potentially attributable to the species as another similar sized Dasyurid, *Dasykaluta rosamondae*, occurs in the area and has a similar gait. However, the Brush-tailed Mulgara has been previously recorded along or near the pipeline corridors near Port Hedland, Yarrie and Nifty (DBCA Threatened Fauna Database, 2020; Atlas of Living Australia, 2020; Appendix 2). Consequently, the species is likely to occur within the local area. The superficially similar Crest-tailed Mulgara (*Dasycercus cristicauda*), however, is not currently considered likely to occur along the pipeline corridors (Woinarski and Burbidge, 2016).

7.2.3 Great Desert Skink

The Great Desert Skink was not recorded during the field surveys and was also not detected during the pipeline's initial construction in 2004. The species has not been previously recorded near the pipeline corridor, with the nearest records coming from Karlamilyi, 120 km to the south-east (DBCA, 2020; Figure 18).

Despite a lack of local records (which can be an artefact of a lack of survey effort), the Great Desert Skink was actively targeted during surveying. Field personnel were familiar with the species' habitat requirements and distinctive burrows and scat latrines, having previously recorded burrows, tracks and scats in the Great Sandy and Great Victoria Deserts. As the Great Desert Skink was not recorded, and inhabits distinctive and large burrow systems, the species was considered unlikely to occur within the pipeline corridor at the time of clearing activities. As such, any disturbances to the species as a result of clearing appear unlikely.

Figure 18. Distribution of the Great Desert Skink in western and central Australia.



7.2.4 Dampierland Plain Slider

The Dampierland Plain Slider (*Lerista separanda*) has a restricted distribution and is known from few records on the Dampier Peninsula, extending south into the Great Sandy Desert. The TGP and NGL occur near the species’ southern range extreme (DBCA, 2020). However, the species has been recorded near Nimingarra and Mijijimaya (DBCA, 2020). The Dampierland Plain Slider is fossorial, inhabiting sand dunes and sand plains, associated with spinifex hummock grasslands. Targeted searching (raking) and pitfall trapping did not detect the species, however, did record three other species of *Lerista* (*Lerista bipes*, *Lerista clara*, *Lerista ips*, Table 6), suggesting the Dampierland Plain Slider may have a restricted distribution in the local area.

The Dampierland Plain Slider lives predominantly underground. As clearing activities were conducted during the cooler months (during a period where reptile activity is minimal) and mulching machinery typically did not disturb below the ground surface, impacts to a local Dampierland Plain Slider population resulting from the clearing activities appear minimal.

7.3 Other Species of Conservation Significance Recorded During Surveying

Several additional species of conservation significance were detected during the 2020 field surveys. This included two species listed under the EPBC Act (Northern Quoll and Ghost Bat), two DBCA Priority Species (Western Pebble-mound Mouse and Spectacled Hare-Wallaby) and one locally significant species with a restricted and declining distribution (Bush Stone-curlew). These species are discussed below.

7.3.1 Northern Quoll

The Northern Quoll (*Dasyurus hallucatus*) is listed as Endangered under the EPBC and BC Acts as the species has suffered significant declines across Northern Australia and now occurs in a number of fragmented populations across its former range (Department of the Environment, 2016). In Western Australia, the species occurs in the Pilbara and Kimberley regions, with a few scattered populations known from the intervening desert regions (Turpin and Bamford, 2015; DBCA, 2020).

In the Pilbara, the Northern Quoll population appears intact as it has not yet experienced the invasion of the Cane Toad seen elsewhere in Australia. However, populations in the arid interior (> 200 km from the coast) are few and poorly known (Turpin and Bamford, 2015). The Northern Quoll is regularly recorded from rocky areas within 200 km of the coastline, from Pannawonica east to Shay Gap and particularly north of the Fortescue Marsh (DBCA, 2020). Outside this area, records are few and scattered but occur near Newman, south of Nullagine, Nifty and the Little Sandy Desert (Turpin and Bamford, 2015).

The Northern Quoll was recorded at four locations during the 2020 field surveys (Appendix 4, Figures 19 and 26). Northern Quoll tracks were recorded in sand along the TGP, near the vicinity of low rocky hills, where the species is likely to den. While Northern Quolls den in rocky habitats, they can forage widely in adjacent habitats, and can also den in tree hollows along watercourses (Department of the Environment, 2016). As the pipeline routes avoided most rocky habitats, and disturbances to large trees were avoided, impacts to the local Northern Quoll population appear to have been minimal during clearing activities, and the species was likely to occur in the area during foraging or transit. The 2020 records however are significant as they lie at the extreme edge of the Pilbara and therefore the edge of the regional population's range (DBCA, 2020).

Figure 19. Northern Quoll tracks recorded along the TGP during 2020.



7.3.2 Ghost Bat

The Ghost Bat is listed as Vulnerable under the EPBC Act and BC Act. It has declined over much of arid Australia, with disjunct populations persisting in the Pilbara and Kimberley regions of Western Australia (DBCA 2020). Ghost Bats inhabit deep caves as they rely on underground roosts with warm, humid microclimates to maintain their heat and water balance (as they do not enter torpor), especially in the more arid regions or at drier times of the year and during breeding (Armstrong *et al.*, 2019). As such, roost availability is restricted to relatively few subterranean structures (typically deep caves and underground mines), though individuals are sometimes found in old mines and caves with cooler and drier conditions. The species typically occurs within the ironstone landscapes of the Pilbara, however, can also roost in sandstone formations, and granite boulder piles (Armstrong *et al.*, 2019; J. Turpin, pers. obs.). Ghost Bats are carnivorous (diet includes small mammals, birds, reptiles, frogs and large insects) with prey typically taken to a feeding perch in trees, rock overhangs, or cave entrances to be consumed. Due to their large size and mobility, Ghost Bats can forage widely in the landscape surrounding their roosts.

The Ghost Bat was recorded during the 2020 field surveys with an individual observed foraging adjacent to a rocky range near Callawa Creek (at -20.5544, 120.6035; WGS 1984); Figure 20 and 26). The species has also been recorded adjacent to the pipeline corridor at Table Hill (Appendix 4). Due to the presence of caves and rock crevices the species is likely to roost in the local area, however such rocky habitat is absent from the pipeline corridor. As such, the Ghost Bat was not considered present during clearing activities.

Figure 20. Rocky hills supporting the Ghost Bat along the TGP during 2020.



7.3.3 Western Pebble-mound Mouse

The Western Pebble-mound Mouse (*Pseudomys chapmani*) is listed as Priority 4 by the DBCA and has a distribution centred on the Pilbara region. The species occurs on the crests and slopes of rocky hills where it uses small stones to construct one or more colonial mounds (van Dyck and Strahan, 2008). While the Western Pebble-mound Mouse is widespread across parts of the Pilbara, declines have been noted at the fringes of its range and the species appears to have declined dramatically from the neighbouring Gascoyne, Murchison and desert regions (DBCA, 2020). Possible threats include increased predation by introduced predators (e.g. feral cats and foxes), fire and habitat removal (van Dyck and Strahan, 2008).

The Western Pebble-mound Mouse was recorded adjacent to the TGP during the 2020 surveys (Appendix 4, Figures 21, 22, Table 10). Several old, inactive mounds were located on the slopes of rocky hills, adjacent to the pipeline corridor. The records represent previously undocumented and significant populations as they come from within the Great Sandy Desert, a region with few records and from where the species is poorly known. The mounds also lie near the species' eastern range extent, where previous declines have been noted. The Western Pebble-mound mouse has been previously recorded near the TGP, however from within the Pilbara region (e.g. Ord Ranges, Yarrie, Niningarra and Table Hill; DBCA 2020), with no local records from the adjacent Great Sandy Desert.

Due to the presence of local and regional records, the Western Pebble-mound Mouse was targeted during the 2020 field surveys. However, suitable habitat (rocky hills and slopes) were sparsely distributed along the pipeline, as the route avoids most rocky hills and slopes. No pebble mounds were recorded within the pipeline corridor during the surveys and therefore disturbances to this species during clearing appear minimal.

Table 10. Western Pebble-mound Mouse records during the field surveys.

Type	Latitude	Longitude	Date Recorded	Distance from pipeline corridor
Mound	-21.0074	121.2436	31/07/2020	1000 metres west
Mound	-21.1777	121.4712	01/08/2020	7 km west
Mound	-21.1816	121.4773	01/08/2020	7 km west
Mound	-20.8522	121.0908	04/08/2020	100 metres west
Mound	-20.8527	121.0903	04/08/2020	170 metres west

Figure 21. Western Pebble-mound Mouse mound recorded during the 2020 field surveys.



Figure 22. Western Pebble-mound Mouse mound recorded during the 2020 field surveys.



7.3.4 Spectacled Hare-wallaby

The Spectacled Hare-wallaby (*Lagorchestes conspicillatus leichardti*, mainland subspecies) is listed as Priority 4 by the DBCA. Within Western Australia, this taxa is now restricted to a few small isolated patches in the Pilbara, Great Sandy Desert and Kimberley (DBCA, 2020). *L. c. leichardti* occupies a wide variety of habitat types including open forests, open woodland, tall shrublands, tussock grasslands and hummock grasslands. In the drier southern parts of its range (such as within the Pilbara) it commonly occupies spinifex (*Triodia* spp.) sandplains interspersed with low shrubs (Winter *et al.*, 2020). It is considered rare and declining in the Kimberley and Pilbara regions (Winter *et al.*, 2020) and very few records exist for the Great Sandy Desert (DBCA, 2020; ALA, 2020). Threats include habitat alteration arising from fire and introduced grazers (e.g. cattle and rabbits) and predation by introduced predators (e.g. foxes and feral cats, Winter *et al.*, 2020). The only records near the TPG are historical records from the Pilbara (Shay Gap in 1899 and Nimingarra in 1983, Appendix 2; DBCA, 2020).

The Spectacled Hare-wallaby was recorded during the 2020 surveys, representing new and significant records for the Great Sandy Desert and wider region. Tracks attributable to the species were recorded at two locations (see Figures 23 – 26 and Table 11). Tracks were recorded from a patch of long unburnt, dense *Acacia* shrubland, approximately 13 km south-east of Mijijimaya (Appendix 4) and from Eucalypt Woodland (with a *Triodia* dominated understorey of mixed seral age), approximately 35 km south-east of Mijijimaya (Appendix 4). At both locations, the presence of small Macropod tracks alerted zoologists to the species' possible presence. Tracks were then assessed and measured across the wider area to ascertain shape and size characteristics. Tracks were distinguished from the other locally occurring Macropods (Red Kangaroo and Euro) by their size, shape, and gait, including tail drags and the distance between hopping tracks (see Figures 23 - 25, Table 11; Triggs, 2004; Ecotec, 2010). As the species is undergoing regional decline, few records exist for the Great Sandy Desert and the nearest records come from the Pilbara, over 120 km to the west, these records are significant and may warrant further investigation.

Table 11. Track Comparison of three locally occurring Macropods (Red Kangaroo, Euro, Spectacled Hare-wallaby) with tracks recorded during the field surveys compared to Triggs (2004).



Species	Hindfoot Hopping Track (Length)	Hindfoot Hopping Track (width)	Walking Track Pattern (Triggs 2004)
Red Kangaroo (from Triggs, 2004)	10 cm	3 cm	
Euro (from Triggs, 2004)	10.5 cm	3 cm	
Spectacled Hare-wallaby (from Triggs, 2004)	6.1 cm	2.2 cm	
TGP Macropod Tracks (recorded in the field)	6.0 – 6.5 cm	2.0 – 2.3 cm	

Figure 23. Spectacled Hare-wallaby (left), Red Kangaroo (right) tracks recorded during surveying.

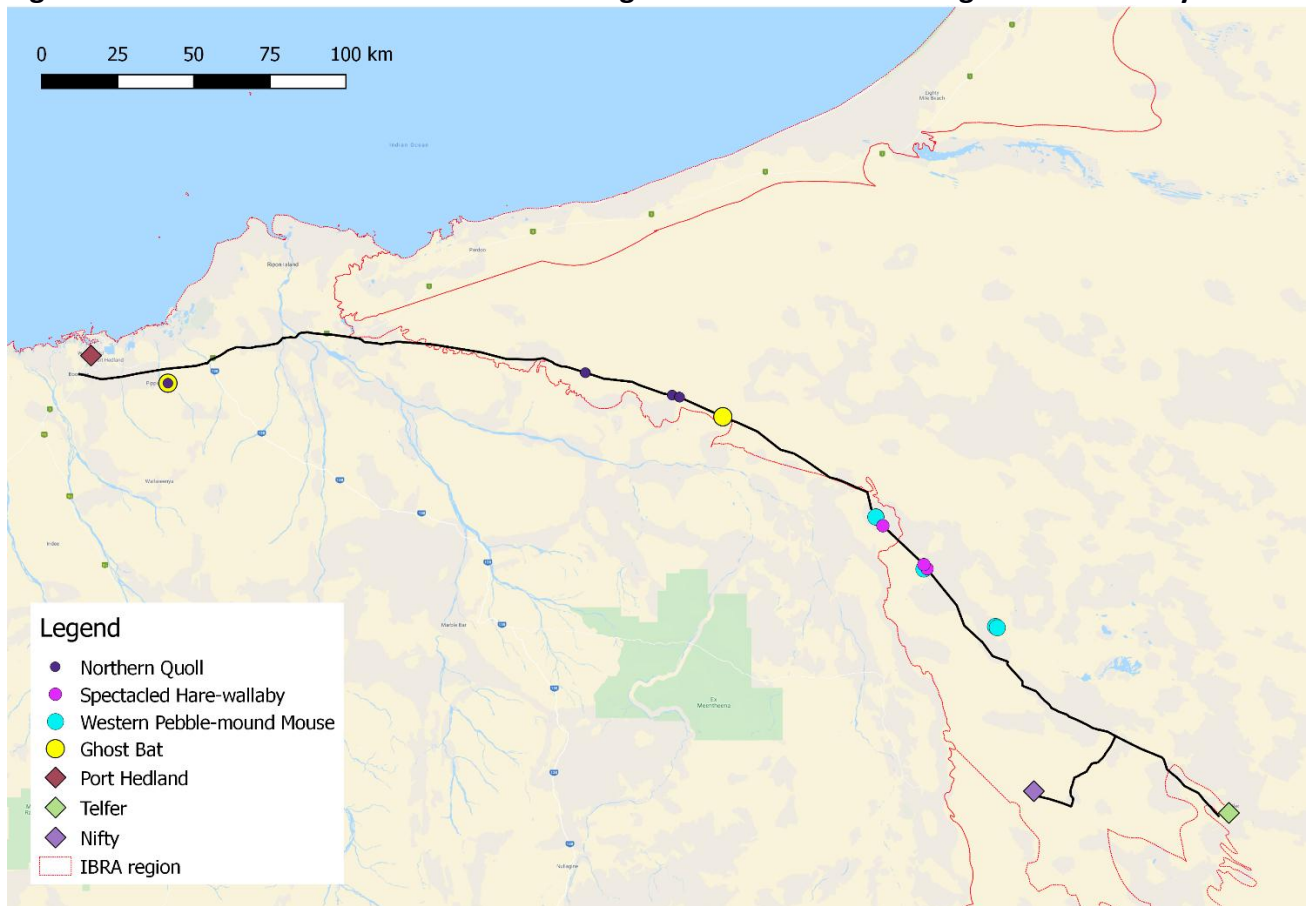


Figure 24. Spectacled Hare-wallaby tracks and tail drag recorded during the 2020 surveys.



Figure 25. Spectacled Hare-wallaby tracks recorded during the 2020 surveys (top pictures) compared with tracks from the Tanami Desert (bottom picture; Ecotec, 2010).



Figure 26. Additional Fauna of Conservation Significance recorded during the 2020 surveys.

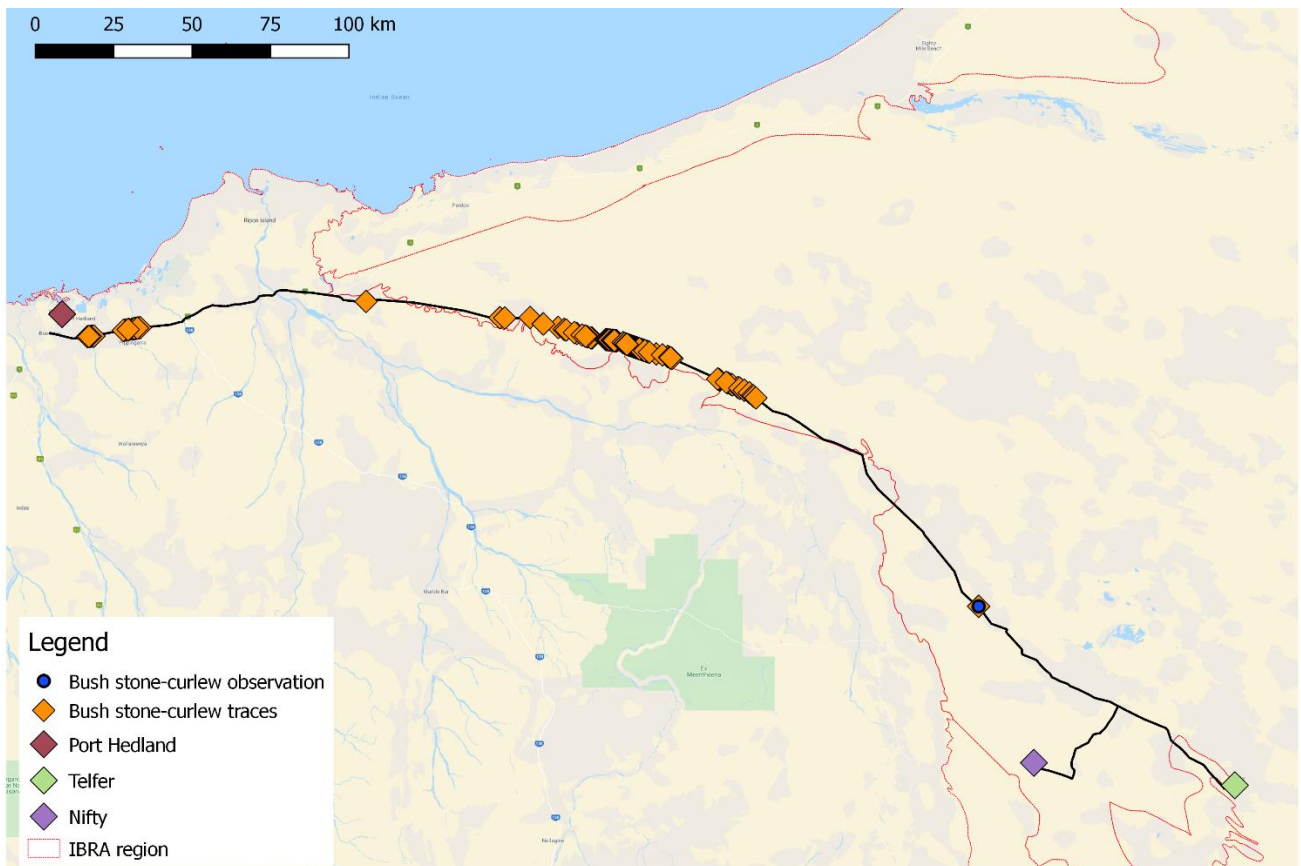
7.3.5 Bush Stone-curlew

Bush Stone-curlew (*Burhinus grallarius*) was formerly listed as Priority by the DBCA with recognised sensitivity to predation and decline (nests and roosts on the ground; Woinarski *et al.*, 2017). While the species appears to be widespread in the northern Pilbara (ALA, 2020), the Bush Stone-curlew appears uncommon or absent throughout the adjacent desert regions (Great Sandy, Gibson and Great Victoria Deserts), where records are few and scattered (ALA, 2020). During the 2020 field surveys, the species was regularly recorded within the Pilbara section of the pipeline corridor, with numerous tracks recorded (from near Port Hedland to Callawa Creek, Figures 27 and 28). However, the species was distinctly absent from most of the Great Sandy Desert. One observation of the Bush stone-curlew came from within the sand dune fields of the Great Sandy Desert, with one bird heard calling, near a permanent spring with dense vegetation (at -21.216, 121.423, WGS 1984); approximately 300 m east of the TGP corridor, Figure 28).

Figure 27. Bush Stone-curlew tracks recorded along the TGP during 2020.



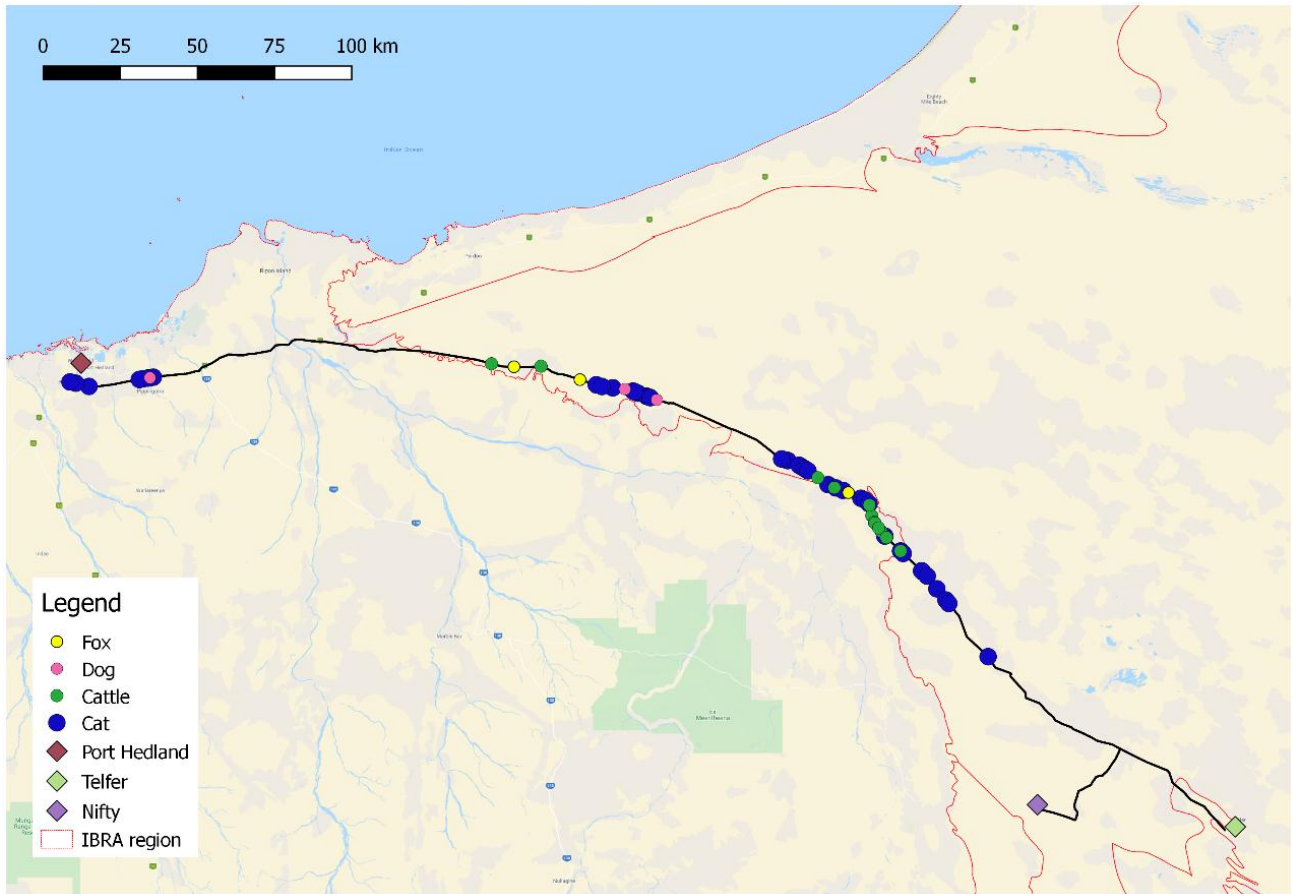
Figure 28. Bush Stone-curlew records from the 2020 surveys.



7.4 Introduced Fauna

Seven introduced mammal species were recorded during the survey (Appendix 2, Figure 29). The Dingo, Camel, Feral Cat, and European Red Fox were recorded from tracks and scats. The Dingo and Feral Cat were also both observed and recorded on motion-activated camera. Feral Cat tracks were widely recorded along the TGP, while the European Red Fox was only recorded at a small number of locations (Figure 29). Cattle were recorded along the TGP on pastoral properties and also in the Great Sandy Desert near Mijijimaya (Figure 29).

Figure 29. Introduced mammals recorded along the pipeline corridors.



8. CONCLUSIONS

APA conducted “line of sight” clearing along the Telfer Gas Pipeline and Nifty Gas Lateral, from May to August 2020. To minimise disturbances to conservation significant fauna, Kingfisher Environmental was commissioned to conduct pre-clearance fauna surveys and to ensure project compliance with permit conditions issued by the Department of Mines, Industry Regulation and Safety (DMIRS, CPS 8396/1 and CPS 8399/1). Specifically, disturbances to the Greater Bilby, Brush-tailed Mulgara, Great Desert Skink and Dampierland Plain Slider required management under CPS 8396/1 and CPS 8399/1. Fauna surveys were conducted with reference to guidelines and technical guidance (e.g. EPA, 2016a; 2016b; 2018) and carried out in accordance with the fauna management plan developed in consultation with DBCA and APA (Kingfisher, 2020).

Pre-clearance fauna surveys were conducted prior to and during clearing activities, during May, June, July and early August 2020. The field surveys assessed the status of the four focal species of significance within the clearing footprint and also aimed to determine the status of other threatened taxa within the project’s disturbance footprint. While the 2020 field surveys aimed to detect species of conservation significance, opportunistic observations, pitfall trapping and the use of motion-activated cameras enabled a large fauna assemblage to be recorded. A total of 145 vertebrate fauna species were recorded during the field surveys, comprising one amphibian, 53 reptile, 71 bird, 13 native mammal and seven introduced mammal species. Two of the four focal species of conservation significance were recorded (Greater Bilby and Brush-tailed Mulgara), while a third had the potential to occur.

Seven species of conservation significance were recorded during the 2020 field surveys. Three species listed under the EPBC Act (Greater Bilby, Northern Quoll and Ghost Bat), three DBCA Priority species (Brush-tailed Mulgara, Spectacled Hare-Wallaby and Western Pebble-mound Mouse) and one locally significant fauna species (Bush Stone-curlew) were recorded:

1. Greater Bilby (EPBC Vulnerable): detected at five motion camera sites, burrows, tracks, scats and diggings widely recorded along the pipeline routes;
2. Northern Quoll (EPBC Endangered): tracks and scats recorded at three locations;
3. Ghost Bat (EPBC Vulnerable): individuals observed and scats recorded at three locations;
4. Brush-tailed Mulgara (DBCA Priority 4): tracks and scats recorded;
5. Western Pebble-mound Mouse (DBCA Priority 4): old mounds recorded at five locations;
6. Spectacled Hare-wallaby (DBCA Priority 4): likely tracks recorded at two locations;
7. Bush Stone-curlew (locally significant): individuals recorded at two locations and tracks widely recorded.

The Great Desert Skink (EPBC Vulnerable) was not recorded during the 2020 field surveys and was not detected during the pipeline’s initial construction in 2004. As the Great Desert Skink inhabits distinctive and large burrow systems, the species was considered unlikely to occur within the pipeline corridor at the time of clearing. As such, any disturbances to the species as a result of clearing appear unlikely.

The Dampierland Plain Slider (DBCA Priority 2) was also not recorded during the 2020 field surveys. The species lives predominantly underground, and as clearing activities were conducted during the cooler months (when reptile activity is minimal) and the mulching machinery did not typically disturb below the ground surface, impacts to a local Dampierland Plain Slider population (if present) appeared minimal.

Disturbances to conservation significant fauna were minimised during the clearing process. All burrows identified with the potential to support the Greater Bilby and Brush-tailed Mulgara were retained. Therefore, the need to relocate threatened fauna was avoided, minimising disturbance to a range of fauna (as a range of burrowing species occur locally). Additional fauna (e.g. skinks, legless lizards, geckoes) identified during pre-clearance surveys, were relocated by hand immediately prior to clearing. A total of 224 animals were removed from the disturbance footprint prior to clearing and released within adjacent habitat of similar vegetation.

Disturbances to all burrows potentially suitable for the Greater Bilby or Brush-tailed Mulgara were avoided. Pre-clearance surveys were conducted immediately prior to clearing, and any burrows identified with the potential to be used by the Greater Bilby or Brush-tailed Mulgara were located, assessed and clearly demarcated to be avoided. During clearing activities, zoologists searched in front of the clearing machinery to alert operators to the presence of any Greater Bilby or Brush-tailed Mulgara burrow (including active, inactive or potential burrows). Clearing activities were diverted around all burrow sites with a disturbance-free buffer of 10 m established. In this way impacts to the local Greater Bilby and Brush-tailed Mulgara populations were minimised and avoided.

While the surveys ensured minimal disturbance to the four focal species of conservation significance, the presence of other significant taxa was also detected. These included regionally significant records of threatened and declining taxa, some of which may warrant further investigation. This included the Spectacled Hare-wallaby, with tracks attributable to the species recorded south of Mijjimaya. The Spectacled Hare-wallaby is known from few locations in the Pilbara and even fewer in the adjacent Great Sandy Desert and so the tracks likely represent a new and previously undocumented population. Additionally, records of the Western Pebble-mound mouse, Northern Quoll and Ghost Bat come from areas where they are poorly documented and near range extremes. As the pipeline routes avoided most rocky habitats, and disturbances to large trees were avoided, impacts to such fauna appear to have been minimal during clearing activities.

The pre-clearance surveys and fauna management during clearing ensured compliance with clearing permits issued by DMIRS (CPS 8396/1 and CPS 8399/1). The surveys ensured disturbances to conservation significant fauna were minimised, detected some additional species of significance and maintained APA's strong commitment to environmental management.

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Appendix 1. Categories Used in the Assessment of Conservation Status.

IUCN categories as used for the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Biodiversity Conservation Act 2016*

CATEGORY	DEFINITION
Extinct	Taxa not definitely located in the wild during the past 50 years.
Extinct in the Wild	Taxa known to survive only in captivity.
Critically Endangered	Taxa facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	Taxa facing a very high risk of extinction in the wild in the near future.
Vulnerable	Taxa facing a high risk of extinction in the wild in the medium-term future.
Near Threatened	Taxa that risk becoming Vulnerable in the wild.
Conservation Dependent	Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classed as Vulnerable or more severely threatened.
Data Deficient (Insufficiently Known)	Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.
Least Concern	Taxa that are not Threatened.

Definitions of relevant categories under the EPBC Act 1999

CATEGORY	DEFINITION
Endangered (EN)	The species is likely to become extinct unless the circumstances and factors threatening its abundance, survival or evolutionary development cease to operate; or its numbers have been reduced to such a critical level, or its habitats have been so drastically reduced, that it is in immediate danger of extinction.
Vulnerable (VU)	Within the next 25 years, the species is likely to become endangered unless the circumstances and factors threatening its abundance, survival or evolutionary development cease to operate.
Migratory (M)	Species are defined as migratory if they are listed in an international agreement approved by the Commonwealth Environment Minister, including: <ul style="list-style-type: none"> the Bonn Convention ((Convention on the Conservation of Migratory Species of Wild Animals) for which Australia is a range state; The Agreement between the Government of Australia and the Government of the Peoples Republic of China for the Protection of Migratory Birds and their Environment (CAMBA); or The Agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA).

Categories used in the Biodiversity Conservation Act 2016

CATEGORY	DEFINITION
Critically Endangered	Facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	Facing a very high risk of extinction in the wild in the near future.
Vulnerable	Facing a high risk of extinction in the wild in the medium-term future.
Extinct	There is no reasonable doubt that the last individual has died. A species is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the species' life cycle and life form.
Extinct in the wild	It is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range. A species is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the species' life cycle and life form
Special Conservation Interest	It is of special conservation interest because it - (i) has a naturally low population range; or (ii) has a restricted natural range; or

	(iii) is subject to or recovering from a significant population decline or reduction in natural range Conservation dependent species – that is species that have previously been listed as threatened, but have recovered to the extent that they no longer meet the criteria for threatened, and the species is dependent on conservation actions continuing, i.e. the species is the focus of a specific conservation programme, the cessation of which would result in it again becoming eligible for listing as a threatened species within a period.
Migratory	A native species is eligible for listing in the category of migratory if: (i) Members of the species periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or (ii) the species is the subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth. International agreements that apply to the listing of a species as a migratory species are: Japan - Australia Migratory Birds Agreement (JAMBA); China - Australia Migratory Birds Agreement (CAMBA); Republic of Korea - Australia Migratory Birds Agreement (ROKAMBA); and the Convention on the Conservation of Migratory Species of Wild Animals (Bonn).
Species otherwise in need of special protection	A species that is otherwise in need of special protection if it does not meet any of the above criteria, but is a species for which a need for special protection exists.

Department of Biodiversity, Conservation and Attractions Priority Fauna Species (species not listed under the BC Act, but for which there is some concern)

CATEGORY	DEFINITION
Priority One (P1)	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.
Priority Two (P2)	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.
Priority Three (P3)	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.
Priority Four (P4)	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 2. Fauna Recorded or Expected in the Survey Area.

Fauna Recorded or and Expected along the Telfer Gas Pipeline (Tables 2.1 to 2.4).

These lists are derived from the results of database and literature searches and from previous field surveys conducted in the local area. These are:

- DBCA Threatened Fauna Database (DBCA), NatureMap Database (NM), Birdlife Australia Database (BA), Atlas of Living Australia (ALA);
- Species previously recorded along the pipeline corridor (includes fauna recorded during TGP and NGL pipeline construction in 2004 and records submitted to DBCA; DBCA 2020);
- Species recorded during previous surveys conducted in nearby areas (e.g. at Telfer, Nifty, Port Hedland – see Kingfisher Environmental 2018);
- Species previously recorded by Jeff Turpin during fauna surveys in nearby areas (Kingfisher records – see Kingfisher Environmental 2018); and
- Species recorded during the 2020 TGP and NGL fauna surveys.

Key:

Note the conservation status of significant taxa is listed under “Status”. This includes species listed under legislation, DBCA Priority Fauna and Locally Significant Fauna (L).

Table 2.1. Frog species recorded or expected to occur in the survey area.

FROGS		Conservation Status	DBCA Threatened Database	NatureMap / ALA	Corridor Records	Surrounding Surveys	Kingfisher Records	2020
HYLIDAE								
Giant Frog	<i>Cyclorana australis</i>			X				
Main's Frog	<i>Cyclorana maini</i>			X	X	X	X	
Desert Tree Frog	<i>Litoria rubella</i>			X	X	X	X	X
LIMNODYNASTIDAE								
Northern Burrowing Frog	<i>Neobatrachus aquilonius</i>			X	X	X		
Shoemaker Frog	<i>Neobatrachus sutor</i>			X				
Desert Spadefoot	<i>Notaden nichollsi</i>			X	X	X		
Spencer's Burrowing Frog	<i>Platyplectrum spenceri</i>			X				
MYOBATRACHIDAE								
Glandular Toadlet	<i>Uperoleia glandulosa</i>			X	X	X	X	
Tanami Toadlet	<i>Uperoleia micromeles</i>			X				
Pilbara Toadlet	<i>Uperoleia saxatilis</i>			X		X	X	
Ratcheting Toadlet	<i>Uperoleia talpa</i>			X				
Total Number of Species: 11		0	0	11	5	6	4	1

Table 2.2. Reptile species recorded or expected to occur in the survey area.

REPTILES		Status	DBCA Threatened Database	NatureMap	Corridor Records	Surrounding Surveys	Kingfisher Records	2020
Agamidae								
<i>Amphibolurus gilberti</i>	Gilbert's Dragon			X				
<i>Amphibolurus longirostris</i>	Long-nosed Dragon			X		X	X	X
<i>Ctenophorus caudicinctus</i>	Ring-tailed Dragon			X	X	X	X	X
<i>Ctenophorus clayi</i>	Collared Dragon			X		X		X
<i>Ctenophorus isolepis</i>	Central Military Dragon			X	X	X	X	X
<i>Ctenophorus nuchalis</i>	Central Netted Dragon			X	X	X	X	X
<i>Ctenophorus reticulatus</i>	Western Netted Dragon			X	X			
<i>Diporiphora paraconvergens</i>	Grey-striped Western Desert Dragon			X		X		X
<i>Diporiphora pindan</i>	Pindan Dragon			X	X			X
<i>Diporiphora valens</i>	Southern Pilbara Tree Dragon			X				
<i>Diporiphora vescus</i>	Northern Pilbara tree dragon			X				
<i>Moloch horridus</i>	Thorny Devil			X		X		X
<i>Pogona minor</i>	Western Bearded Dragon			X	X	X	X	X
Diplodactylidae								
<i>Crenadactylus ocellatus</i>	Clawless Gecko			X				
<i>Diplodactylus conspicillatus</i>	Fat-tailed Gecko			X	X	X	X	
<i>Diplodactylus galaxias</i>	Pilbara Beak-Faced Gecko							
<i>Diplodactylus savagei</i>	Pilbara Beak-Faced Gecko			X				
<i>Diplodactylus laevis</i>	Desert Fat-tailed Gecko			X	X			X
<i>Lucasium stenodactylum</i>	Sand-plain Gecko			X	X	X		X
<i>Lucasium wombeyi</i>	Pilbara ground gecko			X	X	X	X	
<i>Oedura fimbria</i>	Marbled Velvet Gecko			X	X			X
<i>Rhynchoedura ornata</i>	Beaked Gecko			X	X	X		X
<i>Strophurus ciliaris</i>	Northern spiny-tailed gecko			X	X	X		
<i>Strophurus elderi</i>	Jewelled Gecko			X	X	X		
<i>Strophurus jeanae</i>	Southern phasmid gecko			X				
Carphodactylidae								
<i>Nephrurus laevis</i>	Smooth Knob-tail			X		X		
<i>Nephrurus levis</i>	Three-lined Knob-tail			X	X	X		
<i>Nephrurus wheeleri</i>	Banded Knob-tailed Gecko			X				
Gekkonidae								
<i>Gehyra pilbara</i>	Pilbara Dtella			X	X	X	X	
<i>Gehyra media</i>	Medium Pilbara Spotted Gehyra							X
<i>Gehyra monitum</i>	Spotted Dtella			X	X	X	X	X
<i>Gehyra purpurascens</i>	Purplish Dtella			X		X	X	X
<i>Gehyra variegata</i>	Variegated Dtella			X	X	X	X	X
<i>Hemidactylus frenatus</i>	Asian House Gecko			X				
<i>Heteronotia binoei</i>	Bynoe's Gecko			X		X	X	X
<i>Heteronotia spelea</i>	Desert Cave Gecko			X		X	X	
Pygopodidae								
<i>Delma borea</i>	Rusty-topped Delma			X		X		
<i>Delma butleri</i>	Unbanded Delma			X				
<i>Delma demosa</i>	Banded Delma			X	X	X		
<i>Delma elegans</i>	Pilbara Delma			X		X		X
<i>Delma haroldi</i>	Neck-barred Delma			X	X	X		
<i>Delma nasuta</i>	Sharp-snouted Delma			X	X	X		X

REPTILES		Status	DBCA Threatened Database	NatureMap	Corridor Records	Surrounding Surveys	Kingfisher Records	2020
<i>Delma pax</i>	Peace Delma			X	X			X
<i>Delma tincta</i>	Excitable Delma			X	X			
<i>Lialis burtonis</i>	Burton's Legless Lizard			X	X	X		X
<i>Pygopus nigriceps</i>	Western Hooded Scaly-foot			X	X	X		X
Scincidae								
<i>Carlia munda</i>	Shaded-litter Rainbow Skink			X	X	X	X	
<i>Carlia triacantha</i>	Desert rainbow-skink			X	X			
<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink			X				
<i>Cryptoblepharus ustulatus</i>	Russet snake-eyed skink			X		X	X	
<i>Ctenotus ariadnae</i>	Ariadna's Ctenotus			X		X		
<i>Ctenotus brooksi</i>	Brooks' Ctenotus			X		X		X
<i>Ctenotus calurus</i>	Blue-tailed Ctenotus			X		X		
<i>Ctenotus duricola</i>	Pilbara Ctenotus			X	X	X	X	X
<i>Ctenotus dux</i>	Narrow-lined Ctenotus			X				
<i>Ctenotus grandis</i>	Grand Ctenotus			X	X	X		X
<i>Ctenotus hanloni</i>	Nimble Ctenotus			X	X			X
<i>Ctenotus helenae</i>	Clay-soil Ctenotus			X	X	X		X
<i>Ctenotus leae</i>	Orange-tailed Finesnout Ctenotus					X		
<i>Ctenotus nasutus</i>	Nasute finesnout Ctenotus			X		X		
<i>Ctenotus nigrilineatus</i>	Pin-striped Finesnout Ctenotus	P1						
<i>Ctenotus pantherinus</i>	Leopard Ctenotus			X	X	X	X	X
<i>Ctenotus piankai</i>	Coarse Sands Ctenotus			X	X	X		X
<i>Ctenotus quattuordecimlineatus</i>	Fourteen-lined Ctenotus			X	X	X		
<i>Ctenotus rubicundus</i>	Ruddy Ctenotus			X				
<i>Ctenotus rufescens</i>	Rufous finesnout Ctenotus			X				
<i>Ctenotus rutilans</i>	Rusty-shouldered Ctenotus			X				
<i>Ctenotus saxatilis</i>	Rock Ctenotus			X	X	X	X	X
<i>Ctenotus schomburgkii</i>	Barred Wedgesnout Ctenotus			X	X			
<i>Ctenotus serventyi</i>	North-western Sandy-loam Ctenotus			X				X
<i>Ctenotus superciliaris</i>	Sharp-browed Ctenotus							X
<i>Cyclodomorphus melanops</i>	Spinifex Slender Blue-Tongue			X				X
<i>Egernia cygnitos</i>	Pygmy Spiny-tailed Skink							
<i>Egernia epcisolus</i>	Eastern Pilbara spiny-tailed skink			X		X	X	
<i>Egernia formosa</i>	Goldfields Crevice-skink					X	X	
<i>Egernia pilbarensis</i>	Pilbara Crevice-skink						X	
<i>Eremiascincus isolepis</i>	Northern Bar-lipped Skink			X				
<i>Eremiascincus musivus</i>	Mosaic Desert Skink			X	X			X
<i>Eremiascincus pallidus</i>	Narrow-banded Sand-swimmer			X		X		X
<i>Eremiascincus richardsonii</i>	Broad-banded Sand-swimmer			X	X			
<i>Lerista bipes</i>	North-western Sandslider			X	X	X		X
<i>Lerista clara</i>	Sharp-blazed Three-toed Slider			X				X
<i>Lerista ips</i>	Robust Duneslider			X		X		X
<i>Lerista jacksoni</i>	Jackson's Three-toed Slider			X				
<i>Lerista muelleri</i>	Wood mulch-slider			X				
<i>Lerista separanda</i>	Dampierland Plain Skink	P2	X	X				
<i>Lerista timida</i>	Timid Slider							
<i>Lerista verhmens</i>	Powerful three-toed slider			X				
<i>Lerista vermicularis</i>	Slender Duneslider			X				

REPTILES		Status	DBCA Threatened Database	NatureMap	Corridor Records	Surrounding Surveys	Kingfisher Records	2020
<i>Lerista xanthurus</i>	Yellow-tailed Plain Slider					X		
<i>Liopholis striata</i>	Night Skink			X	X	X		X
<i>Menetia greyii</i>	Common Dwarf Skink			X	X	X		X
<i>Menetia surda</i>	Western dwarf skink			X				
<i>Morethia ruficauda</i>	Lined fire-tailed skink			X	X	X	X	X
<i>Notoscincus ornatus</i>	Ornate soil-crevice skink			X	X	X		X
<i>Proablepharus reginae</i>	Western soil-crevice skink			X	X			X
<i>Tiliqua multifasciata</i>	Centralian Blue-tongue			X	X	X		X
Varanidae								
<i>Varanus acanthurus</i>	Spiny-tailed Monitor			X	X	X	X	X
<i>Varanus brevicauda</i>	Short-tailed Pygmy Monitor			X		X		
<i>Varanus bushi</i>	Pilbara Mulga Monitor			X				
<i>Varanus eremius</i>	Pygmy Desert Monitor			X	X	X	X	X
<i>Varanus giganteus</i>	Perentie			X		X	X	X
<i>Varanus gouldii</i>	Sand Goanna			X	X	X		X
<i>Varanus panoptes</i>	Yellow-spotted Monitor			X			X	
<i>Varanus pilbarensis</i>	Pilbara Rock Monitor			X				
<i>Varanus tristis</i>	Black-headed Monitor			X				
Typhlopidae								
<i>Anilius ammodytes</i>	Sand-diving Blind Snake			X				
<i>Anilius endoterus</i>	Interior Blind Snake					X		
<i>Anilius grypus</i>	Long-beaked Blind Snake					X		X
<i>Anilius pilbarensis</i>	Pilbara Blind Snake							
<i>Anilius waitii</i>	Beaked Blind Snake							
Pythonidae								
<i>Antaresia perthensis</i>	Pygmy Python			X				
<i>Antaresia stimsoni</i>	Stimson's Python			X		X	X	
<i>Aspidites melanocephalus</i>	Black-headed Python			X		X	X	
<i>Aspidites ramsayi</i>	Woma			X		X		
<i>Liasis olivaceus barroni</i>	Pilbara Olive Python	VUL	X	X			X	
Elapidae								
<i>Acanthophis pyrrhus</i>	Desert Death Adder			X				
<i>Acanthophis wellsi</i>	Pilbara Death Adder			X				
<i>Brachyurophis approximans</i>	Northwestern Shovel-nosed Snake			X				
<i>Brachyurophis fasciolatus</i>	Narrow-banded Shovel-nosed Snake			X	X			
<i>Demansia psammophis</i>	Yellow-faced Whipsnake			X				
<i>Demansia rufescens</i>	Rufous Whipsnake			X		X		
<i>Furina ornata</i>	Moon Snake			X	X			X
<i>Parasuta monachus</i>	Monk Snake			X				
<i>Pseudechis australis</i>	Mulga Snake			X	X	X	X	X
<i>Pseudonaja modesta</i>	Ringed Brown Snake			X		X		
<i>Pseudonaja mengdeni</i>	Gwardar			X	X	X	X	
<i>Simoselaps anomalus</i>	Desert Banded Snake			X	X	X		X
<i>Suta fasciata</i>	Rosen's Snake			X				
<i>Suta punctata</i>	Spotted Snake			X				
<i>Vermicella snelli</i>	Pilbara bandy-bandy							
Total Number of Species: 129		3	2	116	53	69	31	53

Table 2.3. Bird species recorded or expected to occur in the survey area.

BIRDS	Status	DBC Threatened Database	NatureMap (BA)	Corridor Records	Surrounding Surveys	Kingfisher Records	2020
Casuariidae							
<i>Dromaius novaehollandiae</i>	Emu		X		X	X	X
Phasianidae							
<i>Coturnix pectoralis</i>	Stubble Quail		X	X			
<i>Coturnix ypsilophora</i>	Brown Quail		X	X	X	X	
Anatidae							
<i>Aythya australis</i>	Hardhead		X	X	X		
<i>Dendrocygna arcuata</i>	Wandering Whistling-Duck		X		X		
<i>Dendrocygna eytoni</i>	Plumed Whistling-Duck		X		X		
<i>Cygnus atratus</i>	Black Swan		X	X	X	X	X
<i>Chenonetta jubata</i>	Australian Wood Duck		X	X	X		
<i>Malacorhynchus membranaceus</i>	Pink-eared Duck		X		X		
<i>Anas gracilis</i>	Grey Teal		X	X	X		
<i>Anas superciliosa</i>	Pacific Black Duck		X	X	X	X	
<i>Anas rhynchotis</i>	Australasian Shoveler		X		X		
Podicipedidae							
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe		X	X	X		
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe		X	X	X		
Columbidae							
<i>Phaps chalcoptera</i>	Common Bronzewing		X		X	X	X
<i>Ocyphaps lophotes</i>	Crested Pigeon		X	X	X	X	X
<i>Geophaps plumifera</i>	Spinifex Pigeon		X		X	X	X
<i>Geopelia cuneata</i>	Diamond Dove		X	X	X	X	X
<i>Geopelia humeralis</i>	Bar-shouldered Dove		X				
<i>Geopelia striata</i>	Peaceful Dove		X	X	X	X	X
Podargidae							
<i>Podargus strigoides</i>	Tawny Frogmouth		X	X	X	X	X
Eurostopodidae							
<i>Eurostopodus argus</i>	Spotted Nightjar		X	X	X	X	X
Aegothelidae							
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar		X	X	X	X	X
Apodidae							
<i>Apus pacificus</i>	Fork-tailed Swift		X			X	
Phalacrocoracidae							
<i>Microcarbo melanoleucos</i>	Little Pied Cormorant		X	X	X	X	
<i>Phalacrocorax carbo</i>	Great Cormorant		X	X	X	X	
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		X	X	X	X	
<i>Phalacrocorax varia</i>	Pied Cormorant		X	X	X	X	
Anhingidae							
<i>Anhinga novaehollandiae</i>	Australian Dater		X	X	X	X	
Ciconiidae							
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork		X	X	X	X	
Gruidae							
<i>Grus rubicunda</i>	Brolga		X	X	X		X
Pelicanidae							
<i>Pelecanus conspicillatus</i>	Australian Pelican		X	X	X	X	
Ardeidae							

BIRDS		Status	DBCA Threatened Database	NatureMap (BA)	Corridor Records	Surrounding Surveys	Kingfisher Records	2020
<i>Ardea pacifica</i>	White-necked Heron			X	X	X	X	X
<i>Ardea modesta</i>	Eastern Great Egret			X	X			X
<i>Ardea ibis</i>	Cattle Egret			X				
<i>Ardea intermedia</i>	Intermediate Egret			X	X	X		
<i>Egretta garzetta</i>	Little Egret			X	X	X		
<i>Egretta novaehollandiae</i>	White-faced Heron			X	X	X	X	
<i>Nycticorax caledonicus</i>	Nankeen Night Heron			X			X	
Threskiornithidae								
<i>Plegadis falcinellus</i>	Glossy Ibis	MIG	X	X	X	X		
<i>Threskiornis spinicollis</i>	Straw-necked Ibis			X	X	X	X	X
<i>Threskionis molucca</i>	Australian White Ibis					X		
<i>Platelea regia</i>	Royal Spoonbill			X	X	X		
<i>Platalea flavipes</i>	Yellow-billed Spoonbill			X	X	X		
Pandionidae								
<i>Pandion cristatus</i>	Eastern Osprey	MIG	X	X	X	X		
Accipitridae								
<i>Elanus axillaris</i>	Black-shouldered Kite			X	X	X	X	
<i>Elanus scriptus</i>	Letter-winged Kite	P4		X				
<i>Lophoictinia isura</i>	Square-tailed Kite			X			X	
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard			X	X	X	X	X
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle			X	X		X	
<i>Haliastur sphenurus</i>	Whistling Kite			X	X	X	X	X
<i>Milvus migrans</i>	Black Kite			X	X	X	X	X
<i>Accipiter fasciatus</i>	Brown Goshawk			X	X	X	X	
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk			X	X		X	
<i>Circus assimilis</i>	Spotted Harrier			X	X	X	X	X
<i>Circus approximans</i>	Swamp Harrier			X				
<i>Aquila audax</i>	Wedge-tailed Eagle			X	X	X	X	X
<i>Hieraaetus morphnoides</i>	Little Eagle			X	X		X	X
Falconidae								
<i>Falco cenchroides</i>	Nankeen Kestrel			X	X	X	X	X
<i>Falco berigora</i>	Brown Falcon			X	X	X	X	X
<i>Falco longipennis</i>	Australian Hobby			X	X	X	X	
<i>Falco hypoleucos</i>	Grey Falcon	VUL	X	X		X	X	
<i>Falco subniger</i>	Black Falcon			X				
<i>Falco peregrinus</i>	Peregrine Falcon	OS	X	X		X	X	
Rallidae								
<i>Gallirallus</i>	Buff-banded Rail			X	X			
<i>Tribonyx ventralis</i>	Black-tailed Native-hen							
<i>Fulica atra</i>	Eurasian Coot			X	X		X	
Otididae								
<i>Ardeotis australis</i>	Australian Bustard			X	X	X	X	X
Burhinidae								
<i>Burhinus grallarius</i>	Bush Stone-curlew	L		X		X	X	X
Recurvirostridae								
<i>Himantopus himantopus</i>	Black-winged Stilt			X	X		X	
<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet			X				
<i>Cladorhynchus leucocephalus</i>	Banded Stilt			X				

BIRDS		Status	DBC Threatened Database	NatureMap (BA)	Corridor Records	Surrounding Surveys	Kingfisher Records	2020
Charadriidae								
<i>Charadrius ruficapillus</i>	Red-capped Plover			X	X	X	X	
<i>Charadrius veredus</i>	Oriental Plover	MIG		X		X	X	
<i>Euseyornis melanops</i>	Black-fronted Dotterel			X	X	X	X	
<i>Peltohyas australis</i>	Inland Dotterel			X		X		
<i>Erythrogonys cinctus</i>	Red-kneed Dotterel			X		X	X	
<i>Pluvialis squatarola</i>	Grey Plover	MIG		X		X		
<i>Vanellus miles</i>	Masked Lapwing			X	X	X		
Scolopacidae								
<i>Actitis hypoleucos</i>	Common Sandpiper	MIG	X	X	X			
<i>Arenaria interpres</i>	Ruddy Turnstone	MIG	X	X				
<i>Calidris alba</i>	Sanderling	MIG	X	X				
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	MIG	X	X				
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE	X	X				
<i>Calidris ruficollis</i>	Red-necked Stint	MIG	X	X				
<i>Calidris subminuta</i>	Long-toed Stint	MIG	X	X				
<i>Calidris tenuirostris</i>	Great Knot	MIG		X				
<i>Gallinago megalala</i>	Swinhoe's snipe	MIG	X	X				
<i>Limosa lapponica</i>	Bar-tailed Godwit	MIG	X	X				
<i>Limosa limosa</i>	Blak-tailed Godwit	MIG	X	X				
<i>Numenius madagascariensis</i>	Eastern Curlew	MIG	X	X				
<i>Numenius minutus</i>	Little Curlew	MIG	X	X				
<i>Numenius phaeopus</i>	Whimbrel	MIG	X	X				
<i>Phalaropus lobatus</i>	Red-necked Phalarope	MIG	X	X				
<i>Tringa brevipes</i>	Grey-tailed Tattler	MIG	X	X				
<i>Tringa glareola</i>	Wood Sandpiper	MIG	X	X				
<i>Tringa nebularia</i>	Common Greenshank	MIG	X	X	X			
<i>Tringa stagnatilis</i>	Marsh Sandpiper	MIG	X	X				
<i>Xenus cinereus</i>	Terek Sandpiper	MIG	X	X				
Rostratulidae								
<i>Rostratula australis</i>	Australian Painted Snipe	END						
Turnicidae								
<i>Turnix velox</i>	Little Button-quail			X	X	X	X	X
Glareolidae								
<i>Glareola maldivarum</i>	Oriental Pratincole	MIG	X	X				
<i>Stiltia isabella</i>	Australian Pratincole			X		X	X	
Laridae								
<i>Chlidonias leucopterus</i>	White-winged Black Tern	MIG	X	X				
<i>Chlidonia hybrida</i>	Whiskered Tern			X			X	
<i>Hydroprogne caspia</i>	Caspian Tern	MIG	X	X	X			
<i>Sterna nilotica</i>	Gull-billed Tern	MIG	X	X			X	
<i>Thalasseus bergii</i>	Crested Tern	MIG	X	X				
<i>Larus novaehollandiae</i>	Silver Gull			X		X	X	
Cacatuidae								
<i>Eolophus roseicapillus</i>	Galah			X	X	X	X	X
<i>Cacatua sanguinea</i>	Little Corella			X	X	X	X	X
<i>Nymphicus hollandicus</i>	Cockatiel			X	X	X	X	X
Psittacidae								

BIRDS		Status	DBCAs Threatened Database	NatureMap (BA)	Corridor Records	Surrounding Surveys	Kingfisher Records	2020
<i>Barnardius zonarius</i>	Australian Ringneck			X	X	X	X	X
<i>Melopsittacus undulatus</i>	Budgerigar			X	X	X	X	X
<i>Neopsephotus bourkii</i>	Bourke's Parrot							
<i>Polytelis alexandrae</i>	Princess Parrot	P4						
<i>Pezoporus occidentalis</i>	Night Parrot	CrE						
Cuculidae								
<i>Centropus phasianinus</i>	Pheasant Coucal			X	X	X	X	X
<i>Chalcites basal</i>	Horsfield's Bronze-Cuckoo			X		X	X	X
<i>Chalcites osculans</i>	Black-eared Cuckoo			X				
<i>Cacomantis pallidus</i>	Pallid Cuckoo			X	X	X	X	X
Strigidae								
<i>Ninox connivens</i>	Barking Owl	L		X	X	X	X	
<i>Ninox novaeseelandiae</i>	Southern Boobook			X		X	X	
Tytonidae								
<i>Tyto javanica</i>	Eastern Barn Owl			X		X	X	
Halcyonidae								
<i>Dacelo leachii</i>	Blue-winged Kookaburra			X	X	X	X	
<i>Todiramphus</i>	Red-backed Kingfisher			X	X	X	X	X
<i>Todiramphus sanctus</i>	Sacred Kingfisher			X	X		X	
Meropidae								
<i>Merops ornatus</i>	Rainbow Bee-eater			X	X	X	X	X
Ptilonorhynchidae								
<i>Ptilonorhynchus guttatus</i>	Western Bowerbird			X	X	X	X	X
Maluridae								
<i>Malurus leucopterus</i>	White-winged Fairy-wren			X	X	X	X	X
<i>Malurus lamberti</i>	Variiegated Fairy-wren			X	X	X	X	X
<i>Stipiturus ruficeps</i>	Rufous-crowned Emu-wren			X				
<i>Amytornis striatus</i>	Striated Grasswren			X		X	X	
Acanthizidae								
<i>Smicrornis brevirostris</i>	Weebill			X		X	X	X
<i>Gerygone fusca</i>	Western Gerygone			X			X	
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill			X		X	X	
Pardalotidae								
<i>Pardalotus rubricatus</i>	Red-browed Pardalote			X	X	X	X	X
<i>Pardalotus striatus</i>	Striated Pardalote			X		X	X	X
Meliphagidae								
<i>Certhionyx variegatus</i>	Pied Honeyeater			X	X			X
<i>Lichenostomus virescens</i>	Singing Honeyeater			X		X	X	X
<i>Lichenostomus keartlandi</i>	Grey-headed Honeyeater			X		X	X	X
<i>Lichenostomus plumulus</i>	Grey-fronted Honeyeater							
<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater			X		X	X	X
<i>Manorina flavigula</i>	Yellow-throated Miner			X	X	X	X	X
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater			X		X	X	
<i>Conopophila whitei</i>	Grey Honeyeater							
<i>Epthianura aurifrons</i>	Orange Chat			X				
<i>Epthianura tricolor</i>	Crimson Chat			X	X	X	X	X
<i>Sugomel niger</i>	Black Honeyeater					X	X	X
<i>Lichmera indistincta</i>	Brown Honeyeater			X	X	X	X	X

BIRDS		Status	DBCA Threatened Database	NatureMap (BA)	Corridor Records	Surrounding Surveys	Kingfisher Records	2020
<i>Melithreptus gularis</i>	Black-chinned Honeyeater			X		X	X	
<i>Purnella albifrons</i>	White-fronted Honeyeater			X	X			X
Pomatostomidae								
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler			X	X	X	X	X
<i>Pomatostomus superciliosus</i>	White-browed Babbler							
Neosittidae								
<i>Daphoenositta</i>	Varied Sittella			X		X		
Campephagidae								
<i>Coracina maxima</i>	Ground Cuckoo-shrike							
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike			X	X	X	X	X
<i>Lalage sueurii</i>	White-winged Triller			X	X	X	X	X
Pachycephalidae								
<i>Pachycephala rufiventris</i>	Rufous Whistler			X		X	X	X
<i>Colluricincla harmonica</i>	Grey Shrike-thrush			X	X	X	X	X
<i>Oreoica gutturalis</i>	Crested Bellbird			X		X	X	X
Climacteridae								
<i>Climacteris melaneura</i>	Black-tailed Treecreeper			X		X	X	
Artamidae								
<i>Artamus cinereus</i>	Black-faced Woodswallow			X	X	X	X	X
<i>Artamus leucorhynchus</i>	White-breasted Woodswallow			X	X	X	X	
<i>Artamus minor</i>	Little Woodswallow			X			X	X
<i>Artamus personatus</i>	Masked Woodswallow			X	X	X	X	X
<i>Artamus superciliosus</i>	White-browed Woodswallow			X				
<i>Cracticus torquatus</i>	Grey Butcherbird			X				
<i>Cracticus nigrogularis</i>	Pied Butcherbird			X	X	X	X	X
<i>Cracticus tibicen</i>	Australian Magpie			X		X	X	
Rhipiduridae								
<i>Rhipidura albiscapa</i>	Grey Fantail			X				
<i>Rhipidura leucophrys</i>	Willie Wagtail			X	X	X	X	X
Corvidae								
<i>Corvus bennetti</i>	Little Crow			X	X	X	X	
<i>Corvus orru</i>	Torresian Crow			X	X	X	X	X
Monarchidae								
<i>Grallina cyanoleuca</i>	Magpie-lark			X	X	X	X	X
Petroicidae								
<i>Petroica goodenovii</i>	Red-capped Robin			X	X	X		
<i>Melanodryas cucullata</i>	Hooded Robin			X			X	X
Alaudidae								
<i>Mirafra javanica</i>	Horsfield's Bushlark			X	X	X	X	X
Megaluridae								
<i>Cincloramphus mathewsi</i>	Rufous Songlark			X		X	X	
<i>Cincloramphus cruralis</i>	Brown Songlark			X		X	X	
<i>Eremiornis carteri</i>	Spinifexbird			X			X	X
Acrocephalidae								
<i>Acrocephalus australis</i>	Australian Reed Warbler			X			X	
Hirundinidae								
<i>Cheramoeca leucosterna</i>	White-backed Swallow			X	X	X	X	
<i>Hirundo neoxena</i>	Welcome Swallow			X	X	X	X	

BIRDS		Status	DBCA Threatened Database	NatureMap (BA)	Corridor Records	Surrounding Surveys	Kingfisher Records	2020
<i>Hirundo rustica</i>	Barn Swallow	MIG	X	X				
<i>Petrochelidon nigricans</i>	Tree Martin			X	X	X	X	
<i>Petrochelidon ariel</i>	Fairy Martin			X	X	X	X	X
Nectariniidae								
<i>Dicaeum hirundinaceum</i>	Mistletoebird			X		X	X	X
Estrildidae								
<i>Taeniopygia guttata</i>	Zebra Finch			X	X	X	X	X
<i>Neochmia ruficauda</i>	Star Finch			X	X	X	X	
<i>Emblema pictum</i>	Painted Finch			X		X	X	X
<i>Heteromunia pectoralis</i>	Pictorella Mannikin			X			X	
Motacillidae								
<i>Anthus novaeseelandiae</i>	Australasian Pipit			X		X	X	X
TOTAL: 194		38	29	182	98	124	119	71

Table 2.4. Mammal species recorded or expected to occur in the survey area.

MAMMALS		Conservation Status	DBCA Threatened Database	NatureMap	Corridor Records	Surrounding Surveys	Kingfisher Records	2020
Tachyglossidae								
Echidna	<i>Tachyglossus aculeatus</i>			X		X	X	X
Dasyuridae								
Kultarr	<i>Antechinomys laniger</i>			X				
Northern Quoll	<i>Dasyurus hallucatus</i>	END	X	X		X	X	X
Brush-tailed Mulgara	<i>Dasyercus blythi</i>	P4	X	X		X	X	X
Little Red Kaluta	<i>Dasykaluta rosamondae</i>			X	X	X	X	X
Wongai Ningau	<i>Ningau ridei</i>			X		X		
Pilbara Ningau	<i>Ningau timealeyi</i>			X				
Planigale	<i>Planigale sp. 1</i>			X				
Planigale	<i>Planigale sp. 2</i>			X				
Rory's Pseudantechinus	<i>Pseudantechinus roryi</i>			X	X			
Woolley's Pseudantechinus	<i>Pseudantechinus woolleyae</i>			X		X		
Long-tailed Dunnart	<i>Sminthopsis longicaudata</i>	P4						
Stripe-faced Dunnart	<i>Sminthopsis macroura</i>			X		X		
Lesser Hairy-footed Dunnart	<i>Sminthopsis youngsoni</i>			X	X	X		X
Notoryctidae								
Northern Marsupial Mole	<i>Notoryctes caurinus</i>	P4	X	X		X	X	
Thylacomyidae								
Greater Bilby	<i>Macrotis lagotis</i>	VUL	X	X	X	X	X	X
Phalangeridae								
Brush-tail Possum	<i>Trichosurus vulpecula</i>	L			X	X	X	
Macropodidae								
Spectacled Hare-Wallaby	<i>Lagorchestes conspicillatus</i>	P3	X	X		X		X
Red Kangaroo	<i>Macropus rufus</i>			X	X	X	X	X
Euro	<i>Osphranter robustus</i>			X	X	X	X	X
Rothschild's Rock-Wallaby	<i>Petrogale rothschildi</i>			X		X	X	
Pteropodidae								
Little Red Flying-fox	<i>Pteropus scapulatus</i>			X				
Black Flying Fox	<i>Pteropus alecto</i>							
Megadermatidae								
Ghost Bat	<i>Macroderma gigas</i>	VUL	X	X		X	X	X
Hipposideridae								
Pilbara Leaf-nosed Bat	<i>Rhinonicteris aurantia</i>	VUL	X	X		X	X	
Emballonuridae								
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>			X		X		
Common Sheath-tail-bat	<i>Taphozous georgianus</i>			X		X	X	X
Vespertilionidae								
Gould's Wattled Bat	<i>Chalinolobus gouldii</i>			X		X		
Northern Long-eared Bat	<i>Nyctophilus arnhemensis</i>			X				
Northwestern Long-eared Bat	<i>Nyctophilus bifax</i>							
Lesser Long-eared Bat	<i>Nyctophilus geoffroyi</i>			X		X		
Inland Broad-nosed Bat	<i>Scotorepens greyii</i>			X		X		

MAMMALS		Conservation Status	DBCA Threatened Database	NatureMap	Corridor Records	Surrounding Surveys	Kingfisher Records	2020
Finlayson's Cave Bat	<i>Vespadelus finlaysoni</i>			X		X	X	
Molossidae								
Northern Freetail-bat	<i>Chaerephon jobensis</i>			X		X		
Beccari's Freetail-bat	<i>Mormopterus beccarii</i>							
Northern Coastal Free-tailed Bat	<i>Mormopterus cobourgianus</i>			X		X		
White-striped Freetail-bat	<i>Austronomus australis</i>					X	X	
Muridae								
Short-tailed Mouse	<i>Leggadina lakedownensis</i>	P4		X				
Spinifex Hopping-mouse	<i>Notomys alexis</i>			X		X		X
Western Pebble-mound	<i>Pseudomys chapmani</i>	P4	X	X		X	X	X
Delicate Mouse	<i>Pseudomys delicatulus</i>			X	X			
Desert Mouse	<i>Pseudomys desertor</i>			X		X		
Sandy Inland Mouse	<i>Pseudomys hermannsburgensis</i>			X	X	X		
Western Chestnut Mouse	<i>Pseudomys nanus</i>	L		X		X		
Common Rock-rat	<i>Zyzomys argurus</i>			X	X	X	X	
Introduced Mammals								
House Mouse	<i>Mus musculus</i>			X	X	X		
Black Rat	<i>Rattus rattus</i>			X				
Dog/Dingo	<i>Canis lupus</i>			X		X	X	X
Cat	<i>Felis catus</i>			X	X	X	X	X
European Red Fox	<i>Vulpes vulpes</i>			X				X
European Cattle	<i>Bos taurus</i>			X		X	X	X
Donkey	<i>Equus asinus</i>							
Horse	<i>Equus caballus</i>			X				X
Dromedary Camel	<i>Camelus dromedarius</i>					X	X	X
Rabbit	<i>Oryctolagus cuniculus</i>			X				X
Total Number of Species: 45 native; 10 Introduced		11	8	45	12	37	21	20

Appendix 3. Motion Camera Locations. Datum WGS 1984.

Name	Model	Latitude	Longitude	Date	Comments
cam 18657	Reconyx	-20.4278	118.5581	29/04/2020	Installed to sample potential Mulgara habitat
cam 18601a	Reconyx	-20.4281	118.5606	29/04/2020	Installed to sample potential Mulgara habitat
cam 3920	Reconyx	-20.4338	118.5867	29/04/2020	Installed to sample potential Mulgara habitat
cam 3991	Reconyx	-20.4396	118.6597	29/04/2020	Installed to sample potential Mulgara habitat
cam fb8	Bushnell	-20.3901	120.0576	03/05/2020	Inactive Bilby Burrow
cam1637	Bushnell	-20.3901	120.0575	03/05/2020	Inactive Bilby Burrow
fb5	Bushnell	-20.4531	120.3216	04/05/2020	Inactive Bilby Burrow
Bushnell	Bushnell	-20.4531	120.3215	04/05/2020	Inactive Bilby Burrow
fb1	Bushnell	-20.8785	121.113	08/05/2020	Installed to sample potential significant habitat
fd3	Bushnell	-21.1675	121.3688	09/05/2020	Active Bilby Burrow
fb3	Bushnell	-21.1678	121.369	09/05/2020	Active Bilby Burrow
fc4	Bushnell	-21.1678	121.369	09/05/2020	Active Bilby Burrow
fd4 cam	Bushnell	-21.2664	121.4654	09/05/2020	Installed to sample potential Mulgara habitat
fb10	Bushnell	-21.4191	121.6489	10/05/2020	Installed to sample potential Mulgara habitat
fc2	Bushnell	-21.4916	121.832	10/05/2020	Installed to sample potential Mulgara habitat
fa7	Bushnell	-21.4529	121.7272	10/05/2020	Installed to sample potential Mulgara habitat
fb2	Bushnell	-20.7267	120.9318	27/07/2020	Active Bilby Burrow
fd2	Bushnell	-20.7266	120.9318	27/07/2020	Active Bilby Burrow
fd2	Bushnell	-20.9937	121.2444	30/07/2020	Installed to sample potential significant habitat
cam 18642	Reconyx	-20.9935	121.2454	30/07/2020	Installed to sample potential significant habitat
fd4	Bushnell	-21.0112	121.2578	31/07/2020	Installed to sample potential Mulgara habitat
cam 18601b	Reconyx	-21.0039	121.2567	31/07/2020	Installed to sample potential significant habitat
Fc6	Bushnell	-20.3318	119.5582	30/05/2020	Inactive Bilby Burrow
Fc1	Bushnell	-20.3321	119.5568	30/05/2020	Inactive Bilby Burrow
Fa2	Bushnell	-21.5292	121.9105	23/06/2020	Inactive Bilby Burrow

Appendix 4. Details of Conservation Significant Fauna Recorded.

Table 1. Conservation significant fauna recorded along the pipeline. WGS 1984.

Name	Type	Latitude	Longitude	Date
Greater Bilby	Active burrow	-20.7267	120.9317	07/05/2020
	Active burrow	-21.1678	121.3689	09/05/2020
	Active burrow	-21.1674	121.3688	09/05/2020
	Active burrow	-20.4543	120.3237	17/05/2020
	Active burrow	-20.9701	121.2167	30/07/2020
	Active burrow	-20.3318	119.5582	30/05/2020
	Active burrow	-20.3321	119.5568	30/05/2020
	Active burrow	-20.3349	119.5321	31/05/2020
	Inactive burrow	-20.39013	120.05757	03/05/2020
	Inactive burrow	-20.390111	120.057434	03/05/2020
	Inactive burrow	-20.4530663	120.3215135	04/05/2020
	Inactive burrow	-20.4547554	120.3246685	04/05/2020
	Inactive burrow	-20.4526055	120.3204927	04/05/2020
	Inactive burrow	-20.4533461	120.3219723	04/05/2020
	Inactive burrow	-20.4525989	120.3204775	04/05/2020
	Inactive burrow	-20.444868	120.2640247	04/05/2020
	Inactive burrow	-20.4556572	120.3270612	04/05/2020
	Inactive burrow	-20.4539351	120.3232879	04/05/2020
	Inactive burrow	-20.4545105	120.3242416	04/05/2020
	Inactive burrow	-20.4537318	120.3226314	17/05/2020
	Inactive burrow	-20.4535591	120.3223192	17/05/2020
	Inactive burrow	-20.389896	120.057129	11/06/2020
	Inactive burrow	-20.334059	119.538116	11/06/2020
	Inactive burrow	-20.334932	119.532082	11/06/2020
	Inactive burrow	-20.335756	119.528206	11/06/2020
	Inactive burrow	-20.389874	120.05706	11/06/2020
	Inactive burrow	-20.389561	120.056526	11/06/2020
	Inactive burrow	-20.389479	120.056396	11/06/2020
	Inactive burrow	-20.389395	120.056236	11/06/2020
	Inactive burrow	-20.389353	120.056152	11/06/2020
	Inactive burrow	-20.388914	120.055351	11/06/2020
	Inactive burrow	-20.331825	119.558205	11/06/2020
	Inactive burrow	-20.332111	119.556854	11/06/2020
	Inactive burrow	-20.302681	119.277618	21/07/2020
	Inactive burrow	-20.302761	119.277344	21/07/2020
	Inactive burrow	-20.302818	119.27726	21/07/2020
	Inactive burrow	-20.7255144	120.9307361	28/07/2020
	Digging	-20.335848	119.527908	01/05/2020
	Digging	-20.33562	119.529265	01/05/2020
	Digging	-20.335562	119.52933	01/05/2020
	Digging	-20.335569	119.529614	01/05/2020
	Digging	-20.335066	119.532138	01/05/2020
	Digging	-20.335026	119.532517	01/05/2020
	Digging	-20.334667	119.533494	01/05/2020
	Digging	-20.334669	119.534152	01/05/2020
	Digging	-20.334579	119.534473	01/05/2020
	Digging	-20.334307	119.53607	01/05/2020
	Digging	-20.334162	119.540353	01/05/2020
	Digging	-20.332185	119.557064	01/05/2020
	Digging	-20.331974	119.557478	01/05/2020
Digging	-20.331771	119.558924	01/05/2020	
Digging	-20.33115	119.562617	01/05/2020	
Digging	-20.330664	119.568529	01/05/2020	
Digging	-20.330733	119.569461	01/05/2020	
Digging	-20.330798	119.570505	01/05/2020	
Digging	-20.330858	119.572039	01/05/2020	
Digging	-20.330929	119.572234	01/05/2020	
Digging	-20.33094	119.572626	01/05/2020	

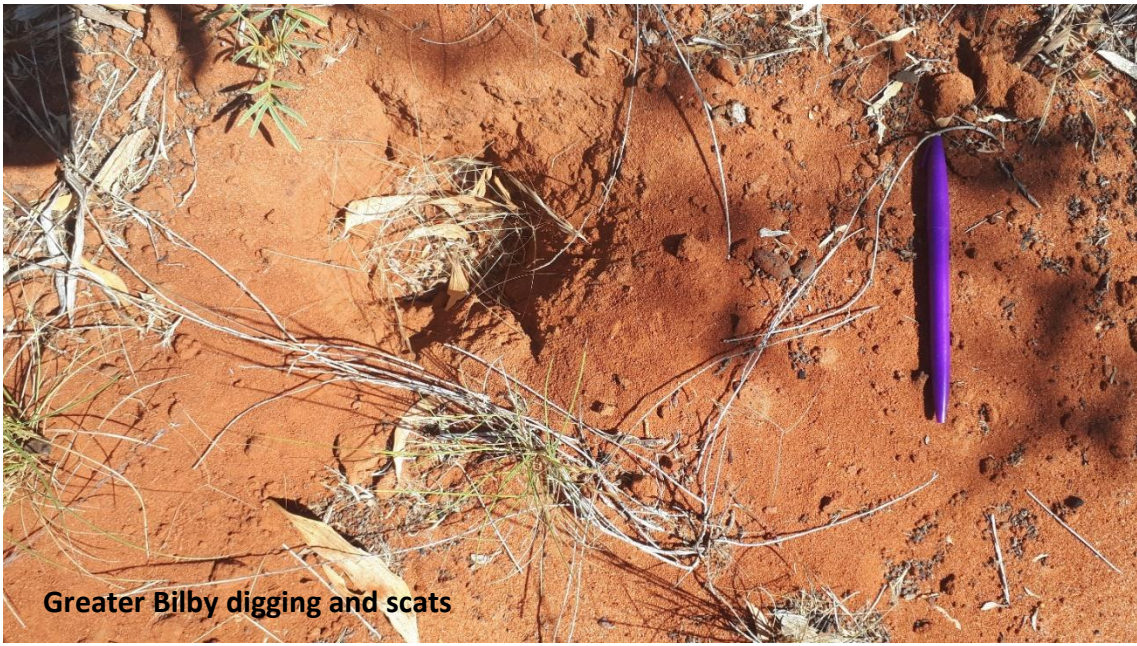
Name	Type	Latitude	Longitude	Date
	Digging	-20.337285	119.659854	01/05/2020
	Digging	-20.405471	120.104759	03/05/2020
	Digging	-20.405587	120.105393	03/05/2020
	Digging	-20.405889	120.106674	03/05/2020
	Digging	-20.4527309	120.3207233	04/05/2020
	Digging	-20.4539849	120.3234729	04/05/2020
	Digging	-20.5835721	120.678515	06/05/2020
	Digging	-20.5843437	120.6803666	06/05/2020
	Digging	-20.727024	120.9319732	07/05/2020
	Digging	-20.726757	120.9314776	07/05/2020
	Digging	-20.7266165	120.9311339	07/05/2020
	Digging	-20.7263093	120.9307474	07/05/2020
	Digging	-20.7271868	120.9322225	07/05/2020
	Digging	-20.7355225	120.9468844	07/05/2020
	Digging	-21.1672331	121.3686426	09/05/2020
	Digging	-21.1675862	121.3688275	09/05/2020
	Digging	-21.1672751	121.368412	09/05/2020
	Digging	-21.1678615	121.3689901	09/05/2020
	Digging	-21.1679714	121.3689542	09/05/2020
	Digging	-21.1683395	121.3691004	09/05/2020
	Digging	-21.1687272	121.3692137	09/05/2020
	Digging	-21.1687899	121.3692525	09/05/2020
	Digging	-21.1690254	121.3693231	09/05/2020
	Digging	-21.1697221	121.3697199	09/05/2020
	Digging	-21.1707827	121.3700232	09/05/2020
	Digging	-21.1709833	121.3701221	09/05/2020
	Digging	-21.1712862	121.3702459	09/05/2020
	Digging	-21.1714002	121.3702687	09/05/2020
	Digging	-21.1716759	121.370387	09/05/2020
	Digging	-21.1721745	121.3705645	09/05/2020
	Digging	-21.3389171	121.5580069	09/05/2020
	Digging	-21.3387403	121.558457	09/05/2020
	Digging	-21.5185698	121.8455767	11/05/2020
	Digging	-21.518682	121.8454735	11/05/2020
	Digging	-21.5206056	121.8444745	11/05/2020
	Digging	-21.5213642	121.8441779	11/05/2020
	Digging	-21.5776606	121.8005089	11/05/2020
	Digging	-20.4448181	120.2624642	16/05/2020
	Digging	-20.4541221	120.3237023	17/05/2020
	Digging	-20.4541022	120.3237592	17/05/2020
	Digging	-20.454426	120.3241464	17/05/2020
	Digging	-20.4546551	120.3243694	17/05/2020
	Digging	-20.4540884	120.323565	17/05/2020
	Digging	-20.4541014	120.3232965	17/05/2020
	Digging	-20.4541206	120.3235443	17/05/2020
	Digging	-20.4540558	120.3235569	17/05/2020
	Digging	-20.454147	120.3237383	17/05/2020
	Digging	-20.4543641	120.3240555	17/05/2020
	Digging	-20.454878	120.3250658	17/05/2020
	Digging	-20.333416	119.606491	11/06/2020
	Digging	-20.333239	119.551155	11/06/2020
	Digging	-20.332256	119.557114	11/06/2020
	Digging	-20.332207	119.556625	11/06/2020
	Digging	-20.334288	119.542564	11/06/2020
	Digging	-20.334225	119.537666	11/06/2020
	Digging	-20.334944	119.532066	11/06/2020
	Digging	-20.3361	119.527328	11/06/2020
	Digging	-20.335833	119.528252	11/06/2020
	Digging	-20.335632	119.529228	11/06/2020
	Digging	-20.335611	119.529541	11/06/2020
	Digging	-20.332979	119.600311	11/06/2020

Name	Type	Latitude	Longitude	Date
	Digging	-20.335264	119.531151	11/06/2020
	Digging	-20.334961	119.5326	11/06/2020
	Digging	-20.334637	119.534149	11/06/2020
	Digging	-20.334566	119.534523	11/06/2020
	Digging	-20.335073	119.531593	11/06/2020
	Digging	-20.330971	119.572624	11/06/2020
	Digging	-20.330942	119.572197	11/06/2020
	Digging	-20.330889	119.571503	11/06/2020
	Digging	-20.330811	119.571289	11/06/2020
	Digging	-20.330793	119.570473	11/06/2020
	Digging	-20.330751	119.569725	11/06/2020
	Digging	-20.330696	119.56852	11/06/2020
	Digging	-21.2055377	121.4072969	26/07/2020
	Digging	-20.6973026	120.8864841	28/07/2020
	Digging	-20.7236033	120.9267619	28/07/2020
	Digging	-20.7243384	120.9286248	28/07/2020
	Digging	-20.7262781	120.9310829	28/07/2020
	Digging	-20.7318602	120.9394878	28/07/2020
	Digging	-20.7307488	120.937482	28/07/2020
	Digging	-20.7298029	120.9361806	28/07/2020
	Digging	-20.7293849	120.9355152	28/07/2020
	Digging	-20.7285221	120.9348876	28/07/2020
	Digging	-20.7285281	120.9353838	28/07/2020
	Digging	-20.7290285	120.9357639	28/07/2020
	Digging	-20.7303487	120.9380836	28/07/2020
	Digging	-21.128279	121.25998	01/08/2020
	Digging	-21.132724	121.260037	01/08/2020
	Scat	-20.3322	119.5571	01/05/2020
	Scat	-20.727	120.932	07/05/2020
	Scat	-20.4544	120.3241	17/05/2020
	Tracks	-20.336516	119.525215	01/05/2020
	Tracks	-20.33476	119.533704	01/05/2020
	Tracks	-20.334669	119.534152	01/05/2020
	Tracks	-20.334288	119.535715	01/05/2020
	Tracks	-20.33413	119.538129	01/05/2020
	Tracks	-20.334114	119.542035	01/05/2020
	Tracks	-20.331804	119.55808	01/05/2020
	Tracks	-20.33146	119.560701	01/05/2020
	Tracks	-20.330618	119.56835	01/05/2020
	Tracks	-20.5806764	120.6715586	06/05/2020
	Tracks	-20.7269013	120.9317608	07/05/2020
	Tracks	-20.7268838	120.9317322	07/05/2020
	Tracks	-20.7266165	120.9311339	07/05/2020
	Tracks	-21.1674854	121.3686707	09/05/2020
	Tracks	-21.1676365	121.3688886	09/05/2020
	Tracks	-21.1684257	121.3691447	09/05/2020
	Tracks	-21.1705709	121.3698839	09/05/2020
	Tracks	-20.4541967	120.3240881	17/05/2020
	Tracks	-20.4540398	120.323812	17/05/2020
	Tracks	-20.4542387	120.3240634	17/05/2020
	Tracks	-20.4544041	120.3240145	17/05/2020
	Tracks	-20.330853	119.566406	11/06/2020
	Tracks	-20.330853	119.566406	11/06/2020
	Tracks	-20.330748	119.566696	11/06/2020
	Tracks	-20.330748	119.566696	11/06/2020
	Tracks	-20.330896	119.564842	11/06/2020
	Tracks	-20.330896	119.564842	11/06/2020
	Tracks	-20.334249	119.535759	11/06/2020
	Tracks	-20.334249	119.535759	11/06/2020
	Tracks	-21.622599	122.045311	21/07/2020
	Tracks	-21.623909	122.04705	21/07/2020

Name	Type	Latitude	Longitude	Date
	Tracks	-21.631186	122.055908	21/07/2020
	Tracks	-21.666988	122.108299	21/07/2020
	Tracks	-21.1678914	121.368905	27/07/2020
Brush-tailed Mulgara	Burrow	-20.383	119.9529	03/05/2020
	Burrow	-20.3965	118.9507	20/07/2020
	Burrow	-20.4419	118.6334	22/07/2020
	Burrow	-20.9727	121.2195	30/07/2020
	Burrow	-21.0393	121.2817	31/07/2020
	Burrow	-21.0518	121.2926	31/07/2020
	Digging	-21.4332	121.6814	10/05/2020
	Digging	-20.3992	118.9399	20/07/2020
	Digging	-20.4014	118.9312	20/07/2020
	Scat	-20.4278	118.7287	29/04/2020
	Tracks	-20.403	118.9245	30/04/2020
	Tracks	-20.3514	119.7629	02/05/2020
	Tracks	-20.3823	119.9254	02/05/2020
	Tracks	-20.4168	120.145	04/05/2020
	Tracks	-20.4154	120.1383	11/06/2020
	Tracks	-20.44	118.6145	24/07/2020
Ghost Bat	Scat	-20.4543	118.8369	21/07/2020
	Sighting	-20.5544	120.6035	11/06/2020
	Sighting (x4)	-20.4543	118.8369	21/07/2020
Northern Quoll	Scat	-20.4543	118.8369	21/07/2020
	Tracks	-20.423	120.1653	04/05/2020
	Tracks	-20.4232	120.1664	04/05/2020
	Tracks	-20.4897	120.4423	11/06/2020
	Tracks	-20.4958	120.4647	11/06/2020
	Tracks	-20.4961	120.466	11/06/2020
Western Pebble-mound Mouse	Mound	-21.0074	121.2436	31/07/2020
	Mound	-21.1777	121.4712	01/08/2020
	Mound	-21.1816	121.4773	01/08/2020
	Mound	-20.8522	121.0908	04/08/2020
	Mound	-20.8527	121.0903	04/08/2020
Spectacled hare-wallaby	Tracks	-20.8786	121.1129	08/05/2020
	Tracks	-21.0062	121.2537	31/07/2020
	Tracks	-20.9941	121.2432	30/07/2020

Appendix 5. Photographs of Greater Bilby tracks, diggings and burrows.

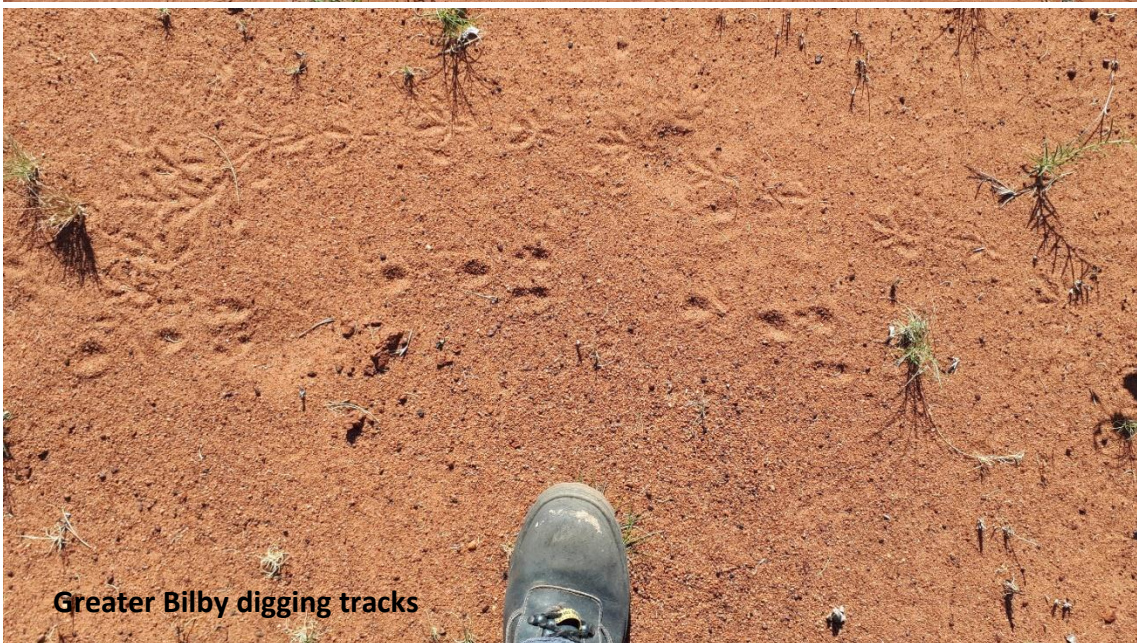




Greater Bilby digging and scats



Greater Bilby digging and tracks



Greater Bilby digging tracks



Greater Bilby active burrow



Greater Bilby diggings



Greater Bilby inactive burrow monitored by camera



Greater Bilby: inactive burrow



Greater Bilby: active burrow

Greater Bilby: active burrow monitored by camera



Greater Bilby: active burrow monitored by camera





Greater Bilby digging and scats



Greater Bilby tracks