EcOz Environmental Services

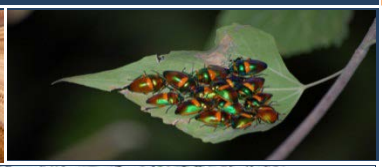
Appendix H1
Fauna Report

Sherwin Iron (NT) Pty Ltd

Sherwin Creek Iron Ore Project

Environmental Impact Statement





2013

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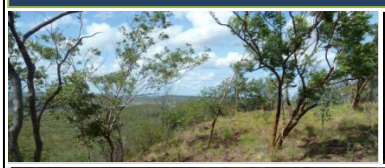
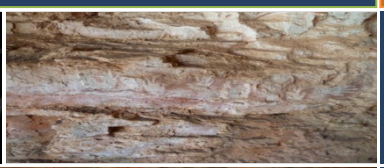
Fauna of the Sherwin Iron Leases

Prepared for: Sherwin Iron (NT) Pty Ltd

Prepared by: EcOz Environmental Services





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Document Control Record

Document Code:	EZ13503-C0302-EST-Ms-0037
Catalogue Number:	35643
Project Manager:	Justine Shailes
Author(s):	Dane Trembath, Will Riddell & Chris Brady
Approved by:	
	Jeff Richardson
Approval date:	8th November 2013

DOCUMENT HISTORY

Version	Issue Date	Brief Description	Reviewer/Approver
1.A - C	06 July 2013	Report preparation by authors	Authors
1.D	18 Sep 2013	EcOz review	C. Brady
1.E	8 Nov 2013	Final	Jeff Richardson

Recipients are responsible for eliminating all superseded documents in their possession.

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Executive Summary

Sherwin Iron (NT) Pty Ltd (Sherwin) plan to commence Direct Shipping Ore (DSO) operations within the Sherwin Creek area located in the Northern Territory, 570 km south-east of Darwin by road and 150 km east of Mataranka by road. This project will involve the construction of open pits in conjunction with associated infrastructure; including accommodation, ancillary facilities, stock-pile and waste areas deemed necessary to support the project.

This report describes the fauna of the project area (Deposit C) from desktop and field survey. Species of conservation significance, those protected by Commonwealth (*Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*) and/or Northern Territory legislation (*Territory Parks and Wildlife Conservation Act (NT) (TPWC Act)*) are highlighted and discussed.

To identify fauna species present or likely to occur at the project area, a desktop review was conducted and field surveys undertaken. A desktop review of the Land Resource Management (NT) database revealed that approximately 503 native terrestrial vertebrate species occur within the Gulf Fall Uplands bioregion. This review also indicated that 25 vertebrate species listed as threatened either under the *EPBC Act* and/or the *TPWC Act* could exist at the proposed site.

The field surveys undertaken for Sherwin at Deposit C recorded a total of 101 native terrestrial vertebrate species, comprising of 60 birds, 18 reptiles, 4 amphibians and 19 mammals. Two introduced mammals and one introduced amphibian were also recorded; but no threatened species.

To give the Deposit C survey regional context field survey work was undertaken in the area surrounding Deposit C. Those field surveys recorded a total of 200 native terrestrial vertebrate species, comprising of 117 birds, 44 reptiles, 14 amphibians and 25 mammals. Five feral mammals and one introduced amphibian, the Cane Toad (*Rhinella marina*) were also recorded. Two threatened species and two species listed as migratory in international agreements were recorded during the surveys from the broader area:

- Grey Falcon (*Falco hypoleucos*) (Vulnerable – *TPWC Act*)
- Mertens' Water Monitor (*Varanus mertensi*) (Vulnerable – *TPWC Act*)
- Buff-sided Robin (*Poecilodryas cerviniventris*) listed under the *EPBC Act* as *Poecilodryas superciliosa cerviniventris* as a migratory species. This species is also classed as Near-Threatened in the Northern Territory. Its habitat includes mangroves, riparian thickets and gorges across the top end.
- Rainbow Bee-eater (*Merops ornatus*) listed under the EPBC Act as a migratory species is a wide ranging common species.

Following an assessment of the ecology and distribution of threatened species that are known to, or may, occur within Deposit C, no threatened species are considered to be potentially significantly impacted by the development.

Two species considered migratory in international agreements were found at Deposit C:

- Buff-sided Robin (*Poecilodryas cerviniventris*) listed under the *EPBC Act* as *Poecilodryas superciliosa cerviniventris*. This species is also classed as Near-Threatened in the Northern Territory
- Rainbow Bee-eater (*Merops ornatus*) a wide ranging common species.

It is concluded that the Rainbow Bee-eater as a common species will not be deleteriously affected by this development. In contrast the Buff-sided Robin will lose some of its gorge habitat but this is not considered a significant impact as there are other gorges nearby as well as riparian vegetation along the Roper River.

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Acknowledgements

We hereby thank the Traditional Owners who accompanied us on surveys of their country. Additionally the staff of Sherwin Iron provided much help with planning and also the provision of information required to accomplish these surveys.

1 Introduction

Sherwin Iron (NT) Pty Ltd (Sherwin) plans to commence Direct Shipping Ore (DSO) operations within the Sherwin Creek area. This project will involve the construction of open pits in conjunction with associated infrastructure including accommodation, ancillary facilities, stock-pile and waste areas deemed necessary to support the project. The proposed site is located in the Northern Territory 570 km south-east of Darwin by road and 150 km east of Mataranka by road. The Roper Highway connects the project's deposits with the Stuart Highway. Land use in the project area includes pastoral, conservation, tourism, Aboriginal freehold and leasehold, fishing and horticulture. Currently, mining makes up a very small percentage of land use in the region.

EcOz Environmental Services was contracted by Sherwin to undertake fauna surveys in the Sherwin Creek and Hodgson Downs ore deposit areas. The aim of these surveys was to provide a baseline biodiversity assessment of the deposit areas as well as determine the presence of threatened species to be included as part of the Environmental Impact Statement (EIS) process.

1.1 Focus area

The focus area of the Environmental Impact Statement (EIS) that this report supports is Deposit C within MLA29584. Sherwin intends to undertake mining activities at this deposit in 2014. Ecological assessments undertaken in the surrounding areas, including fauna surveys of mineral Deposits X and W, are discussed in this report to provide a regional perspective.

1.2 Scope

The objectives for the terrestrial biodiversity assessment were to:

- Describe and characterise the existing fauna biodiversity within and around the development
- Identify the location, frequency and nature of threatened animals within and nearby the project area
- Scope the potential environmental impacts from the development on fauna to assess the level of risk to these species.

This report aims to provide detailed baseline information underpinning management decisions. It consolidates all matters of conservation significance identified from desktop research and field investigations, with particular consideration for priority species which may require management actions beyond the general minimal impact standards. It does not recommend specific mitigation measures; these are addressed in Chapter 3 Risk Assessment within the EIS.

2 Existing Environment

2.1 Climate

The Roper River region experiences two distinct seasons, an almost rainless dry season from May to September and a wet season from November to March (Figure 1). The closest weather station to the project area is Flying Fox (station number 014646). Rainfall is concentrated during the wet season, the wettest months are January and February with an average of 234.1 mm and 269.5 mm rain respectively. Temperatures range from an average maximum temperature of 38.6 degrees Celsius (°C) in November to average maximum temperature of 27.8°C in August. July is the coolest month with an average minimum temperature of 12.4°C.

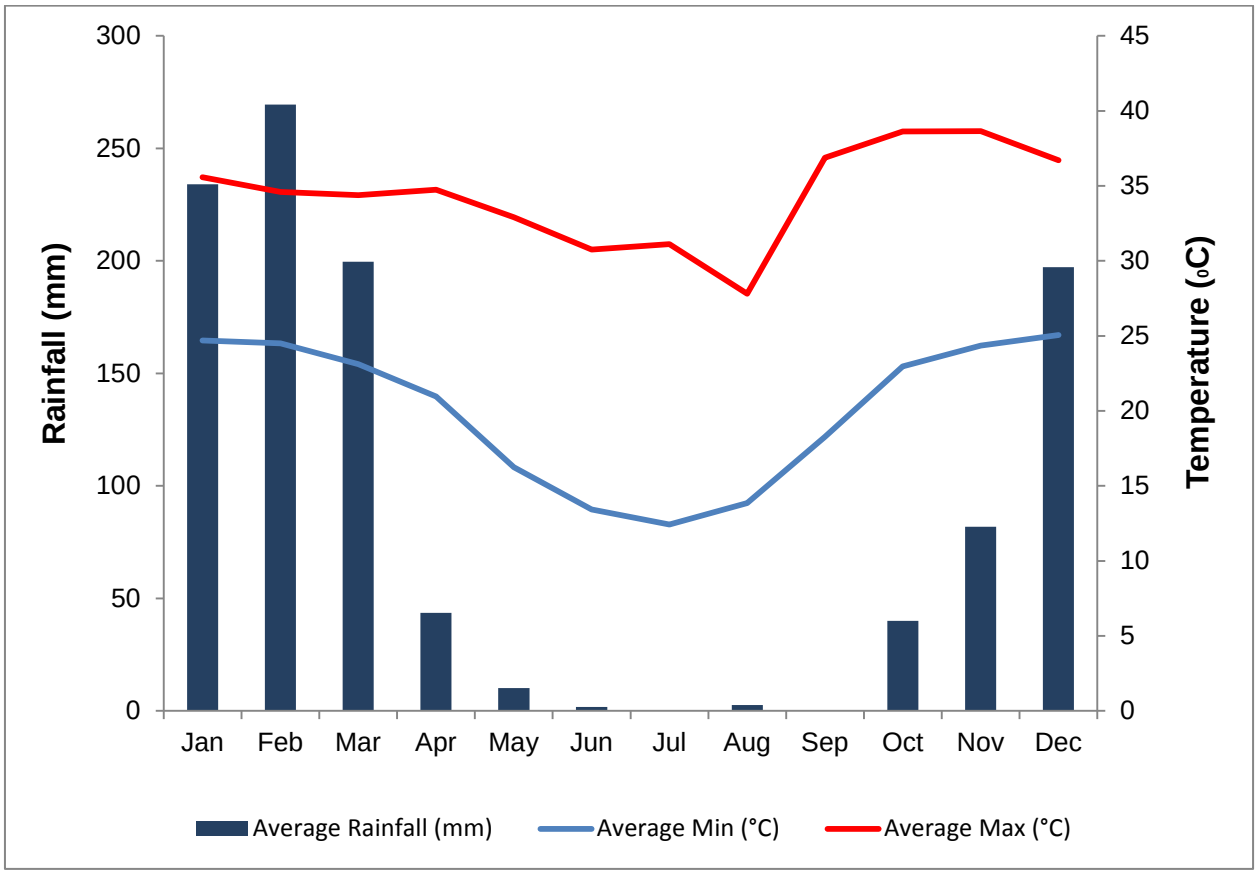

Figure 1. Rainfall and temperature from Flying Fox Weather Station (1996 – 2013)

2.2 Bioregion

The Interim Biogeographic Regionalisation for Australia (IBRA) divides Australia into units of broadly similar landform, geology and biodiversity (Baker et al. 2005). The project falls within the Gulf Fall and Uplands Bioregion (Figure 2).

The Gulf Falls and Uplands bioregion comprises undulating terrain with scattered low, steep rocky hills. The most extensive vegetation is woodland dominated by *Eucalyptus* and *Corymbia* species with spinifex understory, and woodland dominated by *Eucalyptus* species with tussock grass understory. Important rivers within this bioregion include the Roper and McArthur Rivers. The rocky sandstone ranges of this bioregion have some significant refugial values, and include some endemic or near-endemic species.

The major industries of the bioregion are cattle grazing and mining. Other land uses include Aboriginal land and conservation reserves. The major population centres are Borroloola and Ngukurr (Department of the Environment, Water, Heritage and the Arts 2008).

2.3 Vegetation

Broad scale vegetation assessments have been carried out by Wilson et al. (1990) and incorporated into the National Vegetation Information System (2005), a collaborative initiative between the Australian and state and territory governments to manage national vegetation data to help improve vegetation planning and management within Australia.

Deposit C consists of Eucalyptus low woodland (Figure 3). This vegetation community contains *Eucalyptus phoenicea*, *Corymbia ferruginea* and *Corymbia dichromophloia* in the upper-storey; *Erythrophleum chlorostachys*, *Calytrix exstipulata* and *Terminalia canescens* in the mid-storey, and *Triodia bitextura*, *Eriachne obtusa* and *Sorghum stipoideum* in the ground layer.

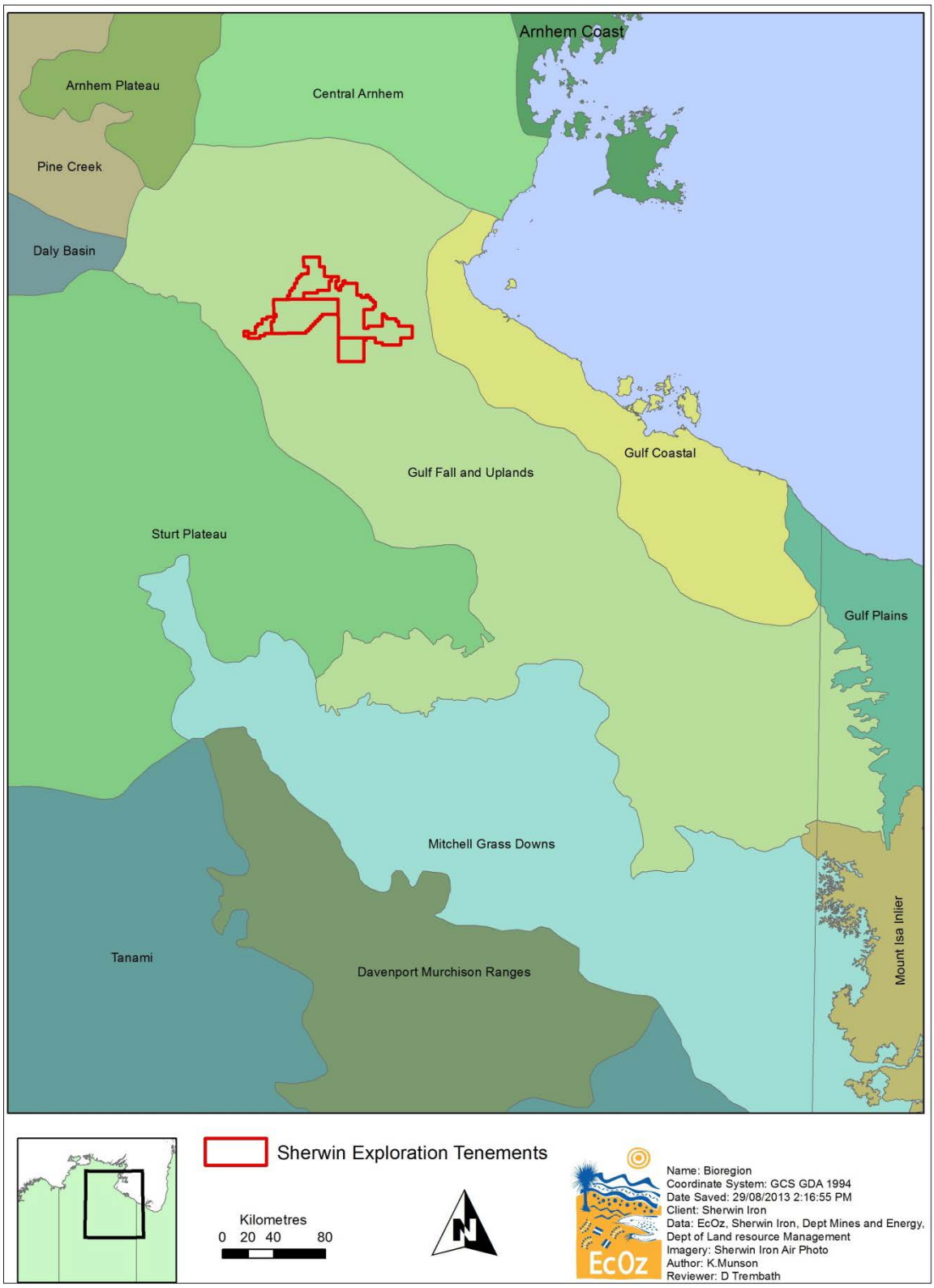

Figure 2. Map of bioregions surrounding the Sherwin exploration tenements

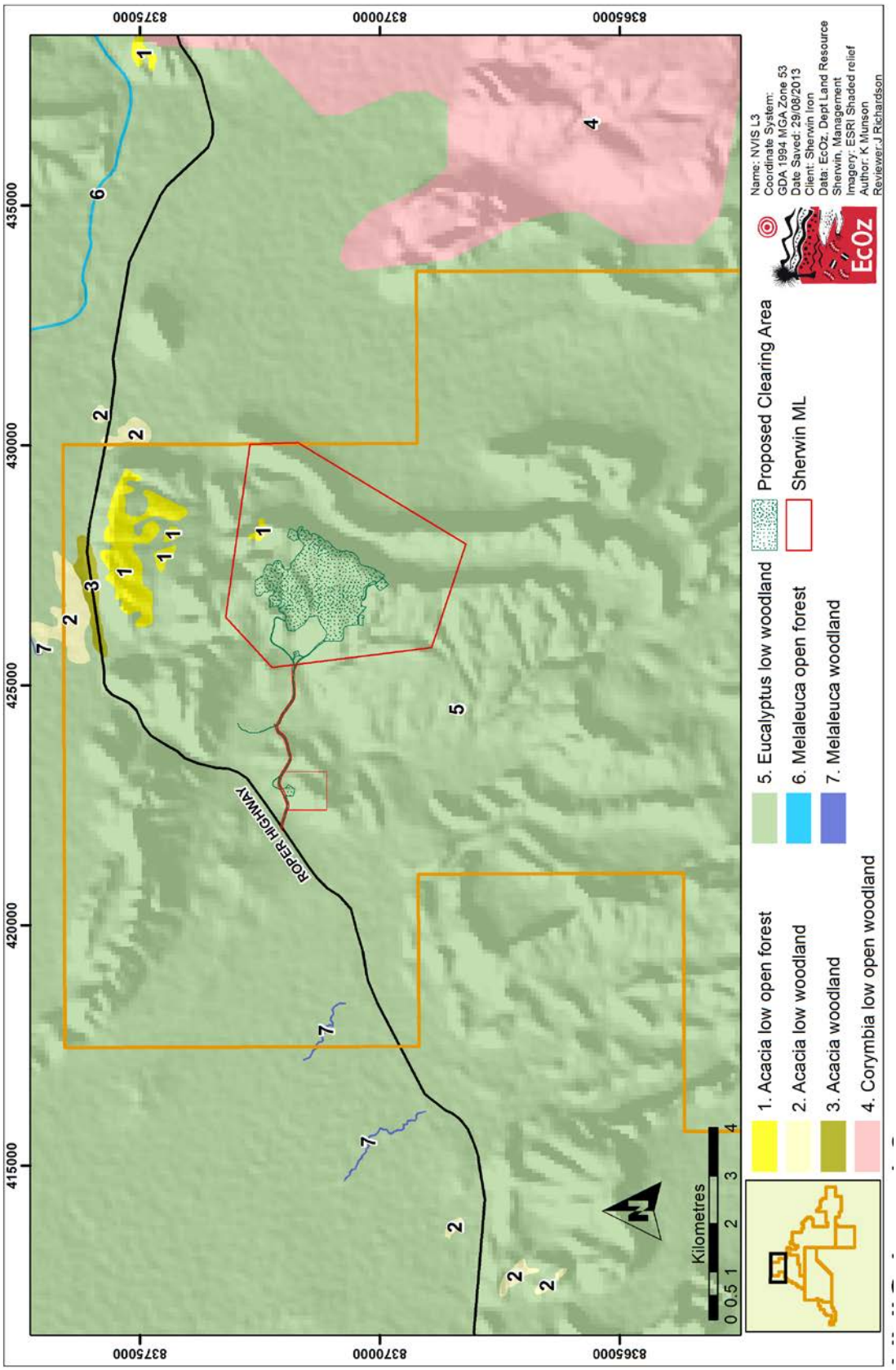

Figure 3. Map of vegetation communities at Deposit C and surrounds

2.4 Hydrology

The project area is located within the Roper River catchment, which is characterised by a number of large perennial waterways, including the Roper, Hodgson and Wilton Rivers. The project area (see Figure 4) is the top of a mesa with small creeks and gullies giving ephemeral drainage (small creeks and gullies).

Sherwin Creek is an intermittent stream that ceases to flow in the early to mid-dry season. At this time it becomes a series of disconnected pools, with many or all of these becoming dry over the dry season. The largest pool located on Sherwin Creek is about 1.5 km to the west of Deposit C. This pool is likely to retain water throughout the dry season in at least some years (Figure 4). The next closest late dry season/permanent water to Deposit C is the Roper River (approximately 10 km).

Flooding during the wet season is extensive in low-lying areas, with access by road currently restricted between January and mid-March.

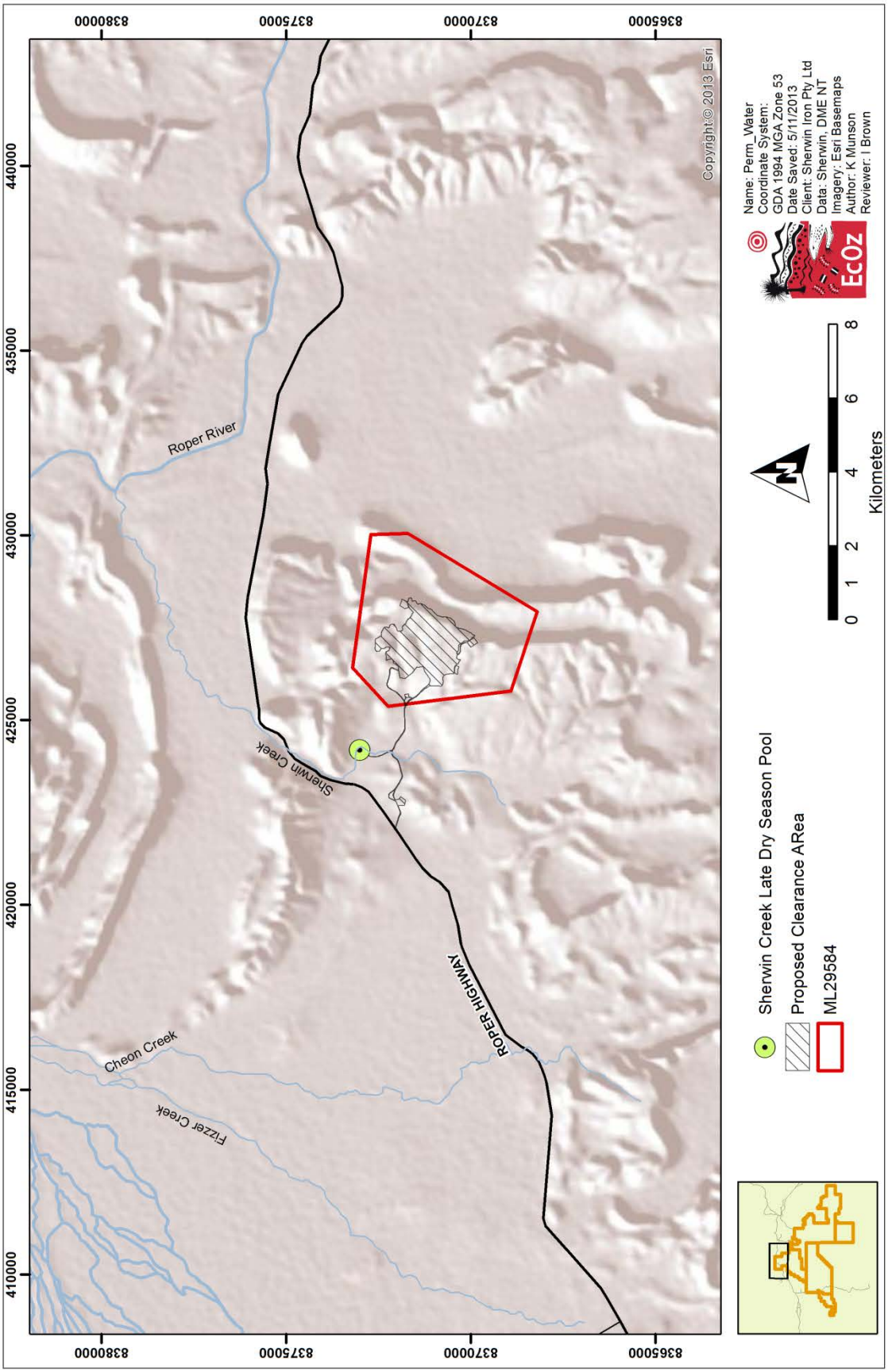

Figure 4. Map of ML29584 showing the closest late dry season pool and the Roper River

3 Methodology

The International Union for the Conservation of Nature (IUCN) nominates a set of criteria used to identify species at risk of extinction used to define categories of risk (Figure 5). These criteria and categories are used by both the NT Government to identify threatened species and habitat, and the Commonwealth Government to identify national threatened species. These species are then listed under the *Territory Parks and Wildlife Conservation (TPWC) Act* and/or the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* respectively, to afford them legislated protection.

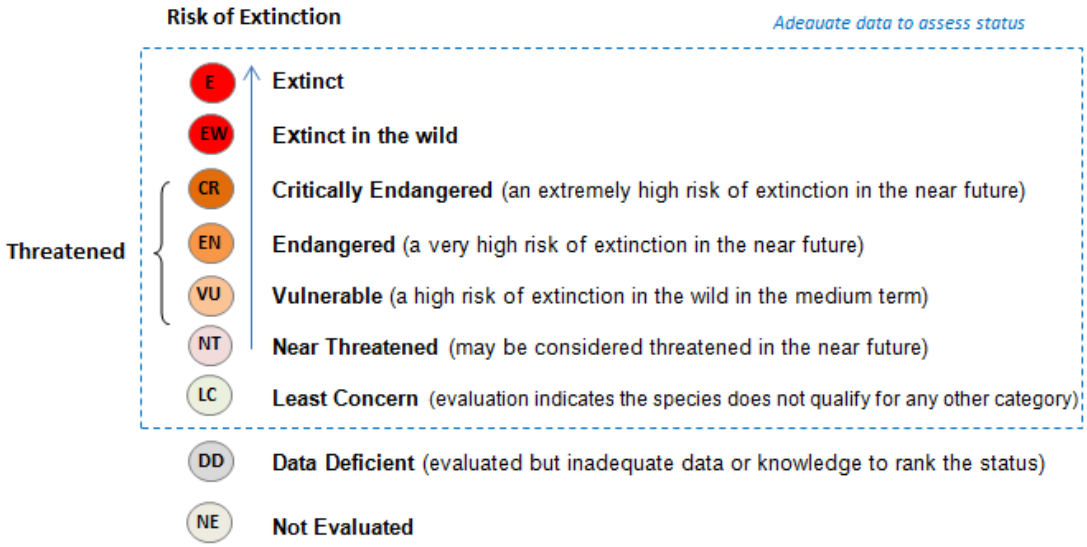

Figure 5. The IUCN Red List categories of risk for threatened species
(Source: http://www.eoearth.org/article/IUCN_Red_List_Categories_and_Criteria)

3.1 Desktop review

Prior to designing and conducting an on-ground survey, the ecological context for the project area was established by collating information from previous studies and existing datasets. This included broad-scale reviews of climate data, geomorphology, land system and vegetation mapping, the existing fauna records and known distributions and preferred habitats of fauna species.

A list of fauna which have been recorded or predicted to occur within the project area was compiled from the following sources:

- Northern Territory Fauna Atlas (Department of Land Resource Management) (DLRM)
- EPBC Act Protected Matters Search Tool (http://www.environment.gov.au/epbc/pmst/index.html)
- Biological Survey of the proposed Limmen Gate National Park (Griffiths et al. 1997).
- Terrestrial Fauna Survey of Western Desert Resources (EcOz 2012).

3.2 Terrestrial fauna survey

All surveys were undertaken under NT Parks and Wildlife permit number 43782.

Field surveys were undertaken by EcOz Environmental Services during 2011 and 2012. Surveys were undertaken in the following locations (Figure 6):

- Deposit C (see also Figure 7)
- Deposit W
- Deposit X
- Blackwater Creek
- Hodgson River
- LD Creek
- Little Towns River
- Mountain Creek

A total of 62 sites were surveyed across the eight locations listed above (Table 1).

3.2.1 Survey timing and effort

Deposit C, Deposit W, Blackwater Creek, Little Towns River, Mountain Creek and Hodgson River were surveyed during May-August 2011. Deposit X and LD Creek were surveyed during May 2012 (Table 1).

Table 1. Survey timing and effort

Survey location	Number of sites surveyed	Date
Deposit C (east)	4	July 2011
Deposit C (west)	6	May 2012
Deposit C (Short range endemics survey)	6	July 2013
Deposit W	12	June 2011
Deposit X	6	May 2012
Blackwater Creek	7	June 2011
Hodgson River	6	May-June 2011
LD Creek	7	May 2012
Little Towns River	3	June 2011
Mountain Creek	3	May 2011

3.2.2 Site selection

Existing land system mapping together with preliminary vegetation mapping from aerial imagery assisted with the pre-selection of survey sites. Sites were selected to assess a range of habitat types. A general description of each site is provided in Appendix 1.

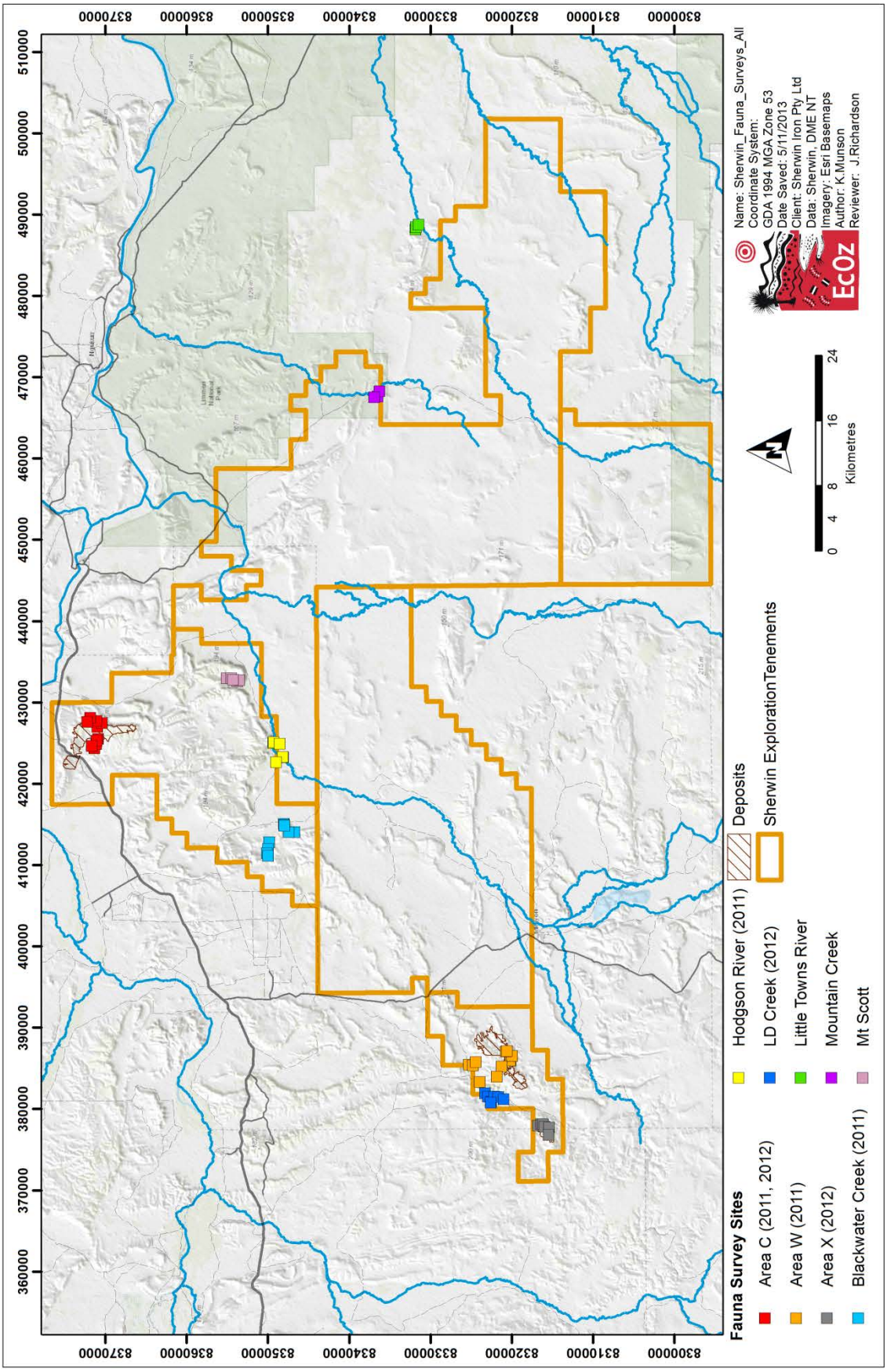

Figure 6. Map of fauna survey sites of the Sherwin leases

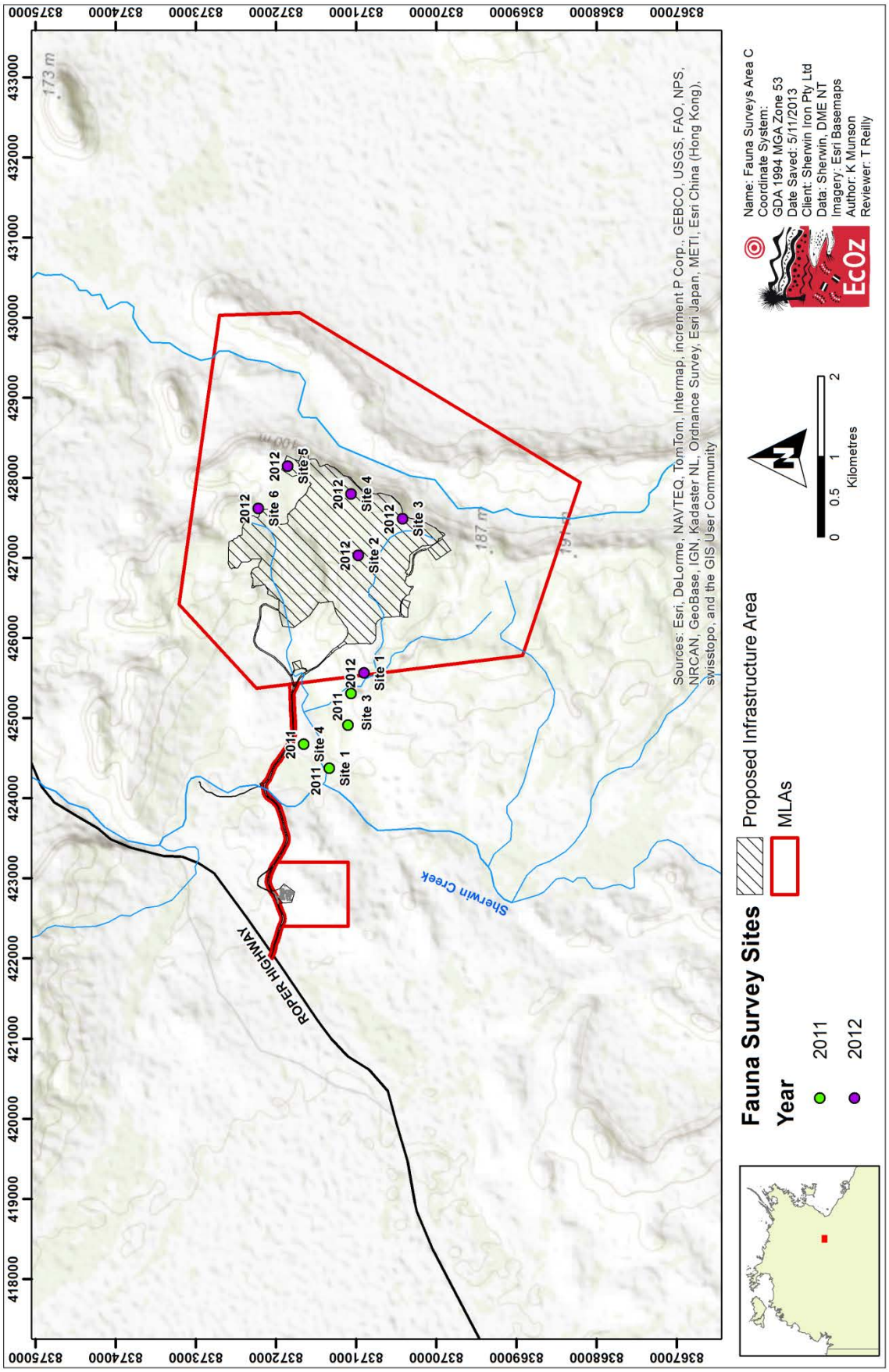

Figure 7. Map of fauna survey sites of Deposit C

3.2.3 Survey design

Site layout

The methods for fauna survey (including habitat descriptions) followed the Northern Territory Survey Methods for Flora and Fauna Surveys Used for Standard Biodiversity Unit Survey Sites (an unpublished report of NRETAS [2008]). This involves a three night trapping and searching program within a 50 x 50m quadrat (or similar are in transect formation). This methodology is a standard approach for fauna surveys in the northern bioregions of the Northern Territory.

The layout of traps at each survey quadrat is based on the standard and accepted NT fauna survey guidelines which involves a 50m x 50m quadrat (or equivalent) comprising:

- Twenty Elliott traps around the perimeter – five on each side approximately 8m apart
- Four cage traps, one in each corner
- Four pitfall traps, with 10m of drift fence
- Eight funnel traps, set along pitfall drift fences.

Pitfall traps were 20L white plastic buckets which were dug to ground level and set with 10m of drift-fence. Where possible, the pits were located across different microhabitats within the quadrat. Funnel traps were set on the end of the drift fence. Silver reflective thermafoil (roof insulation) were set over pits and funnel traps to protect animals from dehydration and predation from raptors. The pits and funnels were opened for the duration of the survey (three nights and three days) and were checked early each morning and mid-afternoon.

The Elliott and cage traps were baited each afternoon, opened overnight and closed for the duration of the day. Trapping occurred for a three night period, the bait was a mixture of quick oats, peanut butter, and sardines in oil. Bait was removed from traps during the day to reduce ant attraction to the trapping area.

All trapped animals were identified and released near the capture point. The purpose of this survey was to investigate species diversity rather than population size so the mark capture recapture method was not used.

Bird survey

Birds were surveyed within a 100x100m area with the trapping quadrat being central. Bird counts were carried out over 15 minutes using binoculars and call recognition during the early morning (6am – 9:30am), late afternoon (3:30pm – 5pm) and one night (after 7:30pm). Only birds within the quadrat were counted as using the survey site – birds merely flying across or overhead or situated nearby were recorded as incidental records. Raptors were included if they were hunting overhead.

Bird call broadcasting was undertaken (opportunistically) in suitable habitat for targeted threatened species such as Gouldian Finch (*Erythrura gouldiae*) and Masked Owl (*Tyto novaehollandiae*).

Bat survey

Bat species present were assessed by using an Anabat SD1 Bat Detector, which was set up to record data either overnight or the early part of the evening (for one night only) at a central location within the survey areas. Recorded bat calls were sent to a bat expert (Kyle Armstrong, Specialised Zoological) for analysis and identification.

Active searching

Survey sites were actively searched five times for reptiles, mammals, and their scats and signs, including three daytime searches (morning, midday, and late afternoon) and two nocturnal searches.

Active searches lasted for 20 minutes and involved:

- Turning rocks and logs, raking through leaf litter and grass, looking under bark, behind trees, in crevices, etc.
- Recording the number of individuals of each species
- Recording scats, bones and other signs where they could be confidently attributed to species.

Opportunistic observations made while travelling between quadrats were also recorded in an 'incidentals' list.

Short range endemic invertebrate (SRE) survey

At the present time the Department of Land Resource Management (formerly NRETAS) expects that environmental impact assessment will consider impacts on the conservation of SRE fauna (NRETAS 2011). The Department of Land Resource Management is conducting a systematic review of terrestrial fauna in the Northern Territory to identify species that may be considered SRE but a guidance statement has not yet been published (NRETAS 2011). As no list is available, the following groups specifically in the Northern Territory and based on Harvey (2002) have a high incidence of SRE:

- Arachnids
- Molluscs
- Freshwater crayfish.

As SRE's often belong to relictual fauna groups with origins from the mesic climates of the Miocene, extant SRE's are often associated with mesic environments (EPA 2009) such as:

- Rock piles
- Deep gorges
- Mesas
- Caves.

A short-range endemic (SRE) invertebrate survey was conducted within Deposit C on July 17-18 2013 and involved diurnal and nocturnal hand searching of 6 sites (Figure 8).

Habitat description

The habitat for each fauna survey site was described using a range of data (aligning to both NVIS and NRETAS Standards for Biodiversity Assessment).

Nomenclature

Nomenclature and classification of fauna species refers to the Classification of Wildlife of the NT – January 2011 (DLRM).

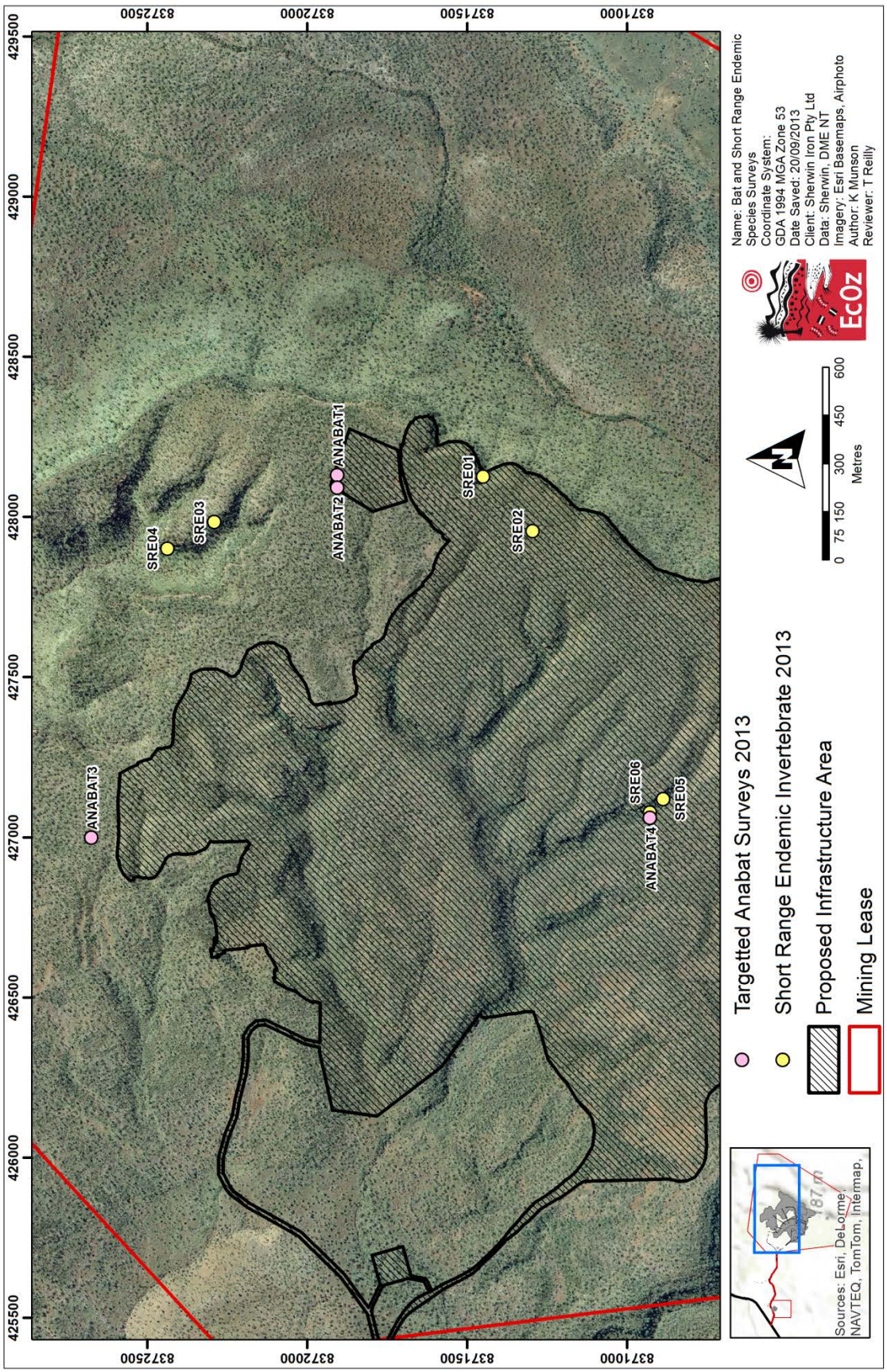

Figure 8. Map of SRE sites and targeted Anabat surveys of Deposit C

Data limitations

- The results of these surveys are only a snapshot in time, and do not allow for temporal variations or species migrations.
- Sampling, as against censussing, is logistically necessary due to limited human resources and time constraints.
- Scats cannot always be correctly attributed to species, however where they can be confidently identified, they provide an accurate indication of the presence and habitat preferences of certain species (Telfer et al. 2006).
- Detection of nocturnal species by spotlight potentially only detects about 25% of the animals present (e.g. Goldingay & Sharpe 2004), and is affected by environmental factors (Wayne et al. 2005).
- Environmental factors affect capture rates (Read & Moseby 2001). Planning logistics for fauna surveys such as this around specific environmental conditions is very difficult particularly with the compromise between access (during the dry season) and times when species are more active (e.g. during the build-up/wet season).
- Fauna and Flora Atlas records are biased toward previous NT Government survey sites and accessible sites often recognised for their unique biodiversity. Therefore, a lack of records at any particular site is more likely to indicate that the area has not been previously surveyed rather than indicate that various species are not present in the area.

3.3 Camera trap survey

Three motion-activated camera traps were set up at an isolated billabong along Sherwin Creek on September 18 2013. These camera traps were set up to observe whether Gouldian Finch (*Erythrura gouldiae*) occurred in the area. At the time that the traps were installed the billabong was the only surface water present in Sherwin Creek and were therefore likely to attract fauna that occurred within the area. The traps were located north-east of Deposit C. The trap site was visited on October 10 2013. By this time the billabong was dry, except for a small number of holes that had been dug by Agile Wallabies (*Macropus agilis*) where water was observed being sourced by various avifauna, including Double-barred Finch (*Taeniopygia bichenovii*). Two of the three camera traps were moved and set up to focus on one small waterhole. These traps were operational for a further three days before all camera traps were removed on October 13 2013.

4 Results

4.1 Desktop survey

4.1.1 Fauna

A desktop review of the Land Resource Management (NT) database revealed that approximately 503 native terrestrial vertebrate species occur within the Gulf Fall Uplands bioregion (Table 2).

Table 2. Number of species known to occur in the Gulf Fall Uplands bioregion

	Number of species
Amphibian	29
Reptile	142
Bird	272
Mammal	60
Total	**507**

4.1.2 Threatened fauna

Based on existing records (i.e. IBRA Bioregions and EPBC Protected Matters Search Tool) and a review of the biology of the Northern Territory and Commonwealth listed threatened species, approximately 25 threatened species could potentially occur within the boundaries of Deposit C (Table 3). These species are discussed in Section 5.1.

Table 3. Threatened species that may occur in the project area

Common Name	Scientific Name	EPBC Status	TPWC Status
Carpentarian Grasswren	*Amytornis dorotheae*	-	Endangered
Australasian Bittern	*Botaurus poiciloptilus*	Endangered	-
Greater Sand Plover	*Charadrius leschenaultii*	Migratory	Vulnerable
Gouldian Finch	*Erythrura gouldiae*	Endangered	Vulnerable
Red Goshawk	*Erythrotriorchis radiatus*	Vulnerable	Vulnerable
Crested Shrike-tit (northern)	*Falcunculus frontatus whitei*	Vulnerable	Near Threatened
Grey Falcon	*Falco hypoleucos*	-	Vulnerable
Partridge Pigeon (eastern)	*Geophaps smithii smithii*	Vulnerable	Vulnerable
Painted Honeyeater	*Grantiella picta*		Vulnerable
Australian Painted Snipe	*Rostratula australis*	Vulnerable	Vulnerable
Masked Owl (northern)	*Tyto novaehollandiae kimberli*	Vulnerable	Vulnerable
Brush-tailed Rabbit-rat	*Conilurus penicillatus*	Vulnerable	Endangered
Northern Spotted Quoll	*Dasyurus hallucatus*	Endangered	Critically Endangered
Golden Bandicoot	*Isoodon auratus*	Vulnerable	Endangered
Greater Bilby	*Macrotis lagotis*	Vulnerable	Vulnerable

Common Name	Scientific Name	EPBC Status	TPWC Status
Golden-backed Tree-rat	*Mesembriomys macrurus*	Vulnerable	Critically Endangered
Northern Brush-tailed Phascogale	*Phascogale pirata*	Vulnerable	Endangered
Carpentarian Antechinus	*Pseudantechinus mimulus*	Vulnerable	Near Threatened
Pale Field-rat	*Rattus tunneyi*	-	Vulnerable
Bare-rumped Sheathtailed bat	*Saccolaimus saccolaimus nudicluniatus*	Critically Endangered	Near Threatened
Carpentarian Rock-rat	*Zyzomys palatalis*	Endangered	Endangered
Gulf Snapping Turtle	*Elseya lavarackorum*	Endangered	Least Concern
Mertens' Water Monitor	*Varanus mertensi*	-	Vulnerable
Mitchell's Water Monitor	*Varanus mitchelli*	-	Vulnerable
Floodplain Monitor	*Varanus panoptes*	-	Vulnerable

4.1.3 Migratory species

Migratory species are those animals that migrate to Australia and its external territories, or pass through or over Australian territory during their annual migrations. Many migratory species listed under international conventions and agreements that Australia is party to, are protected under the *EPBC Act.* The EPBC protected matters search tool revealed that a total of ten migratory species, all birds, potentially occur within the boundaries of Sherwin's exploration lease areas, they are:

- Fork-tailed Swift (*Apus pacificus*)
- Great Egret (*Ardea alba*)
- Cattle Egret (*Ardea ibis*)
- Oriental Plover (*Charadrius veredus*)
- Oriental Pratincole (*Glareola maldivarum*)
- White-bellied Sea-eagle (*Haliaeetus leucogaster*)
- Barn Swallow (*Hirundo rustica*)
- Rainbow Bee-eater (*Merops ornatus*)
- Buff-sided Robin (*Poecilodryas cerviniventris*)
- Rufous Fantail (*Rhipidura rufifrons*).

4.1.4 Introduced species

Feral animals are widespread across the Gulf Fall and Uplands bioregion (Table 4). Donkeys occur in high densities in parts of the bioregion and contribute considerably to overgrazing. Cane Toad, Feral Cat and Feral Pig are listed as a Key Threatening Process under the *EPBC Act*. These species are discussed further in the Pest and Weed Management Plan, Appendix I of the EIS.

Table 4. Introduced species that may occur within the proposed project area

Common Name	Scientific Name	Recorded impacts
Feral Cattle	*Bos taurus*	Known to cause damage to monsoon rainforest and riparian habitats (Low 2007).
Swamp Buffalo	*Bubalus bubalis*	Known to cause extensive damage to the environment (Corbett 2007a).
Wild Dog	*Canis lupus*	Known to prey on many species of native animals (Corbett 2007b).
Donkey	*Equus asinus*	Known to cause extensive erosion (Choquenot 2007).
Horse	*Equus caballus*	Known to cause extensive erosion and damage vegetation (SEWPaC 2011).
Feral Cat	*Felis catus*	Known to prey on many species on native animals (Denny 2007).
House Mouse	*Mus domesticus*	Not currently considered to be a great threat to biodiversity. May impact upon native vegetation via seed predation (DLRM 2012).
Cane Toad	*Rhinella marina*	Known to cause population reductions in a range of predatory species (Shine 2010).
Pig	*Sus scrofa*	Known to cause extensive damage to wetlands (Heise-Pavlov 2007).

4.2 Terrestrial fauna survey

4.2.1 Deposit C

The field surveys undertaken for Sherwin at Deposit C recorded a total of 101 native terrestrial vertebrate species, comprising of 60 birds, 17 reptiles, four amphibians and 19 mammals; two introduced mammals and one introduced amphibian were also recorded (Appendix 2).

Amphibians

A total of four native amphibian species were recorded during active nocturnal searches (Appendix 1). One introduced species was identified, the Cane Toad (*Rhinella marina*).

Reptiles

A total of 17 reptile species were recorded during the survey. This included two species of varanids, three geckos, two dragons, five skinks and three flap-footed lizards. Two species of python were recorded during nocturnal searches.

Birds

A total of 60 bird species from 29 families were recorded during the survey. Honeyeaters were the most diverse family with eight species recorded. Two species are listed as Migratory under the *EPBC Act*:

- Buff-sided Robin (*Poecilodryas cerviniventris*) listed under the *EPBC Act* as *Poecilodryas superciliosa cerviniventris*. This species is also classed as Near-Threatened in the Northern Territory

- Rainbow Bee-eater (*Merops ornatus*).

Mammals

A total of 19 native mammal species were recorded during the survey (Appendix 2). This included three species of dasyurids, three macropods, eight bats, one rodent, two possums, one bandicoot, and one monotreme; the Short-Beaked Echidna (*Tachyglossus aculeatus*). Three species are classed as Near-Threatened in the Northern Territory:

- Northern Brown Bandicoot (*Isoodon macrourus*)
- Ghost bat (*Macroderma gigas*)
- Orange Leaf-nosed Bat (*Rhinonicteris aurantia*).

Cattle (*Bos taurus*) and Feral Pigs (*Sus scrofa*) was observed in the project area during an active search.

Invertebrates

Six invertebrate samples were collected during the short range endemic invertebrate survey at Deposit C. None of these specimens were found to be short-range endemics (SRE) (Appendix 3). The invertebrate specimens consisted of the following:

- Scorpion spider (family Trochanteriidae)
- Spider (*Karaops sp*., family Selenopidae)
- Tropical wolf spider (family Ctenidae)
- Silverfish (*Acrotelsella sp*. family Lepismatidae)
- Marbled scorpion (*Lychas variatus*).

4.2.2 Sherwin exploration area

The field surveys undertaken for Sherwin in the broader area surrounding Deposit C recorded a total of 200 native terrestrial vertebrate species, comprising of 117 birds, 44 reptiles, 14 amphibians and 25 mammals (Appendix 2) (Figure 9). Five feral mammals and one introduced amphibian, the Cane Toad (*Rhinella marina*) were also recorded (Appendix 2).

Amphibian diversity was high with 14 species recorded. Site species numbers varied from high (12 species at Blackwater Creek) to low (none found at Deposit X). The seven sites that had amphibians also had high densities of Cane Toad (*Rhinella marina*). Overall amphibian biodiversity was similar to that recorded by Griffiths et al. (1997) in nearby Limmen National Park, where 15 species were recorded across 45 survey sites (compared to 54 sites surveyed during this study). No *TPWC* or *EPBC* listed species of amphibians were found during the survey.

Overall reptile diversity was moderate with 44 species recorded. Species numbers varied between sites from high (22 species) at Blackwater Creek to low at Deposit W (eight species). Griffiths et al. (1997) recorded 51 species at Limmen National Park, a figure comparable with this study but significantly less than the 117 species of reptile that have been recorded at Kakadu National Park (SEWPaC 2013a). One *TPWC* listed species was recorded, the Mertens' Water Monitor (*Varanus mertensi*). No *EPBC* listed species of reptiles were recorded during the survey.

Mammal diversity was moderate with 25 species recorded during the surveys, including four introduced species. Previous surveys at similar latitudes have found low mammal diversity in this region (Calaby 1976; Woinarski 1992; Griffiths et al. 1997), and some sites (Deposit X and Hodgson River) had very low mammal diversity and trapping success. Acoustic bat detectors recorded nine species of bats during the survey (Appendix 4, Appendix 5 and Appendix 6). Due to the nature of this technology a number of other species (*Chalinolobus nigrogriseus, Nyctophilus sp.* and *Scotorepens greyii*) may also be present, but could not be

confirmed due to poor quality of the call sequences. Deposit C had the highest diversity (19 species). No *TPWC* or *EPBC* listed species of mammal were recorded in the study area.

A total of 117 bird species were recorded during the surveys. Diversity ranged from 46 species at Deposit X to 70 species at LD Creek. One threatened species, the Grey Falcon (*Falco hypoleucos*), listed as Vulnerable under the *TPWC Act*, was recorded at Deposit W. Also of note was the eastern subspecies of the Purple Crowned Fairy Wren (*Malurus coronatus macgillivrayi*) recorded at Mountain Creek. The species is listed as Near Threatened under the *TPWC Act* and may be sensitive to habitat degradation. Other Near Threatened listed birds recorded in the project area were Hooded Parrot (*Psephotus dissimilis*), Star Finch (*Neochmia ruficauda*), Bush Stone-curlew (*Burhinus grallarius*), Australian Bustard (*Ardeotis australis*), Pictorella Mannikin (*Heteromunia pectoralis*) and Buff-sided Robin (*Poecilodryas cerviniventris*).

Species of conservation concern

Two *TPWC Act* threatened species were recorded during the surveys:

- Grey Falcon (*Falco hypoleucos*) (Vulnerable)
- Mertens' Water Monitor (*Varanus mertensi*) (Vulnerable).

In addition ten species classed as Near Threatened in the Northern Territory were recorded during the surveys, namely:

- Australian Bustard (*Ardeotis australis*)
- Bush Stone-curlew (*Burhinus grallarius*)
- Pictorella Mannikin (*Heteromunia pectoralis*)
- Star Finch (*Neochmia ruficauda*)
- Buff-sided Robin (*Poecilodryas cerviniventris*)
- Hooded Parrot (*Psephotus dissimilis*)
- Northern Brown Bandicoot (*Isoodon macrourus*)
- Spectacled Hare Wallaby (*Lagorchestes conspicillatus*)
- Western Chestnut Mouse (*Pseudomys nanus*)
- Orange Leaf-nosed Bat (*Rhinonicteris aurantia*).

Three species listed as Migratory under the *EPBC Act* were also found during the surveys:

- White-bellied Sea-eagle (*Haliaeetus leucogaster*)
- Rainbow Bee Eater (*Merops ornatus*)
- Buff-sided Robin (*Poecilodryas cerviniventris*) listed under the *EPBC Act* as *Poecilodryas superciliosa cerviniventris.*

Children's Python (*Antaresia childreni*)

Northern Dtella (*Gehyra australis*)

Burton's Legless Lizard (*Lialis burtonis*)

Ridge-tailed Monitor (*Varanus acanthurus*)

Orange-naped Snake (*Furina ornata*)

Sandstone False Antechinus (*Pseudantechinus bilarni)*

Figure 9. Photographs of some terrestrial vertebrates found during the Sherwin fauna survey

4.3 Camera trap survey

A total of 24 species were recorded on the camera traps, consisting of five mammals and 19 birds. No Gouldian Finch was detected on the camera traps. Three introduced species were recorded including Cattle (*Bos taurus*), Pig (*Sus scrofa*) and Donkey (*Equus caballus*).

5 Assessment of Significance

This section considers which species listed as threatened or migratory under relevant legislation may be found at, or nearby, or be otherwise affected by this development. The approach taken is to consider the species recorded from the desktop and the field surveys (Section 4.1 and 4.2) and to identify the likelihood of occurrence of each species at two scales: the Gulf Fall and Uplands Bioregion and Deposit C.

Likelihood of presence of a threatened or migratory species is determined by consideration of the following criteria:

- **Unlikely** – The area is outside the species known distribution and/or suitable habitat is not located within the area; and/or there are no records within the area; or the species has experienced a considerable range reduction and is considered either locally or regionally extinct.
- **May** – The range of distribution and potential suitable habitat occurs within the area; there are no records which are post 1970 in the near vicinity (e.g. within 100km) but there are records within a similar habitat type within the bioregion or catchment.
- **Likely** – the range of distribution and suitable habitat is known to occur in the area; there are no records within the project area (or they are historic, pre 1970) but there are relatively recent records (post 1970) within 100km.
- **Known** – Individuals of this species have been recorded within the area.

Species that are known to occur or considered possible to occur within the development (i.e. likelihood of may or likely) are discussed further.

5.1 Threatened species

Based on existing records, fauna surveys in the bioregion, a review of the biology of the state and federally listed threatened species, and current survey data 25 threatened species were identified that could potentially occur within the boundaries of Sherwin's exploration lease area. These species are listed in Table 5.

Of the 25 threatened terrestrial vertebrate identified as potentially occurring within the project area only two *TPWC* listed species, the Grey Falcon (*Falco hypoleucos*) and Mertens' Water Monitor (*Varanus mertensi*) were recorded during the surveys.

Table 5. Summary of threatened species that may occur within the proposed project area

Threatened Species	*EPBC* Status	*TPWC* Status	Habitat & Distribution	Threatening Processes	Existing Records	Likelihood	
						Bio-region	Deposit C
Birds							
Carpentarian Grasswren *Amytornis dorotheae*	-	EN	**Habitat:** NT population restricted to dissected, topographically complex, sandstone and conglomerate hills and plateaux with infrequent fires. **Distribution:** Gulf of Carpentaria hinterland, between Limmen River, NT and Mount Isa, Qld. A recent survey of sites with historic records of this species – including Nathan River, which lies within the area of the proposed development – was unable to detect Carpentarian Grasswrens at seven of the eight sites (including Nathan River) (Perry et al. 2011). The Carpentarian Grasswren has therefore only been observed at one site in the Northern Territory in the past 21 years.	The only site where a positive identification was recorded had been burnt only twice in the preceding 12 years. All other sites had been burnt between three and eight times. It is thought that adult Carpentarian Grasswrens rely on mature spinifex for nesting and protection against predators. Spinifex seeds may also be an important food source for the species. Contemporary fire regimes may reduce seed fertility, causing spinifex to be displaced by flora species that favour the modified fire regimes (Trainor 1996). Martin and McKean (1986) noted a likely relationship between spinifex maturity and height, and the presence of Carpentarian Grasswrens.	There are records 200 km to the south of Deposit C	Known	Unlikely (no suitable habitat)
Australasian Bittern *Botaurus poiciloptilus*	E	-	**Habitat:** Largely freshwater wetlands, rarely, in estuaries or tidal wetlands (Marchant & Higgins 1990). Requires shallow water with medium to low density vegetation for foraging and deeper water with medium to high density vegetation for nesting (Pickering 2013). **Distribution:** Occurs from south-east Qld to south-east SA, Tasmania and south-west WA (Marchant & Higgins 1990).	The major threat is the loss or alteration of suitable habitat, primarily through the diversion of water for irrigation, and the drainage and salinization of swamps (Garnett & Crowley 2000). Distribution is severely fragmented due to the species' narrow habitat preferences and the loss or alteration of suitable habitat.	Two records of the species occur in the bioregion along the Roper River (one within 50km of Deposit C). These records are outside the normal distribution of the species and are likely vagrants.	Known	Unlikely (no suitable habitat)

Threatened Species	*EPBC* Status	*TPWC* Status	Habitat & Distribution	Threatening Processes	Existing Records	Likelihood	
						Bio-region	Deposit C
Greater Sand Plover *Charadrius leschenaultii*	M	V	**Habitat:** Coastal and estuarine. Forages on intertidal sand and mudflats in estuaries, and roosts during high tide on sandy beaches or rocky shores. Occasional on near-coast salt lakes, brackish swamps, and shallow freshwater wetlands. **Distribution:** Widespread around the Australian coast, less common in the south and inland. Breeds in the northern hemisphere in the summer, and migrates to Australia for the southern hemisphere summer. Some birds remain in Australia during the winter.	The greatest threat to migratory shorebirds in the East Asian-Australasian Flyway is habitat loss (Melville 1997). Staging areas used during migration through eastern Asia are being lost and degraded (Barter, 2002; 2005; Ge et al. 2007; Round 2006). Pollutants are a threat as they tend to accumulate in wetlands (DEH 2005). Excess nutrients can lead to eutrophication which can reduce availability of benthic prey (Harding et al. 2007; Straw 1992).	Records from the Roper River mouth and near Katherine. A record of the species occurs within the Gulf Falls and Uplands bioregion close to the QLD border.	Known	Unlikely (no suitable habitat)
Gouldian Finch *Erythrura gouldiae*	E	V	**Habitat:** The critical components of core habitat appear to be favoured annual and perennial grasses (especially Sorghum), a nearby source of surface water and, in the breeding season, unburnt hollow-bearing *Eucalyptus* trees (especially *E. tintinnans, E. brevifolia* and *E. leucophloia*) (Tidemann 1996; et al. 1999; Higgins et al. 2006). **Distribution:** Sparsely distributed across northern Australia.	The main causes of past declines, and the main threats to the species at present, are thought to be grazing pressure, establishment of pastoral, agricultural and mining operations, and fire (Dostine 1998; O'Malley 2006).	A 2006 record is located 25km west of Deposit C which consisted of > 50 individuals mainly juveniles. Several post 1970 records are scattered through the greater region.	Known	May
Red Goshawk *Erythrotriorchis radiatus*	V	V	**Habitat:** Tall open eucalypt forest and riparian areas. Nests in large trees, frequently the tallest and most massive in a tall stand, invariably within one km of permanent water (Debus & Czechura 1988; Aumann & Baker-Gabb 1991). **Distribution:** Northern Australia, from the Kimberley to south-eastern Qld.	Habitat loss. The effect fragmentation of habitat has on the Red Goshawk is yet to be determined. It has been suggested that there may be a threshold above which habitat alterations within a breeding pair's home range will not be tolerated (Debus & Czechura 1988).	A breeding pair at Mataranka, a record from Elsey Creek, from the Roper River (approximately 30km east of Deposit C) and from near Borroloola.	Known	May

Threatened Species	*EPBC* Status	*TPWC* Status	Habitat & Distribution	Threatening Processes	Existing Records	Likelihood	
						Bio-region	Deposit C
Crested Shrike-tit (northern) *Falcunculus frontatus whitei*	V	NT	**Habitat:** *Eucalyptus* open woodlands - especially with *E. opaca*, with an open shrub-layer, and are seasonally waterlogged. **Distribution:** Occurs at very low densities in several isolated subpopulations (Garnett & Crowley 2000), in a narrow band between latitudes of 14°S and 17°S from the Kimberley, WA to Borroloola, NT.	Probably adversely affected by frequent hot fires in the late dry season which prevent invertebrates from becoming established beneath bark (Robinson & Woinarski 1992; Garnett & Crowley 2000).	Pre-1970 records of the species occur within the bioregion north of Borroloola. Recorded near Mataranka.	Known	May
Grey Falcon *Falco hypoleucos*	-	V	**Habitat:** Lightly-timbered lowland plains, typically on inland drainage systems, where the average annual rainfall is less than 500 mm (Ward 2012a). **Distribution:** At low densities through much of the arid and semi-arid areas of Australia.	Threats are not clearly defined. Clearing in the semi-arid zone has destroyed some habitat. Landscape-scale changes in fire-regimes or grazing may reduce the availability of nesting trees and prey species (Ward 2012a).	Record approximately 20km east of Deposit C and two post 1970 records approximately 100km west and southwest.	Known	May
Partridge Pigeon *Geophaps smithii smithii*	V	V	**Habitat:** Open forests and woodlands with an associated grassy understorey (Woinarski 2006a). **Distribution:** Top End of the NT.	The gradual decline of this species is probably related to changes in grass composition due to frequent fires. Also susceptible to predation by feral cats (Woinarski 2006a).	Recorded approximately 20km east of Deposit C. Several records near Borroloola.	Known	May
Painted Honeyeater *Grantiella picta*		V	**Habitat:** *Acacia* and *Eucalyptus*-dominated woodlands and open forest with mistletoe. **Distribution:** Sparsely distributed from southern Victoria and south-eastern SA to far northern Qld and eastern NT. Most breeding occurs in the inland slopes of south-eastern Australia. There are no breeding records form the NT.	The main threatening process is habitat loss and degradation in eastern and south-eastern Australia (Garnett et al. 2011).	Recorded approximately 10km east of Deposit C and approximately 20km north-east. Other records occur within the bioregions to the south-east.	Known	May

Threatened Species	*EPBC* Status	*TPWC* Status	Habitat & Distribution	Threatening Processes	Existing Records	Likelihood	
						Bio-region	Deposit C
Australian Painted Snipe *Rostratula australis*	V	V	**Habitat**: Inhabits fringes of permanent and temporary wetlands, swamps and inundated grasslands (Taylor et al. 2006). The species could occur on any shallow ephemeral wetlands in central or southern Northern Territory. **Distribution:** This species is nomadic and scattered across Australia with no predictable occurrence (Rogers 2001). In the NT it is known from a range of localities with no known resident sites (Taylor et al. 2006), as such the species is unlikely to have a population in the NT that is separate to other areas of Australia.	The main threat to this species is the loss of wetlands from degradation by cattle; however within the Northern Territory there is no substantial data to assess this (Jaensch 2003).	One record approximately 155km SE of Deposit C.	Known	Unlikely (no suitable habitat)
Masked Owl (northern) *Tyto novaehollandiae kimberli*	V	V	**Habitat:** Tall open forests (especially those dominated by *Eucalyptus miniata* and *E. tetrodonta*), also roosts in monsoon rainforests, and forages in more open vegetation including grasslands (Woinarski & Ward 2012a). **Distribution: I**mperfectly known, with few records across its broad range in northern Australia. In the NT records known from the Top End, Kakadu, Coburg Peninsula (majority of records) and south-west Gulf country.	No reliable information on threats to this subspecies. It is possible that food resources may be diminishing, through broad-scale decline of small and medium-sized native mammals, possibly due to changed fire regimes (Woinarski et al. 2001; Pardon et al. 2003). The greatly increased cover and height of invasive exotic grasses (Rossiter et al. 2003) may cause a reduction in foraging efficiency for this owl.	One post-1970 record from the bioregion approximately 270km south-east of Deposit C.	Known	Unlikely (lack of suitable habitat)
Mammals							
Brush-tailed Rabbit-rat *Conilurus penicillatus*	V	E	**Habitat:** Open forest and woodland, or on dunes with Casuarina. Prefers habitats that are not burnt annually, with an understorey of perennial grasses and a sparse-to-moderate mid storey (Firth et al. 2006; Firth 2007; Kemper & Firth 2008). **Distribution:** Currently only Cobourg Peninsula, Tiwi Islands, Groote Eylandt, and a small area in Kakadu (Woinarski & Hill 2012).	At the present time no single factor is known to have caused the decline in this species (Woinarski & Hill 2012). It is however though that habitat alteration due to inappropriate fire regimes and grazing by introduced herbivores, habitat destruction and predation by Feral Cats are the causes (Woinarski & Hill 2012).	There are three pre-1970 records about 50km east of Deposit C on the Roper River.	Known	Unlikely (outside current known distrib-ution)

Threatened Species	*EPBC* Status	*TPWC* Status	Habitat & Distribution	Threatening Processes	Existing Records	Likelihood	
						Bio-region	Deposit C
Northern Quoll *Dasyurus hallucatus*	E	CE	**Habitat:** Originally a wide range of habitats, now mostly restricted to rocky areas. **Distribution:** Across northern Australia. In the NT, most records from central and western Top End.	Primarily Cane toad ingestion (Van Dam et al. 2002), but also inappropriate fire regimes, and removal, degradation and fragmentation of habitat.	Recorded near Ngukurr (pre cane toads). Other post-1970 records occur in the bioregion, more than 200km south-east of Deposit C.	Known	May
Golden Bandicoot *Isoodon auratus*	V	E	**Habitat:** Historically this species occupied desert country in a range of habitats. On Marchinbar Island it is associated with heath and shrub land (Southgate et al. 1996). **Distribution:** Formerly widespread across the NT, now known only from Marchinbar Island (Palmer et al. 2012a).	No single factor is known to have caused the decline in this species. Thought to be predation by introduced carnivorous mammals. Changed fire regimes may also affect this species (Palmer et al. 2012a).	Several pre-1970 records of the species occur within 10km of Deposit C.	Unlikely	Unlikely (locally extinct)
Greater Bilby *Macrotis lagotis*	V	V	**Habitat:** This species is found in hummock grasslands on sandy soils with a preference for drainage lines (Southgate 1990). **Distribution:** Historically widespread in arid Australia. Currently in the NT it is most abundant in the Tanami Desert (Pavey 2006).	The decline in this species is attributed to predation by introduced carnivorous mammals, competition with introduced herbivorous mammals and changed fire regimes (Southgate 1987; Southgate & Carthew 2006; Pavey 2006).	No records of this species occur within the bioregion.	Unlikely	Unlikely (no suitable habitat)
Golden-backed Tree-rat *Mesembriomys macrurus*	V	CE	**Habitat:** Open eucalypt forests, rainforest patches, sandstone screes, beaches, and black soil plains (Woinarski et al. 2012). **Distribution:** At present known only from the north Kimberley, historically known to have occurred at three localities in the NT however no records in the last 30 years (Palmer et al. 2003).	Due to the lack of data, there is no known cause for the decline in this species. As this species continues to survive on some offshore islands it is thought that either an exotic disease or predation by exotic predators has caused the decline on the mainland (Woinarski et al. 2012).	Pre-1970 records of this species occur within the bioregion approximately 230km south-east of Deposit C.	Unlikely	Unlikely (locally extinct)

Threatened Species	*EPBC* Status	*TPWC* Status	Habitat & Distribution	Threatening Processes	Existing Records	Likelihood	
						Bio-region	Deposit C
Northern Brush-tailed Phascogale *Phascogale pirata*	V	E	**Habitat:** Tall open forests dominated by *Eucalyptus miniata* and *E. tetrodonta*. **Distribution:** Restricted to eucalypts forests in the Top End of the Northern Territory. Most records are from Kakadu National Park.	Exotic predators (cats) or disease are considered possible causes of decline. Other potential factors include vegetation change due to altered fire regimes and/or pastoralism (Woinarski & Ward 2012b). Cane toads possibly contribute to decline.	No records of this species occur within the bioregion.	Unlikely	Unlikely (outside known distrib-ution)
Carpentarian Antechinus *Pseudantechinus mimulus*	V	NT	**Habitat:** The few records of this species show a preference for a range of vegetation types associated with a high cover of rocks and boulders. **Distribution:** Southern Gulf of Carpentaria. Most records are from the Sir Edward Pellew Islands (Kitchener, 1991; Taylor et al. 2004).	At the present time no single factor is known to have caused the decline in this species (Woinarski & Ward 2012c). Possible causes include habitat alteration due to inappropriate fire regimes and grazing by introduced herbivores, habitat destruction resulting from forestry and mining operations and predation by Feral Cats (Woinarski & Ward 2012c).	Most records are from Sir Edward Pellew Islands. A recent record south-west of Borroloola suggests the species may be more widespread than previously thought.	Known	May
Pale Field-rat *Rattus tunneyi*	-	V	**Habitat:** Historically occurred in a wide range of habitats, but is now primarily in tropical grassland (Aplin et al. 2008). **Distribution:** Kimberley, coastal NT, coastal Qld and northern NSW (Aplin et al. 2008).	The exact factor is unknown but it presumed to be the loss of its preferred creek line habitats to degradation by introduced mammals (Aplin et al. 2008).	Two records along the Roper River approximately 70km east of Deposit C and two approximately 70km south-east.	Known	May
Bare-rumped sheathtailed bat *Saccolaimus saccolaimus nudicluniatus*	CE	NT	**Habitat:** Open pandanus woodland and tall eucalypt forests in the NT (Friend & Braithwaite 1986; Churchill 1998). **Distribution:** Southeast Asia to North Qld and the NT (Milne & Woinarski 2006). Taxonomic uncertainty about the subspecies, *nudicluniatus*. The EPBC recognises *S. s. nudicluniatus* as occurring in the NT.	The main threatening process appears to be the loss of hollow trees due to land clearing in Queensland (Milne & Woinarski 2006).	No records of this species occur within the bioregion.	Unlikely	Unlikely (no suitable habitat)

Threatened Species	*EPBC* Status	*TPWC* Status	Habitat & Distribution	Threatening Processes	Existing Records	Likelihood	
						Bio-region	Deposit C
Carpentarian Rock-rat *Zyzomys palatalis*	E	E	**Habitat:** Sandstone gorges and escarpments containing a core of dry or wet rainforest vegetation mixed with woodland, scree slopes and permanent water surrounded by savanna woodlands (Puckey & Woinarski 2006). **Distribution:** Known only from Wollogorang Station in the Gulf of Carpentaria, five locations within a radius of 35 km (Puckey 2003).	The major conservation problem for the Carpentarian rock-rat is its extremely limited range (and hence population), and its dependence upon a core monsoon rainforest habitat. Fire is a threat to this habitat (Trainor et al. 2000). Feral cats are known to occur in areas that support the species (Puckey & Woinarski 2006).	The only records for this species are known from a small area in the Gulf of Carpentaria. This area occurs within the bioregion approximately 470km from Deposit C.	Known	Unlikely (no suitable habitat)
Reptiles							
Gulf Snapping Turtle *Elseya lavarackorum*	E	LC	**Habitat:** In deeper, permanent pools of steep, rocky gorges and river reaches. **Distribution:** Known only from a series of rivers that drain in to the Gulf of Carpentaria from the Calvert to Nicholson Rivers (Cann 1998).	The only identifiable threat to this species is the destruction of habitats by cattle and predation of eggs by feral pigs (Cann 1998; Woinarski 2006b).	Records for the species occur within the bioregion, the closest of to Deposit C is approximately 190km to the south-east.	Known	Unlikely (no suitable habitat)
Mertens' Water Monitor *Varanus mertensi*	-	V	**Habitat:** Edges of watercourses and lagoons – seldom seen far from water (Christian 2004a). **Distribution:** North Australia from Cape York Peninsula to the Kimberley (Christian 2004a).	This species has experienced significant declines due to cane toad poisoning (Griffiths & McKay 2005; Doody et al. 2009).	Records scattered throughout the bioregion including at Limmen Bight River and Elsey National Park. Recorded at LD Creek during EcOz fauna survey, approximately 60km south-east of Deposit C.	Known	May
Mitchell's Water Monitor *Varanus mitchelli*	-	V	**Habitat:** Freshwater riparian areas and the edges of mangroves (Schultz & Doody 2004). **Distribution:** Top End and Kimberley regions (Schultz & Doody 2004).	This species has experienced significant declines due to cane toad poisoning (Doody et al. 2009.)	Records scattered throughout the bioregion including one on the Roper River approximately 45km east of Deposit C.	Known	May

Threatened Species	*EPBC* Status	*TPWC* Status	Habitat & Distribution	Threatening Processes	Existing Records	Likelihood	
						Bio-region	Deposit C
Floodplain Monitor *Varanus panoptes*	-	V	**Habitat:** Broad range of habitats from riparian to savannah woodlands (Christian 2004b). **Distribution:** Across northern Australia with a disjunct population in WA (Christian 2004b).	This species experienced significant declines due to cane toad poisoning (Doody et al. 2009).	Records scattered throughout the bioregion including one on the Roper River approximately 45km east of Deposit C.	Known	May

5.1.1 Threatened species considered unlikely to occur at Deposit C

Following the desktop review, and incorporating results from field surveys in the Sherwin mining tenements, the following species were assessed as being unlikely to occur within the project area:

- Carpentarian Grasswren (*Amytornis dorotheae*)
- Australasian Bittern (*Botaurus poiciloptilus*)
- Greater Sand Plover *(Charadrius leschenaultii*)
- Australian Painted Snipe (*Rostratula australis*)
- Masked Owl (N) (*Tyto novaehollandiae kimberli*)
- Brush-tailed Rabbit Rat (*Conilurus penicillatus*)
- Golden Bandicoot (*Isoodon auratus*)
- Greater Bilby (*Macrotis lagotis*)
- Golden-backed Tree-rat (*Mesembriomys macrurus*)
- Northern Brush-tailed Phascogale (*Phascogale pirata*)
- Bare-rumped Sheathtail Bat (*Saccolaimus saccolaimus nudicluniatus*)
- Carpentarian Rock-rat (*Zyzomys palatalis*)
- Gulf Snapping Turtle (*Elseya lavarackorum*).

Several species (Australian Painted Snipe, Masked Owl (N), Brush-tailed Rabbit-rat, Golden Bandicoot, Greater Bilby, Golden-backed Tree-rat, Northern Brush-tailed Phascogale, Bare-rumped Sheathtail Bat and Gulf Snapping Turtle) were determined as being unlikely to occur within Deposit C due to a lack of suitable habitat and/or a lack of recent records within the bioregion (Table 5).

Australasian Bittern and Greater Sand Plover have been recorded within the Gulf Falls and Uplands bioregion; however, these records could be considered as outliers from the species normal distribution (Table 5).

The Carpentarian Rock-rat and Carpentarian Grasswren occur within the Gulf Falls and Uplands bioregion; however, their current known ranges are limited to a small area within the Gulf of Carpentaria (Table 5).

The remaining species are discussed below.

5.1.2 Threatened species that may or are likely to occur at Deposit C

Gouldian Finch (Erythrura gouldiae)

Gouldian Finch was previously known to occur in significant numbers (>50 adult birds) at only five locations in the Northern Territory (O'Malley 2006). In recent years there have been regular reports of the species in previously unrecorded locations across the Top End, indicating that populations have somewhat stabilised. The species conservation status in the NT has consequently been downgraded from Endangered to Vulnerable (Palmer et al. 2012b).

Records of Gouldian Finch occur approximately 25 km west of the Deposit C. A desktop search also reveals that several records of the species are scattered throughout the surrounding region, including a 2006 record of more than 50 individuals, most of which were juveniles.

There is suitable habitat for the Gouldian Finch in the vicinity of Deposit C, with small waterholes that at least persist late in the dry in some years in Sherwin Creek downstream of the project area. However Gouldian Finch has not been detected during fauna surveys (including a late dry season camera trap survey, Section 3.3) suggesting there may not be a breeding population within or nearby to the disturbance area.

Red Goshawk (Erythrotriorchis radiatus)

The Red Goshawk is a thinly dispersed bird of prey that occurs across much of northern Australia. Red Goshawks nest in the highest trees usually within 100 m of a river. The estimated home range of the species is 120 km^2 for a male and 200 km^2 for a female (Aumann & Baker-Gabb 1991). The main threat to the species is clearing of habitat, though breeding success can also be impacted by hot late dry season fires.

Desktop database searches reveal a number of records of the species in the bioregion, including Elsey National Park, a breeding pair at Mataranka and a breeding pair on the Roper River on Elsey Station (Baker-Gabb pers. com.). The species has been recorded on the Roper River approximately 30 km east of Deposit C. Based on the occurrence of two breeding pairs in the region a pair of Red Goshawks is likely to breed every 6-10km along the Roper River (Baker-Gabb pers. com.).

A two-day survey of Red Goshawk habitat along the Roper Highway was undertaken by EcOz in August 2013. The survey confirmed that suitable foraging habitat occurs along the highway but trees are not of sufficient height for nesting. Red Goshawks are unlikely to breed more than 200m from the Roper River or a major creek because in the Roper River catchment the trees are too small (Baker-Gabb pers. comm.). Similarly the woodland habitat within Deposit C does not contain typical Red Goshawk nesting habitat. A pair may occur nearby at the Roper River, which is approximately 10 km from Deposit C. Given the large home range and absence of breeding habitat within the project area it is unlikely that the species will be deleteriously impacted by the development.

Crested Shrike-tit (northern) (Falcunculus frontatus whitei)

The northern subspecies of the Crested Shrike-tit is patchily distributed throughout its range and occurs at low densities within any patch (Woinarski & Ward 2012d). Studies south of Katherine have recorded the subspecies living in territorial pairs, each occupying about 25 ha and at densities of approximately 1.25 adults/km^2 within preferred habitat (Ward 2008). The Sturt Plateau bioregion appears to a stronghold for the Crested Shrike-tit.

Gulf Falls and Uplands bioregion records occur north of Borroloola, with a number of records of Crested Shrike-tit around Mataranka. The species has not been recorded near Borroloola since it was first recorded there in 1913; however, no recent surveys have targeted the species in the region (Ward 2009).

The Crested Shrike-tit inhabits woodland habitat. The total area of woodland to be cleared for the proposed development at Deposit C is negligible in the regional context for this habitat type. This, combined with the lack of recent records close to the project area, suggests that the species will not be deleteriously impacted by the project.

Grey Falcon (Falco hypoleucos)

The Grey Falcon is a rare bird, occurring at low densities in arid and semi-arid areas. Grey Falcons occur in lightly timbered lowland plains, often along inland drainage channels with rainfall of less than 500 mm (Ward 2012a). The Grey Falcon is a highly transient species that will cross vast landscapes in search of suitable breeding habitat. The Grey Falcon is a highly transient species that will cross vast landscapes in search of suitable breeding habitat. A study of breeding records from 2003 to 2011 recorded 38 breeding events, with the northern-most record occurring south of Daly Waters (Schoenjahn 2013). Recent studies suggest that the species is a specialist in regions of the highest annual average temperatures (Schoenjahn 2013). The variability of climate and resources within these regions, combined with the Grey Falcon's limited dietary flexibility means that the species might appear in an area and then disappear again, possibly remaining absent for many years.

Records of the species close to Deposit C are likely to be transitory individuals. As the project area is outside the known breeding range of this species it is very unlikely to be deleteriously impacted by the project.

Partridge Pigeon (eastern) (Geophaps smithii smithii)

Partridge Pigeon occur across the Top End of the NT but have declined dramatically in much of the lower rainfall areas of its range. The prime reason for decline appears to be changed fire regimes that have reduced the diversity of native grasses upon which the species depends for food (Woinarski 2006a).

There are pre-1970 records of the species approximately 20 km east of Deposit C and from near Borroloola. Recent records of the subspecies are aggregated in the north of the Top End, including Litchfield and Kakadu National Parks, Cobourg Peninsula and the Tiwi Islands. The Gulf Falls and Uplands bioregion is at the southern limit of the subspecies range and there are no recent records of the Partridge Pigeon close to the project area. The species is therefore unlikely be deleteriously impacted by the development.

Painted Honeyeater (Grantiella picta)

The Painted Honeyeater has a broad distribution in eastern Australia. There is no evidence of a breeding population in the NT and records are believed to be of irregular visitors from south-eastern Australia (Ward 2012b). This species is therefore unlikely to be deleteriously impacted by this development.

Northern Quoll (Dasyurus hallucatus)

Impacted in the past century by human persecution, habitat clearance and disease, the arrival of toxic Cane Toads initiated a dramatic population collapse of the Northern Quoll (Van Dam et al. 2002). Woinarski et al. (2008) identified that Northern Quoll populations were more persistent in higher altitude sites with steeper slopes, shallower soils, and large rocks, boulders and outcrops. This may be due to less disturbance by fire, as well as lower Cane Toad abundances in these drier habitats.

No Northern Quolls were detected during recent surveys and there are no post Cane Toad records from near the project area. Gorge and escarpment habitat occurs within Deposit C; however, these areas would not be sufficiently high or steep to exclude cane toads. Surveys of the mining tenements confirmed the presence of Cane Toads in the area. It is possible that the proposed project area once supported populations of Northern Quoll, but they are now locally extinct. Therefore it is unlikely that the proposed development will impact on this species.

Carpentarian Antechinus (Pseudantechinus mimulus)

The Carpentarian Antechinus was, until recently, only known from one location in the Barkly Tablelands and from the Sir Edward Pellew Group Islands. Recent records from near Borroloola indicate that the species may be more widespread than previously thought. The few records of this species show a preference for a range of vegetation types associated with a high cover of rocks and boulders.

Threats to the species are poorly known but are likely to include feral cats and changed fire regimes (Woinarski & Ward 2012c).

The distribution of the Carpentarian Antechinus remains uncertain; however, the occurrence of the species in the project area would represent a significant northern range extension. It is therefore unlikely that the development will deleteriously impact the species.

Pale Field-rat (Rattus tunneyi)

The Pale Field-rat was formerly known from arid and semi-arid Australia as well as temperate regions of Western Australia, but its range has retracted to the wetter areas of northern Australia (Young & Hill 2012). Currently there is no clear explanation for decline but is likely due to the impacts of introduced mammalian herbivores on riparian habitats that served as refuge areas during times of low water availability (Aplin et al. 2008).

In the Northern Territory, records suggest the species is more abundant in higher rainfall areas, including Litchfield and Kakadu National Parks. Records of the species in the Gulf Falls and Uplands bioregion are comparatively sparse. There is a record of Pale Field-rat from occur along the Roper River, within 70 km of the project area. The relative scarcity of records in the Gulf Falls and Uplands bioregion suggest that the

project area does not represent critical habitat for the species. The species is therefore unlikely to be significantly impacted by the development.

Mertens' Water Monitor (Varanus mertensi)

Mertens' Water Monitor populations across tropical Australia have been severely diminished by toxic Cane Toads. The species was recorded at LD Creek during surveys of the mining tenements.

Suitable habitat for the species occurs throughout the bioregion, including the nearby Roper River, however Sherwin Creek downstream of Deposit C has few waterholes that persist in the late dry and therefore does not represent critical habitat.

Mitchell's Water Monitor (Varanus mitchelli)

Mitchell's Water Monitor inhabits all of the Northern Territory's northern river systems, with the exception of the Southern Gulf (Ward 2012c). Similar to Mertens' Water Monitor, Mitchell's Water Monitor has experienced severe declines following the invasion of Cane Toads across the Top End.

Records of this species are scattered throughout the bioregion including one on the Roper River approximately 45km east of Deposit C. Deposit C has few waterholes that persist in the late dry and therefore does not represent critical habitat.

Floodplain Monitor (Varanus panoptes)

The Floodplain Monitor has a broad geographic range, occurring across the Top End and Gulf region of the Northern Territory. The species inhabits a wide variety of habitats including floodplains, grasslands and woodlands (Ward et al. 2012). The main threat to the species is its propensity to eat Cane Toads and die from the ingested poison (Ward et al. 2012).

The Floodplain Monitor has been recorded in suitable habitat throughout the Gulf Falls and Uplands bioregion, including from the Roper River approximately 45km east of Deposit C. Deposit C does not represent ideal habitat for this species therefore the Floodplain Monitor is not likely to be impacted by the development.

5.2 Migratory species

In addition to threatened species, the EPBC Protected Matters Search contained a list of migratory species that may occur within the project footprint. These are species which are listed in various international conventions to which Australia is a signatory. They are not listed as threatened under Federal or Territory law. The EPBC Protected Matters search of Sherwin's Exploration Lease Area revealed that 10 Migratory listed species may occur. Table 6 discusses each of these species with the intent of determining their likelihood of presence within the mine impacted area.

Under Significant Impact Guidelines 1.1 (Matters of National Environmental Significance) of the *EPBC Act* an action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

Furthermore, the guidelines define an area of 'important habitat' for a migratory species as:

- Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or

- Habitat that is of critical importance to the species at particular life-cycle stages, and/or
- Habitat utilised by a migratory species which is at the limit of the species range, and/or
- Habitat within an area where the species is declining.

Likelihood of presence for Migratory listed species was determined using the same criteria as that used for threatened species (Section 5.1).

5.2.1 Migratory species considered unlikely to occur at Deposit C

Following the desktop review, and incorporating results from field surveys in the Sherwin mining tenements, the following species were assessed as being unlikely to occur within the project area:

- Barn Swallow (*Amytornis dorotheae*)
- Rufous Fantail (*Rhipidura rufifrons*)

The Barn Swallow is unlikely to occur within the project area due to a lack of records within the bioregion and a lack of suitable habitat within the project area. The Rufous Fantail has recently been split into two separate species, *Rhipidura rufifrons* (Rufous Fantail) and *R. dryas* (Arafura Fantail). Rufous Fantail is restricted to the east coast of Australia. Records of the species in the bioregion can be attributed to Arafura Fantail, which is not listed as Migratory (see Table 6).

5.2.2 Migratory species that may or are likely to occur at Deposit C

Three migratory listed species were recorded during fauna surveys in the project area:

- White-bellied Sea-eagle (*Haliaeetus leucogaster*)
- Rainbow Bee-eater (*Merops ornatus*)
- Buff-sided Robin (*Poecilodryas cerviniventris*) (listed under *EPBC Act* as Derby White-browed Robin *Poecilodryas superciliosa cerviniventris*).

A further four species have been assessed as possibly occurring (may) within the project area and one species (Eastern Great Egret *Ardea alba*) is likely to occur (Table 6).

Table 6. Summary of migratory species that may occur within the project area

Migratory Species	*EPBC* Status	Habitat and Distribution	Existing Records	Likelihood of Presence	
				Bioregion	Deposit C
Fork-tailed Swift *Apus pacificus*	Migratory	**Habitat:** Spends most of its life in the air, occurs over coasts and urban areas, possible tendency to occur over arid areas. This species is generally observed hawking for food in proximity to cyclonic weather (Boehm 1962). **Distribution:** A non-breeding visitor to all states and territories of Australia. Breeds from Siberia eastwards through Asia.	Records of the species occur north of Elsey National Park and are scattered throughout the bioregion.	Known	May
Great Egret *Ardea alba*	Migratory	**Habitat:** A wide variety of wetland habitats including floodwaters, rivers and intertidal mudflats. Prefers shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands. **Distribution:** Throughout most of the world. All states/territories of mainland Australia and in Tasmania, common throughout with the exception of the most arid areas.	Several records occur in the bioregion, including within the exploration leases close to Deposit C.	Known	Unlikely (no suitable habitat)
Cattle Egret *Ardea ibis*	Migratory	**Habitat:** Found in grasslands, woodlands, wetlands, pastures and croplands, especially where drainage is poor. Will also forage at garbage dumps, often seen with cattle and other stock (Birdlife Australia 2013). **Distribution:** The Cattle Egret is found on nearly every continent. In Australia it is most widespread and common in north-eastern WA across the Top End of the NT, and in south-eastern Australia from Bundaberg, Qld to Port Augusta, SA (Birdlife Australia 2013).	Records of the species are scattered throughout the bioregion including several along the Roper River.	Known	Unlikely (no suitable habitat)
Oriental Plover *Charadrius veredus*	Migratory	**Habitat:** Generally occurs inland on open grasslands, less often in estuarine or littoral environments. Prefers flat inland plains, sparsely vegetated short grass with hard bare ground including claypans, playing fields, lawns and cattle camps (Birdlife Australia 2013). **Distribution:** Occurs in both coastal and inland areas, mostly in northern Australia. It breeds in Mongolia passing through east China on migration (Birdlife Australia 2013).	Records of the species occur within the bioregion close to Borroloola.	Known	May

Migratory Species	*EPBC* Status	Habitat and Distribution	Existing Records	Likelihood of Presence	
				Bioregion	Deposit C
Oriental Pratincole *Glareola maldivarum*	Migratory	**Habitat:** In Australia, the Oriental Pratincole usually inhabits open plains, floodplains or short grassland, also near wetlands, such as billabongs, and along the coast on beaches and mudflats. **Distribution:** Breeds in southern, south-eastern and eastern Asia. Found in northern Australia, with largest concentrations in the northwest. Recorded in small numbers in southern Australia.	Bioregional records occur along the upper reaches of McArthur River close to Borroloola and in Elsey National Park.	Known	May
White-bellied Sea-eagle *Haliaeetus leucogaster*	Migratory	**Habitat:** Coastal and terrestrial wetlands. Habitat characterised by large areas of open water (Marchant & Higgins 1993). **Distribution:** A common sight in coastal and near coastal areas of Australia and along major inland waterways. The species is also found in New Guinea, Indonesia, China, south-east Asia and India.	Several records of the species occur within Elsey National Park, and along the Hodgson and Roper Rivers.	Known	Unlikely
Barn Swallow *Hirundo rustica*	Migratory	**Habitat:** Open country in coastal lowlands, often near water, towns and cities. Often sighted perched on overhead wires (Pizzey 1980). **Distribution:** Northern Australia, patchily along the north coast from the Pilbara region WA to Fraser Island in Qld.	No records of the species occur within the bioregion.	Unlikely	Unlikely
Rainbow Bee-eater *Merops ornatus*	Migratory	**Habitat:** Open forests, woodlands, shrublands, and cleared or semi-cleared habitats, farmland and urban areas (Higgins 1999). **Distribution:** Most of Australia, less common in arid areas. Populations that breed in southern Australia are migratory, moving north during winter, after breeding. Resident breeding population in northern Australia (Higgins 1999).	Several records of the species occur throughout the Roper River catchment. The species was recorded at all fauna survey sites including Deposit C.	Known	Known
Buff-sided Robin *Poecilodryas cerviniventris*	Migratory	**Habitat:** Found in tropical forests, riparian vegetation, vine thickets and mangroves. **Distribution:** Occurs across northern Australia from the Kimberley (WA) across the Top End (NT) and the gulf region.	Records of the species occur within the exploration leases. The species was recorded at Deposit C and Mountain Creek.	Known	Known

Migratory Species	*EPBC* Status	Habitat and Distribution	Existing Records	Likelihood of Presence	
				Bioregion	Deposit C
Rufous Fantail *Rhipidura rufifrons*	Migratory	**Habitat:** Tropical rainforest and monsoon rainforests, including mesophyll vine forests, vine thickets or thickets of Paperbarks (*Melaleuca* spp.) (Higgins et al. 2006). **Distribution:** Race *rufifrons***,** coastal and near coastal districts of eastern Australia. Race *dryas* (Arafura Fantail), coastal and near coastal districts of northern Australia.	Records of Arafura Fantail from Elsey National Park and along the Roper River. Recorded at Deposit W. Records of Rufous Fantail in the bioregion can be attributed to Arafura Fantail.	Unlikely	Unlikely

Fork-tailed Swift (Apus pacificus)

The Fork-tailed Swift is a non-breeding visitor to all Australian mainland states. The species is almost exclusively aerial, flying from less than 1 m to at least 300 m above the ground (SEWPaC 2013a). There are no significant threats to the Fork-tailed Swift in Australia (SEWPaC 2013a). The development is therefore unlikely to deleteriously impact the species.

Great Egret (Ardea alba)

The Great Egret occurs throughout northern Australia, including the Gulf Falls and Uplands Bioregion. The largest breeding colonies of the species occur in the near-coastal regions of the Top End (SEWPaC 2013b). Non-breeding birds occur across much of Australia except for the driest regions of the western and central deserts (Marchant & Higgins 1990).

The Eastern Great Egret is threatened by the loss and degradation of foraging and breeding habitat (SEWPaC 2013b). The abundance of records of Eastern Great Egret within the bioregion as well as the presence of suitable habitat indicates that the species is likely to occur within the project area. However, the project area does not constitute breeding habitat for the species. The species is therefore unlikely to be impacted by the development.

Cattle Egret (Ardea ibis)

The Cattle Egret occurs in grassland, woodland and wetland habitat. The species breeds in colonies in wooded swamps such as mangrove forests and Melaleuca woodlands (SEWPaC 2013c). In Australia the major threat facing the Cattle Egret is loss of breeding habitats through wetland degradation and destruction (Birdlife International 2009). Feral Cats can also impact the species.

The project area is not core habitat for this widespread common species. The species is therefore very unlikely to be deleteriously impacted by the development.

Oriental Plover (Charadrius veredus)

The Oriental Plover is a non-breeding visitor to Australia, where the species occurs in both coastal and inland areas, predominantly in northern Australia. Habitat for the species includes flat, open, semi-arid or arid grasslands, claypans, dry paddocks, playing fields, lawns and cattle camps and open areas that have been recently burnt (SEWPaC 2013d).

Most Oriental Plover records are from the north-western coast, between the Exmouth Gulf and Derby in Western Australia. Records of the species within the Gulf Falls and Uplands bioregion occur close to Borroloola, more than 200 km from Deposit C. The lack of records and suitable habitat within the project area suggests that the Oriental Plover will not be impacted by the development.

Oriental Pratincole (Glareola maldivarum)

The Oriental Pratincole is widespread in Northern Australia, including the Top End of the NT, and parts of the Gulf of Carpentaria. The species inhabits open plains, floodplains or short grassland terrestrial wetlands, such as billabongs, and along the coast on beaches and mudflats (SEWPaC 2013e).

There are no recent records of this species near the project area and there is no suitable habitat. This species is unlikely to be impacted by the development.

White-bellied Sea-eagle (Haliaeetus leucogaster)

The White-bellied Sea-eagle is widespread across the Australian coast and inland waterways. Breeding adults are generally sedentary but sometimes undertake long-distance movements in response to drought or shortage of food. Immature birds are capable of dispersing over huge distances to establish new territories (Marchant & Higgins 1993). The species could therefore be

considered as dispersive rather than migratory. Main threats to the White-bellied Sea-Eagle include the loss of habitat due to land development and the disturbance of nesting pairs by human activity (Clunie 1994).

White-bellied Sea-eagle records occur close to the project area on the Roper River. The species was recorded at Deposit W during recent fauna surveys. Suitable nesting habitat for the White-bellied Sea-eagle does not occur at Deposit C. The species may occasionally forage over the project area but suitable foraging habitat exists throughout the region therefore it is unlikely to be impacted by the development.

Rainbow Bee-eater (Merops ornatus)

Rainbow Bee-eater is a common and widespread species that occurs in a large variety of habitats. Southern populations migrate north during the winter months, whilst northern populations are resident. This species was recorded at all fauna survey sites, including Deposit C. The area of suitable habitat to be cleared for the development is negligible in the regional context. Rainbow Bee-eater is a widespread and common species and is therefore unlikely to be impacted by the development.

Buff-sided Robin (Poecilodryas cerviniventris)

The species is listed under the *EPBC Act* as *Poecilodryas superciliosa cerviniventris* (Derby White-browed Robin) but was recently split into *P. superciliosa* (eastern Australia) and *P. cerviniventris* (northern Australia). Buff-sided Robin occurs in mangroves, riparian thickets and gorges across the Top End of the NT and the Kimberley region of Western Australia (WA). This species is considered Near Threatened in the Northern Territory.

Suitable habitat for the species occurs along the Roper River and throughout the bioregion. The species was recorded at Deposit C and Mountain Creek. The project will remove gorge areas including a small area dry monsoon rainforest habitat (approximately 0.65 hectares to be effected see *Flora of the Sherwin Iron Leases*, Appendix H2 of EIS). Due to the clearing of this habitat this development may have an impact on this species at the local scale but as this species is widely distributed it is unlikely to have a significant impact at the population level. This species was also found at Mountain Creek outside the development area.

5.3 Conclusion

5.3.1 Threatened species

Following an assessment of the ecology of threatened species that may occur within the project area and the nature of the development it is thought that no threatened species will be affected by this development. In summary this is due to:

- Most vegetation being cleared is common across northern Australia, thus is a common habitat
- The area being cleared is relatively small compared to the extent of the vegetation types
- There are no critical habitats within the disturbance area
- For the distinctive habitats that are being disturbed (e.g. gorges), fauna survey has found no threatened species and, furthermore, this habitat is relatively common nearby
- There is no permanent water.

5.3.2 Migratory species

In summary, most of the migratory listed species that appear in the EPBC Protected Matters Search are common and widespread across tropical Australia and/or the project does not impact upon

important habitat for these species, or upon any ecologically significant proportions of populations of these species (as defined in Significant Impact Guidelines 1.1). There is one exception to this: the Buff-sided Robin (*Poecilodryas cerviniventris*) has an association with dense vegetation and gorge country across its range; as this development is removing gorge country around Deposit C this development will have a localised effect.

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Appendix 1-Habitat descriptions for each fauna site

Deposit C - Site 1 (2011) Zone 53, 424377 E 8371335 N Zone 53 Photo taken: 18/05/2011 	**Vegetation Description:** *Eucalyptus phoenicea* mid open woodland- upper gully **Landform:** Upper Slope, slope 2 - 3%, south-south east aspect **Soil:** Reddish brown, skeleton **Drainage potential:** High- drainage rapid (good slope / sandy soil) **Fire:** Low impact- last fire >2 years ago **Weeds:** Absent **Ferals**: No damage evident	**Upper:** 10% cover, *Eucalyptus phoenicea* (common). Species < 5% cover: *Corymbia dichromophloia* *Owenia* sp. *Eucalyptus tetrodonta* **Mid:** 5-10% cover, *Erythrophleum chlorostachys* (scattered). *Eucalyptus phoenicea* (scattered) **Lower:** *Schizachyrium fragile* (common)
Deposit C - Site 2 (2011) Zone 53, 424915 E 8371102 N Zone 53 Photo taken: 18/05/2011 	**Vegetation Description:** *Eucalyptus tetrodonta* open woodland- gully floor **Landform:** Creek/River, slope 1%, north aspect **Soil:** Reddish brown, loam, shallow **Drainage potential:** High- drainage rapid (good slope / sandy soil) **Fire:** Low impact- last fire >2 years ago **Weeds:** Absent **Ferals**: Some cattle impacts - potential to cause erosion	**Upper:** 15-20% cover, *Eucalyptus tetrodonta* (common). Species < 5% cover: *Corymbia dichromophloia*, *Eucalyptus phoenicea* **Mid:** 5% cover, *Erythrophleum chlorostachys* (common), *Eucalyptus tetrodonta* (scattered) **Lower:** 75% cover, *Chrysopogon fallax* (common), *Heteropogon contortus* (scattered)

Deposit C - Site 3 (2011) Zone 53, 425311 E 8371063 N Photo taken: 18/05/2011 	**Vegetation Description:** Open Eucalypt woodland over Triodia hummock grassland **Landform:** Upper-slope **Soil:** Sandy clay **Drainage potential:** Rapidly drained on steep slope **Fire:** Moderate impact, fire within previous 2 years **Weeds:** Absent **Ferals:** Absent **Other Features:** Tree hollows common. Fallen logs scattered	**Upper:** 17% cover. *Eucalyptus phoenicea* (common) *Eucalyptus ferruginea* (scattered) **Mid:** 5% cover *Erythrophleum chlorostachys* (scattered) **Lower:** 60% cover. *Triodia pungens* and *Triodia bitextura* (abundant)
Deposit C - Site 4 (2011) Zone 53, 424679 E 8371651 N Photo taken: 18/05/2011 	**Vegetation Description:** Snappy Gum over Spinifex low open woodland- low stony rise **Landform:** Crest **Soil:** Yellowish brown, loamy clay, shallow **Drainage potential:** High-drainage rapid (good slope / sandy soil) **Fire:** Low impact- last fire >2 years ago **Weeds:** Absent **Ferals**: No damage	**Upper:** 10% cover *Eucalyptus leucophloia* (abundant). Species < 5% cover: *Melaleuca* sp. **Mid:** sparse **Lower:** 35-45% cover, *Triodia* sp. (common) Species < 5% cover: *Bothriochloa macra*, *Acacia* sp. *Terminalia canescens*, *Dolichandrone filifolia*
Deposit C – Site 1 (2012) Zone 53, 425566 E 8370901 N Photo taken: 23/05/2012	**Vegetation Description:** *Acacia lamprocarpa* and *Corymbia aspera* woodland **Landform:** Gully **Soil:** Clay loam **Drainage potential:** Rapidly drained (steep slope / sandy soil) **Fire:** No impact **Weeds:** Absent **Ferals**: Absent	**Upper:** 15% cover *Acacia lamprocarpa* and *Corymbia aspera* (common) **Mid:** 60% cover *Cajanus acutifolius* (common), *Denhamia saligna* (sparse) **Lower:** 50% cover *Heteropogon contortus* (dominant)

Deposit C – Site 2 (2012) Zone 53, 427036 E 8370971 Photo taken: 23/05/2012 	**Vegetation Description:** *Eucalyptus miniata* and *Eucalyptus tetrodonta* woodland **Landform:** Mid-slope **Soil:** Clay loam **Drainage potential:** Rapidly drained (steep slope / sandy soil) **Fire:** Low impact- last fire >2 years ago **Weeds:** Absent **Ferals**: Absent	**Upper:** 35% cover *Eucalyptus miniata* and *Eucalyptus tetrodonta* (common) **Mid:** 50% cover *Cajanus acutifolius* common *Helicteres isora* (scattered) **Lower:** 70% cover *Sorghum plumosum* (abundant)
Deposit C – Site 3 (2012) Zone 53, 427492 E 8370420 N Photo taken: 23/05/2012 	**Vegetation Description:** *Eucalyptus phoenicea*, *Corymbia dichromophloia* and *Eucalyptus tetrodonta* woodland **Landform:** mid-slope **Soil:** Clay loam **Drainage potential:** Rapidly drained (steep slope / sandy soil) **Fire:** Low impact- last fire >2 years ago **Weeds:** Absent **Ferals**: Absent	**Upper:** 15% cover *Eucalyptus phoenicea*, *Corymbia dichromophloia* and *Eucalyptus tetrodonta* (common) **Mid:** 5% cover *Erythrophleum chlorostachys* (scattered) **Lower:** 60% cover *Triodia bitextura* abundant, *Eriachne avenacea* (scattered)
Deposit C – Site 4 (2012) Zone 53, 427799 E 8371062 Photo taken: 23/05/2012 	**Vegetation Description:** *Eucalyptus* and *tetrodonta* *Eucalyptus miniata* woodland **Landform:** Crest **Soil:** Clay loam **Drainage potential:** Moderately well drained **Fire:** Low impact- last fire >2 years ago **Weeds:** Absent **Ferals**: Absent	**Upper:** 20% cover *Eucalyptus* and *tetrodonta* *Eucalyptus miniata* (common) **Mid:** 5% cover *Acacia* sp. (scattered) **Lower:** 70% cover *Triodia bitextura* (abundant)

Deposit C - Site 5 (2012) Zone 53, 428148 E 8371851 N Photo taken: 23/05/2012 	**Vegetation Description:** Open *Eucalyptus leucophloia* woodland over *Triodia pungens* hummock grassland **Landform:** Mid-slope **Soil:** Clay **Drainage potential:** Rapidly draining on moderate slope **Fire:** Minimal impact from fire >2 years previous **Weeds:** Absent **Ferals**: Absent **Other features:** Tree hollows scattered. Fallen logs common	**Upper:** 10% cover. *Eucalyptus leucophloia* (common) **Mid:** 2% cover. *Melaleuca citrolens* (scattered) **Lower:** 70% cover. *Triodia pungens* (abundant)
Deposit C - Site 6 (2012) Zone 53, 427622 E 8372220 N Photo taken: 23/05/2012 	**Vegetation Description:** *Corymbia terminalis*, *Eucalyptus tectifica* and *Erythrophleum chlorostachys* woodland over *Sehima nervosum* and *Sorghum plumosum* tussock woodland **Landform:** Mid-slope **Soil:** Clay loam **Drainage potential:** Rapidly drained on steep slope **Fire:** Moderate impact, fire within previous 2 years **Weeds:** Scattered Hyptis **Ferals**: Absent	**Upper:** 15% cover. *Corymbia terminalis*, *Eucalyptus tectifica* and *Erythrophleum chlorostachys* (scattered) **Mid:** 17% cover. *Cochlospermum fraseri* **Lower:** 90% cover. *Sehima nervosum* (abundant) *Sorghum plumosum* (common)

Deposit W – Site 1 Zone 53, 38600 E 832012 N Photo taken: 02/06/2011 	**Vegetation Description:** Snappy Gum and Ironwood open woodland **Landform:** Hillock **Drainage potential:** High-drainage rapid, slope 4-5% **Fire:** Unburnt for more than two years **Weeds:** Absent **Ferals**: Absent **Other features**: Scattered tree hollows present in both living and dead trees with some fallen logs scattered throughout the site. Occasional dome termite mounds	**Upper:** 20% cover, *Eucalyptus leucophloia* and *Erythrophleum chlorostachys* (common) Species < 5% cover: *Terminalia canescens*, *Alphitonia excelsa* and *Corymbia ferruginea* **Mid:** 10% cover *Petalostigma banksii* (common), *Acacia galioides* and *Erythroxylum ellipticum* (sparse) **Lower:** 45% cover *Triodia bitextura* abundant, *Sorghum plumosum* and *Aristida holathera* (common), *Schizachyrium* sp. (scattered)
Deposit W - Site 2 Zone 53, 38600 E 832023 N Photo taken: 02/06/2011 	**Vegetation Description:** *Acacia shirleyi* woodland **Landform:** Ridge line with a south-easterly aspect. **Drainage potential:** Good drainage with a slope of 5-10% **Fire:** Low intensity fire within previous 1-2 years **Weeds:** Absent **Ferals:** Absent **Other features**: Scattered tree hollows present in both living and dead trees. Some fallen logs were scattered throughout the site. Tower termite mounds common throughout.	**Upper:** 40% cover *Acacia shirleyi* (abundant) **Mid:** 5% *Acacia shirleyi* (common). Several sparsely populated species including *Carissa lanceolata*, *Cochlospermum gregorii*, *Ipomoea gracilis* and *Bonamia pannosa.* **Lower:** 15% cover *Scleria brownii* (common), *Blumea saxatilis*

Deposit W - Site 3 Zone 53, 38654 E 832011 N Photo taken: 02/06/2011 	**Vegetation Description:** *Corymbia dichromophloia* and *Erythrophleum chlorostachys* open woodland **Landform:** Ridge line **Drainage potential:** Good drainage with a slope of 5-10% **Fire:** Low intensity fire more than 2 years previous **Weeds:** Absent **Ferals:** Absent **Other features:** Scattered tree hollows present in both living and dead trees. Some fallen logs were scattered throughout the site. Some dome termite mounds present	**Upper:** 15% cover. *Corymbia dichromophloia* and *Erythrophleum chlorostachys.* **Mid:** 10% cover. *Terminalia canescens* (scattered). **Lower:** 50% cover. *Triodia bitextura* and *Sorghum plumosum* (abundant). *Evolvulus alsinoides*, *Petalostigma banksii*, *Zornia muriculata* and *Desmodium filiforme* (scattered)
Deposit W - Site 4 Zone 53, 38655 E 831992 N Photo taken: 02/06/2011 	**Vegetation Description:** *Acacia shirleyi* open woodland **Landform:** Steep slope of rocky sandstone outcrop **Soil:** Skeletal sandy soils **Drainage potential:** Very good-rapidly draining site with slope of 45% **Fire:** Low intensity fire more than two years previous **Weeds:** Absent **Ferals:** Absent **Other features:** No tree hollows. Fallen logs common. Rock crevices provide habitat for small animals.	**Upper:** 40% cover. *Acacia shirleyi* (dominant) *Eucalyptus leucophloia* and *Corymbia dichromophloia* (scattered) **Mid:** 15% cover. *Alphitonia excelsa* and *Boronia lanceolata* (common). *Ehretia saligna*, *Capparis umbonata*, *Petalostigma banksii*, *Sida macropoda* and *Bridelia tomentosa* **Lower:** 20% cover. *Digitaria breviglumis, Aristida exserta* (common). *Dicliptera armata*, *Blumea saxatilis*, *Cyanotis axillaris, Ipomoea coptica*

Deposit W - Site 5 Zone 53, 38708 E 832073 N Photo taken: 02/06/2011 	**Vegetation Description:** *Terminalia canescens* and *Erythrophleum chlorostachys* open woodland over *Sorghum plumosum* tussock grassland. **Landform:** Slope **Drainage potential:** Rapidly draining with slope of 10% **Fire:** No damage evident **Weeds:** Absent **Ferals:** Absent **Other features:** Scattered tree hollows present in both living and dead trees. Fallen logs scattered	**Upper:** 15% cover. *Terminalia canescens* (abundant). *Erythrophleum chlorostachys* (common) **Mid:** 10% cover. *Terminalia canescens* abundant. *Erythrophleum chlorostachys* (common) **Lower:** 75% cover. *Sorghum plumosum* (abundant). *Dicliptera armata*, *Rostellularia adscendens*, *Blumea saxatilis* and *Scleria brownii*
Deposit W - Site 6 Zone 53, 38716 E 832059 N Photo taken: 02/06/2011 	**Vegetation Description:** *Acacia shirleyi* woodland on hill slope **Landform:** Steep hill slope below ridge line **Soil:** Skeletal soils **Drainage potential**: Rapidly draining with a steep slope of 45% **Fire:** Unburnt for more than 2 years **Weeds:** *Passiflora foetida* scattered along a drainage line **Ferals:** Absent **Other features:** Scattered hollows in dead trees, and fallen logs common	**Upper:** 40% cover. *Acacia shirleyi* (dominant). *Corymbia aspera* and *Corymbia dichromophloia* **Mid:** 5% cover. *Acacia shirleyi*, *Boronia lanceolata* and *Distichostemon hispidulus* (common). *Wrightia saligna*, *Capparis umbonata*, *Cleome viscosa*, *Galactia tenuiflora*, *Acacia multisiliqua* **Lower:** 15% cover. *Aristida exserta* abundant. *Dicliptera armata*, *Ptilotus exaltatus*, *Marsdenia viridiflora* and *Blumea saxatilis*

Deposit W - Site 7 Zone 53, 38526 E 832122 N Photo taken: 02/06/2011 	**Vegetation Description:** *Eucalyptus leucophloia* sparse woodland over *Triodia* hummock open grassland **Landform:** Top of bare, stony hillock **Soil**: Bare gravel with skeletal soils **Drainage potential**: Rapidly draining- moderate slope with gravel **Fire:** Low intensity fire within the previous year **Weeds:** Absent **Ferals:** Absent **Other features:** Site in close proximity to vehicle track. Scattered tree hollows present in living and dead trees. Some fallen logs scattered. Mistletoe scattered. Occasional termite mounds	**Upper:** 5% cover. *Eucalyptus leucophloia* (scattered, dominant) **Mid:** 5% cover. *Petalostigma quadriloculare* (scattered). *Maytenus cunninghamii*, *Capparis umbonata* and *Erythroxylum ellipticum* **Lower:** 25% cover. *Triodia sp. longiloba* (common). *Blumea saxatilis*, *Fimbristylis oxystachya*, *Bulbostylis barbata* and *Mitrasacme scrithicola*
Deposit W - Site 8 Zone 53, 38547 E 832526 N Photo taken: 02/06/2011 	**Vegetation Description:** Sparse *Eucalyptus chlorophylla* woodland **Landform:** Flat land, adjacent to creek **Drainage potential**: Poor. Flat topography in close proximity to a creek. Waterlogged during periods of heavy rainfall **Fire:** Low intensity fire within previous year **Weeds:** Absent **Ferals:** Heavily grazed by cattle **Other features:** Scattered hollows in dead trees and scattered fallen logs	**Upper:** 5% cover. *Eucalyptus chlorophylla* (dominant) **Mid:** <5% cover. *Eucalyptus chlorophylla* (dominant) **Lower:** 30% cover. *Heteropogon contortus* (dominant). *Nelsonia campestris*, *Carissa lanceolata*, *Blumea saxatilis* and *Sphaeromorphaea australis*

Deposit W - Site 9 Zone 53, 38540 E 832472 N Photo taken: 02/06/2011 	**Vegetation Description:** *Eucalyptus camaldulensis* open woodland over open *Eulalia aurea* and *Heteropogon contortus* tussock grassland **Landform:** Flat land with small waterhole **Drainage potential:** Poor-waterlogged site with ephemeral waterhole **Fire:** Low intensity fire more than 2 years previous **Weeds:** Isolated patches of *Sida acuta* and *Hyptis suaveolens* **Ferals:** Cattle and donkey damage evident in about 20% of the site **Other features:** Scattered tree hollows present in both living and dead trees	**Upper:** 15% cover. *Eucalyptus camaldulensis* (dominant). *Erythrophleum chlorostachys* (scattered) **Mid:** 15% cover. *Acacia holosericea* (common). *Melaleuca nervosa* and *Antidesma ghesaembilla* (scattered) **Lower:** 35% cover. *Eulalia aurea* and *Heteropogon contortus* (abundant)
Deposit W - Site 10 Zone 53, 38578 E 832442 N Photo taken: 02/06/2011 	**Vegetation Description:** Open Eucalypt woodland over tussock grassland **Landform:** Flat land along a small drainage line **Drainage potential:** Poor. Flat topography and seasonal watercourse indicate seasonal waterlogging **Fire:** Unburnt for >2 years **Weeds:** Isolated patches of *Sida acuta* and *Hyptis suaveolens* **Ferals:** Cattle and donkey damage evident in about 20% of the site **Other features:** Scattered tree hollows present in both living and dead trees	**Upper: 10% cover.** *Eucalyptus camaldulensis*, *Corymbia polycarpa* and *Eucalyptus microtheca* (scattered) **Mid:** 10% cover. *Acacia holosericea* (scattered). *Eucalyptus camaldulensis*, *Fimbristylis microcarya*, *Aeschynomene indica*, *Ludwigia perennis* and *Bacopa floribunda* **Lower:** 45% cover. *Eulalia aurea*, *Panicum trachyrhachis* and *Melochia corchorifolia* (common)

Deposit W - Site 11 Zone 53, 38398 E 832183 N Photo taken: 02/06/2011 	**Vegetation Description:** *Acacia shirleyi* woodland **Landform:** Just below crest of a hillock **Drainage potential:** Good. Rapidly draining with slope of 10% **Fire:** Unburnt for >2 years **Weeds:** *Passiflora foetida* and *Hyptis suaveolens*. Site adjacent to vehicle track **Ferals:** Absent **Other features:** Scattered tree hollows and fallen logs were common. Termite mounds common	**Upper:** 30% cover. *Acacia shirleyi* (abundant and dominant) **Mid:** 5% cover. *Acacia shirleyi* (abundant). *Capparis umbonata* and *Eucalyptus leucophloia* (scattered) **Lower:** 10% cover. *Schizachyrium pachyarthron* abundant. *Panicum mindanaense* (common) and *Blumea saxatilis* (scattered)
Deposit W - Site 12 Zone 53, 38332 E 832397 N Photo taken: 02/06/2011 	**Vegetation Description:** Open *Corymbia polycarpa* woodland over *Heteropogon contortus* tussock grassland **Landform:** Flat land close to a creek **Drainage potential:** Poor. Flat topography and adjacent watercourse indicate seasonal waterlogging during periods of heavy rainfall **Fire:** Low intensity fire within the last year **Weeds:** Scattered *Hyptis suaveolens*. *Sida acuta* and *Passiflora foetida* also present. **Ferals:** Cattle and donkey damage evident in about 20% of the site **Other features:** Scattered tree hollows and fallen logs. Scattered termite mounds	**Upper:** 25% cover. *Corymbia polycarpa* (abundant), *Erythrophleum chlorostachys* (common) and *Corymbia bella* (scattered), *C. confertiflora* **Mid:** 10% cover. *Erythrophleum chlorostachys* (common). *Ehretia saligna*, *Antidesma ghesaembilla*, *Flueggea virosa* and *Barringtonia acutangula* **Lower:** 80% cover. *Heteropogon contortus* (abundant). *Hyptis suaveolens*, *Nelsonia campestris*, *Carissa lanceolata*, *Sphaeromorphaea australis*, and *Blumea tenella*

Deposit X - Site 1 Zone 53, 377967 E 8316714 N Photo taken: 18/05/2012 	**Vegetation description:** *Eucalyptus umbrawarrensis* open woodland over *Triodia* hummock grassland **Landform:** Upper slope **Soil:** Clay **Drainage potential:** Rapidly drained, moderate slope **Fire:** Moderate impact from fire >2 years previous **Weeds:** Absent **Ferals:** Absent **Other features:** Abundant tree hollows and fallen logs. Flowering *Acacia* plants scattered	**Upper:** 10% cover. *Eucalyptus umbrawarrensis* (common) **Mid:** 15% cover. *Eucalyptus umbrawarrensis* (common), *Acacia gonoclada* (scattered) **Lower:** 50% cover. *Triodia sp*. (abundant), *Schizachyrium fragile* and *Eulalia aurea* (scattered)
Deposit X - Site 2 Zone 53, 377258 E 8315741 Photo taken: 18/05/2012 	**Vegetation description:** Low open *Eucalyptus umbrawarrensis* and *Acacia gonoclada* woodland over *Triodia* hummock grassland **Landform:** Ridge / upper slope **Drainage potential:** Rapidly drained on moderate slope **Fire:** Moderate impact from fire from >2 years previous **Weeds:** Absent **Ferals:** Absent **Other features:** Tree hollows common, fallen logs scattered	**Upper:** 5% cover. *Eucalyptus umbrawarrensis* (common) **Mid:** 5% cover. *Acacia gonoclada* (common) **Lower:** 90% cover. *Triodia bitextura*, *Triodia pungens* and *Eulalia aurea* (abundant). *Schizachyrium fragile* (scattered)

Deposit X - Site 3 Zone 53, 377454 E 8313749 N Photo taken: 18/05/2012 	**Vegetation description:** Open *Erythrophleum chlorostachys* woodland over *Sorghum plumosum* tussock grassland **Landform:** Mid-slope **Soil:** Sandy clay **Drainage potential:** Rapidly draining soil on moderate slope **Fire:** Moderate impact from fire from >2 years previous **Weeds:** Absent **Ferals:** Absent **Other features:** Tree hollows and fallen logs abundant. Flowering plants abundant. Termite mounds common	**Upper:** 13% cover. *Erythrophleum chlorostachys* (common), *Corymbia dichromophloia* (scattered) **Mid:** 20% cover. *Petalostigma banksii* (common) **Lower:** 90% cover. *Sorghum plumosum* (abundant), *Chrysopogon fallax* and *Eriachne obtusa* (scattered)
Deposit X - Site 4 Zone 53, 376473 E 8315491 N Photo taken: 18/05/2012 	**Vegetation description:** Open *Eucalyptus umbrawarrensis* and *Acacia gonocarpa* woodland over mixed hummock and tussock grassland **Landform:** Hillock **Soil:** Clay **Drainage potential:** Rapidly draining **Fire:** Moderate impact from fire from >2 years previous **Weeds:** Absent **Ferals:** Absent **Other features:** Tree hollows abundant. Fallen logs common. Flowering Acacia plants abundant	**Upper:** 5% cover. *Eucalyptus umbrawarrensis* (common) **Mid:** 8% cover. *Acacia gonocarpa* (common) **Lower:** 45% cover. *Schizachyrium fragile*, *Eulalia aurea* and *Triodia pungens* (common)

Deposit X - Site 5 Zone 53, 376305 E 8315619 N Photo taken: 18/05/2012 	**Vegetation description:** Closed *Acacia shirleyi* forest **Landform:** Hillock **Soil:** Clay **Drainage potential:** Rapidly draining, moderate slope **Fire:** Minimal impact, fire >2 years previous **Weeds:** Absent **Ferals:** Absent **Other features:** Abundant fallen logs	**Upper:** 95% cover. *Acacia shirleyi* (abundant) **Mid:** <1% cover. *Corymbia dichromophloia* (scattered) **Lower:** 5% cover. *Chrysopogon fallax* and *Cheilanthes nitida* (scattered)
Deposit X - Site 6 Zone 53, 376736 E 8315336 N Photo taken: 18/05/2012 	**Vegetation description:** Low open Eucalypt woodland over Triodia hummock grassland **Landform:** Mid slope **Soil:** Clay loam **Drainage potential:** Rapidly drained, moderate slope **Fire:** Minimal impact, fire >2 years previous **Weeds:** Absent **Ferals:** Compaction hoof marks from cattle or donkey **Other features:** Scattered tree hollows and fallen logs	**Upper:** 10% cover. *Eucalyptus umbrawarrensis* (common), *Erythrophleum chlorostachys* (scattered) **Mid:** <5% cover. *Acacia* sp. (scattered) **Lower:** 40-50% cover. *Triodia* sp. (abundant)

Blackwater Creek Site - Site 1 Zone 53, 414057 E 8346743 N Photo taken: 07/06/2011 	**Vegetation description:** *Eucalyptus camaldulensis* over *Barringtonia aculeata* riparian woodland **Landform:** Creek/river **Drainage potential:** Drains moderately well. Occasional seasonal waterlogging **Fire:** Minimal impact, fire >2 years previous **Weeds:** Isolated patches of *Passiflora foetida*, *Hyptis suaveolens* and *Sida acuta* **Ferals:** Pig diggings evident. Cattle and donkey damage **Other features:** Scattered tree hollows and fallen logs	**Upper:** 20% cover. *Eucalyptus camaldulensis* (abundant), *Melaleuca argentea* and *Terminalia platyptera* (common) **Mid:** 25-30% cover. *Barringtonia acutangula* (abundant), *Helicteres isora* (common), *Alphitonia excelsa* (scattered) **Lower:** 25-30% cover. *Sorghum plumosum* (common), *Mnesithea rottboellioides* (scattered)
Blackwater Creek Site - Site 2 Zone 53, 415086 E 8348057 N Photo taken: 07/06/2011 	**Vegetation description:** *Erythrophleum chlorostachys* and *Eucalyptus confertiflora* open woodland over *Sorghum* and *Burrinus ciliaris* grassland **Landform:** Lower slope **Soil:** Clay loam **Drainage potential:** Good-drainage rapid, moderate slope **Fire:** Low impact fire within the previous year **Weeds:** Absent **Ferals:** Some cattle impact **Other features:** Scattered tree hollows	**Upper:** 10% cover. *Erythrophleum chlorostachys* and *Corymbia confertiflora* (common). **Mid:** 5-10% cover. *Erythrophleum chlorostachys* and *Terminalia canescens* (common) **Lower:** 90% cover. *Sorghum plumosum* (abundant), *Chrysopogon fallax* (common)

Blackwater Creek Site - Site 3 Zone 53, 414943 E 8347971 N Photo taken: 07/06/2011 	**Vegetation description:** *Erythrophleum chlorostachys* open woodland over *Terminalia canescens* shrubs and *Sorghum plumosum* grassland **Landform:** Simple slope **Soil:** Loam **Drainage potential:** Drainage rapid on moderate slope **Fire:** Minimal impact. Fire >2 years previous **Weeds:** Absent **Ferals:** Absent **Other features:** Fallen logs common	**Upper:** 5% cover. *Erythrophleum chlorostachys* (abundant), *Corymbia flavescens* (scattered) **Mid:** 10-15%. *Terminalia canescens* (abundant) **Lower:** 70% cover. *Sorghum plumosum* (abundant), *Triodia longiloba/ epactia* (common)
Blackwater Creek Site - Site 4 Zone 53, 412657 E 8349857 N Photo taken: 07/06/2011 	**Vegetation Description:** *Eucalyptus leucophloia* open woodland over *Melaleuca citrolens* shrubs and mixed grasses **Landform:** Crest **Soil:** Clay loam **Drainage potential:** Good-rapid drainage **Fire:** No impact **Weeds:** Absent **Ferals:** Absent **Other features:** Scattered tree hollows and fallen logs. Sparse termite mounds	**Upper:** 10% cover. *Eucalyptus leucophloia* (common) **Mid:** 5% cover. *Melaleuca citrolens* (scattered) **Lower:** 50% cover. *Triodia sp.* (abundant), *Schizachyrium sp.* and *Chrysopogon fallax* (scattered)

Blackwater Creek Site - Site 5 Zone 53, 412000 E 8550000 N Photo taken: 07/06/2011 	**Vegetation Description:** Low *Eucalyptus tectifica* woodland over *Petalostigma banksii* shrubs and *Sorghum* grasses **Landform:** Flat land **Soil:** Clay loam **Drainage potential:** Moderately well drained- occasional waterlogging **Fire:** No impact **Weeds:** Absent **Ferals:** Some pig diggings and evidence of donkey impacts **Other features:** Scattered tree hollows and fallen logs	**Upper:** 15% cover. *Eucalyptus tectifica* (common), *Terminalia platyptera* (scattered) **Mid:** 15% cover. *Petalostigma banksii* (common), *Terminalia canescens* and *Melaleuca citrolens* (scattered) **Lower:** 80% cover. *Sorghum plumosum* (abundant). *Triodia bitextura* and *Chrysopogon fallax* (common)
Blackwater Creek Site - Site 6 Zone 53, 411457 E 8350114 N Photo taken: 07/06/2011 	**Vegetation Description:** Low *Melaleuca citrolens* woodland over *Eulalia aurea* grasses **Landform:** Flat land **Soil:** Clay loam **Drainage potential:** Poor drainage- seasonally waterlogged most years **Fire:** No impact **Weeds:** Absent **Ferals:** Evidence of pig, cattle and donkey damage **Other features:** Scattered fallen logs and sparse termite mounds	**Upper:** 20% cover. *Melaleuca citrolens* (abundant/ dominant), *Terminalia platyptera*, *Atalaya hemiglauca* and *Eucalyptus pruinosa* (scattered) **Mid:** 10% cover. *Carissa lanceolata* common. *Flueggea virosa* (scattered) **Lower:** 5% cover. *Eulalia aurea* (abundant), *Chrysopogon fallax* and *Aristida latifolia* (common)

Blackwater Creek Site - Site 7 Zone 53, 411183 E 8350000 N Photo taken: 07/06/2011 	**Vegetation Description:** *Acacia difficilis* open woodland over mixed mid storey and *Sorghum* grass **Landform:** Flat land **Soil:** Clay loam **Drainage potential:** Moderately well drained with occasional seasonal waterlogging **Fire:** No impact **Weeds:** Absent **Ferals:** Some pig diggings. Cattle and donkey impacts also evident	**Upper:** 15% cover. *Corymbia polycarpa* and *Erythrophleum chlorostachys* (scattered), *Corymbia confertiflora* **Mid:** 15% cover. *Acacia difficilis* (abundant), *Terminalia platyptera* common. *Erythrophleum chlorostachys* (scattered) **Lower:** 60% cover. *Sorghum plumosum* (abundant), *Waltheria indica* (common)
Hodgson River Site 1 Zone 53, 423292 E 8348106 N Photo taken: 21/06/2011 	**Vegetation description:** Closed Casuarina woodland along steep river banks **Landform:** Riparian channel, northern bank **Soil:** river sand and sediment **Drainage potential:** Rapid drainage **Fire:** Low **Weeds:** Couch Grass which has been heavily grazed by Cattle **Ferals:** Cattle, Pigs **Other features:** Many fallen logs from wet season river flows. Exposed roots on river banks. Some larger trees had good hollows. Erosion present	**Upper:** Canopy 60%, Height 6-16m; average 10m *Casuarina cunninghamiana* *Melaleuca argentea* *Terminalia platyphylla* **Mid:** Canopy 20-50%, Height 1.5-4m; average 2.5m *Cathormion umbellatum,* *Barringtonia acutangula,* *Strychnos lucida* **Lower:** Canopy is mostly bare. Height <0.25m. *Cynodon dactylon*

Hodgson River Site 2 Zone 53, 423329 E 8348154 N Photo taken: 21/06/2011 	**Vegetation description:** Open Corymbia /Casuarina woodland with Whitewood and Acacia mid story over Chrysopogon grassland **Landform:** Floodplain adjacent to Hodgson River **Soil:** Deep sandy loam, brown. **Drainage potential:** moderate, occasional waterlogging **Fire:** Low impact due to high grazing **Weeds:** High, couch grass **Ferals:** Moderate impact from cattle **Other features:** Good level of fallen logs and tree hollows. Poor mid and lower storey vegetation. Shallow and patchy leaf litter	**Upper:** Canopy >50%, Height 7-12m; average 11m *Casuarina cunninghamiana* *Corymbia bella* **Mid:** Canopy 30%, Height 1.5-3.5m; ave. 2.5m *Cathormion umbellatum,* *Atalaya hemiglauca,* *Excoecaria parvifolia* **Lower:** Canopy is mostly bare. Height 0.2-0.5m. *Cynodon dactylon,* *Chrysopogon fallax*
Hodgson River Site 3 Zone 53, 422678 E 8349014 N Photo taken: 21/06/2011 	**Vegetation description:** Low open woodland dominated by *Eucalyptus pruinosa* and *Melaleuca citrolens* over sparse tussock grasses **Landform:** Flat plain **Soil:** Deep clay loam, yellowish brown. **Drainage potential:** mod. to poor **Fire:** Low **Weeds:** Absent **Ferals:** Cattle **Other features:** Shallow leaf litter. Scattered small tree hollows, 500m from small creek. Termite mounds (towers to 1m) common	**Upper:** Canopy 10-20%, Height 4-8m; average 7m *Eucalyptus pruinosa* *Melaleuca citrolens* **Mid:** Canopy <10%, Height 1-2m; ave. 1.5m *Melaleuca citrolens,* *Grevillea striata,* *Terminalia canescens* **Lower:** Canopy 40%; Height 0.1-1m; ave. 0.8m *Sehima nervosa,* *Sorghum plumosum*

Hodgson River Site 4 Zone 53, 425027 E 8349344 N Photo taken: 21/06/2011 	**Vegetation description:** Closed Casuarina woodland along steep river banks **Landform:** Riparian channel, northern bank **Soil:** river sand and sediment **Drainage potential:** Rapid drainage **Fire:** Low **Weeds:** Couch Grass which has been heavily grazed by Cattle **Ferals:** Cattle, Pigs **Other features:** Many fallen logs from wet season river flows. Exposed roots on river banks. Some larger trees had good hollows. Erosion present	**Upper:** Canopy 70%, Height 6-16m; average 10m *Casuarina cunninghamiana,* *Melaleuca argentea,* *Terminalia platyphylla* **Mid:** Canopy 20-50%, Height 1.5-4m; average 2.5m *Cathormion umbellatum,* *Barringtonia acutangula,* *Strychnos lucida* **Lower:** Canopy is mostly bare. Height <0.25m. *Cynodon dactylon*
Hodgson River Site 5 Zone 53, 425130 E 8349254 N Photo taken: 21/06/2011 	**Vegetation description:** Closed Casuarina woodland along steep river banks **Landform:** Riparian channel, southern bank **Soil:** river sand and sediment **Drainage potential:** Rapid drainage **Fire:** Low **Weeds:** Couch Grass which has been heavily grazed by Cattle **Ferals:** Cattle, Pigs **Other features:** Many fallen logs from wet season river flows. Exposed roots on river banks. Some larger trees had good hollows. Erosion present	**Upper:** Canopy 80%, Height 6-16m; average 10m *Casuarina cunninghamiana,* *Melaleuca argentea,* *Terminalia platyphylla* **Mid:** Canopy 20-50%, Height 1.5-4m; average 2.5m *Cathormion umbellatum,* *Barringtonia acutangula,* *Strychnos lucida* **Lower:** Canopy is mostly bare. Height <0.25m. *Cynodon dactylon*

Hodgson River Site 6 Zone 53, 424935 E 8348514 N Photo taken: 21/06/2011 	**Vegetation description:** Grassland with sparse Coolabah trees. Scattered shallow billabongs **Landform:** floodplain **Soil:** Clay **Drainage potential:** Poor **Fire:** Low **Weeds:** Absent **Feral:** Cattle, Pigs **Other features:** Coolabah trees had good hollows. Some fallen logs. Close to water source (i.e. billabong)	**Upper:** Canopy 15%, Height 5-11m; average 7m *Eucalyptus microtheca* **Mid:** Canopy <5%, Height 1.5-4m; average 2.5m *Eucalyptus microtheca,* *Carissa lanceolata* **Lower:** Canopy 85%. Height 0.8-1.2m; ave. 1.2m *Sehima nervosa*, *Dichanthium fecundum*
LD Creek Site 1 Zone 53, 381986 E 8323285 N Photo taken: 15/05/2012 	**Vegetation description:** Open woodland adjacent to permanent water **Landform:** Flat **Soil:** Sandy soil with loam/silt **Drainage potential:** Good **Fire:** Low fire impact **Weeds:** *Hyptis* sp. present **Ferals:** Cattle, donkeys, pigs and dogs **Other features:** Lots of leaf litter and hollow logs present	(flora data not collected)
LD Creek Site 2 Zone 53, 381559 E 8322901 N Photo taken: 15/05/2012 	**Vegetation description:** **Landform:** Open woodland with dense grassy understorey **Soil:** Sandy soil **Drainage potential:** Moderate to poor **Fire:** Low fire impact **Weeds:** No weeds **Ferals:** Cattle, donkeys, pigs and dogs **Other features:** Small tree hollows common in trees	**Upper:** *Eucalyptus chlorophylla* (limited flora data collected)

LD Creek Site 3 Zone 53, 380970 E 8322509 N Photo taken: 15/05/2012 	**Vegetation description:** Open woodland with grassy understorey **Landform:** Flat **Soil:** Sandy soil **Drainage potential:** Moderate to poor **Fire:** Low fire impact **Weeds:** No weeds **Ferals:** Cattle, donkeys, pigs and dogs **Other features:**	**Upper:** *Melaleuca viridiflora* (limited flora data collected)
LD Creek Site 4 Zone 53, 381544 E 8322175 N Photo taken: 15/05/2012 	**Vegetation description:** **Landform:** **Soil:** Sandy soil **Drainage potential:** Moderate to poor **Fire:** Low fire impact **Weeds:** No weeds **Ferals:** Cattle, donkeys, pigs and dogs **Other features:**	(flora data not collected)
LD Creek Site 5 Zone 53, 381519 E 8321655 N Photo not taken.	**Vegetation description:** **Landform:** **Soil:** Sandy soil **Drainage potential:** Moderate to poor **Fire:** Low fire impact **Weeds:** No weeds **Ferals:** Cattle, donkeys, pigs and dogs **Other features:**	(flora data not collected)

LD Creek Site 6 Zone 53, 381226 E 8321012 N Photo taken: 15/05/2012 	**Vegetation description:** **Landform:** **Soil:** Sandy soil **Drainage potential:** Moderate to poor **Fire:** Low fire impact **Weeds:** No weeds **Ferals:** Cattle, donkeys, pigs and dogs **Other features:**	(flora data not collected)
LD Creek Site 7 Zone 53, 380809 E 8322593 N Photo taken: 15/05/2012 	**Vegetation description:** Open *Eucalyptus miniata* woodland at base of scree gully with spinifex cover. **Landform:** Rocky ridge **Soil:** Sandy soil **Drainage potential:** Very high **Fire:** Low fire impact **Weeds:** No weeds **Ferals:** Cattle, donkeys, pigs and dogs **Other features:** Rock crevices and caves	**Upper:** 30% cover *Eucalyptus miniata* **Mid:** 40% cover **Lower:** 80% cover of spinifex
Little Towns River Site 1 Zone 53, 488205 E 8331836 N Photo taken: 25/05/2011 	**Vegetation description:** Open *Eucalyptus camaldulensis* woodland beside creek over *Aristida holathera* tussock understorey **Landform:** Creek/river **Soil:** Sand **Drainage potential:** Very poor drainage. Seasonal inundation expected **Fire:** Moderate impact. Previous fire more than 2 years previous **Weeds:** Absent **Ferals:** Significant impacts from cow, horse and donkeys **Other features:** Hollows and fallen tree logs common	**Upper:** *Eucalyptus camaldulensis* (common) **Mid:** *Acacia holosericea* and *Melaleuca viridiflora* (scattered) **Lower:** *Aristida holathera* (common). *Chrysopogon sp*. (scattered)

Little Towns River Site 2 Zone 53, 488476 E 8331791 N Photo taken: 25/05/2011 	**Vegetation description:** *Eucalyptus miniata* and *Corymbia setosa* woodland over low shrubland of *Petalostigma quadriloculare* and *Triodia bitextura* hummock grassland **Landform:** Ridge **Soil:** Organic **Drainage potential:** Rapid drainage on moderate slope **Fire:** Moderate impact from fire within the previous year **Weeds:** Absent **Ferals:** Moderate impacts from cattle and buffalo **Other features:** Tree hollows common. Fallen logs abundant. Mistletoe scattered	**Upper:** *Eucalyptus miniata* and *Corymbia setosa* (abundant), *Erythrophleum chlorostachys* (common), *Eucalyptus tetrodonta* and *Owenia venosa* (scattered) **Mid:** *Terminalia canescens* and *Petalostigma quadriloculare* (common), *Erythrophleum chlorostachys* (scattered) **Lower:** *Triodia bitextura* (abundant), *Cassytha filiformis* and *Bossiaea bossiaeoides* (common)
Little Towns River Site 3 Zone 53, 488791 E 8331481 N Photo taken: 25/05/2011 	**Vegetation description:** *Eucalyptus miniata* and *Eucalyptus tetrodonta* woodland on sandy deep soils with sparse *Grevillea* shrubs and a *Triodia bitextura* hummock grassland **Landform:** Flat **Soil:** Sandy **Drainage potential:** Drains moderately well with occasional inundation/ waterlogging **Fire:** Moderate impact from fire within the last 2 years **Weeds:** Absent **Ferals:** Moderate impact from pig, horse and donkey **Other features:** Tree hollows and fallen logs common. Flowering plants common. Mistletoe (scattered)	**Upper:** *Eucalyptus miniata* and *Eucalyptus tetrodonta* (abundant), *Erythrophleum chlorostachys* (common) **Mid:** *Grevillea decurrens* and *Grevillea pteridifolia* (scattered) **Lower:** *Triodia bitextura* (common). *Chrysopogon fallax* and *Aristida holathera* (scattered)

Mountain Creek Site 1 Zone 53, 467665 E 8336523 N Photo taken: 25/05/2011 	**Vegetation description:** Eucalypt Mid Open Woodland **Landform:** Rocky Gorge **Soil:** Sand **Drainage potential:** Rapidly draining with sandy soil and 0-11% slope **Fire:** Low incidence of fire > 2 years since the previous fire **Weeds:** Absent **Ferals:** Evidence of donkeys **Other features:** Scattered tree hollows. Shallow leaf litter in patches.	**Upper:** 5% cover, on average 10m high. *Eucalyptus tetrodonta* over *Melaleuca nervosa* with *Grevillea pteridifolia*, *Grevillea benthamiana*, *Buchanania obovata* and *Terminalia carpentariae* **Mid:** 5-10% cover, on average 5m high. *Grevillea pteridifolia*, *Erythrophleum chlorostachys*, *Acacia difficilis*, *Alstonia* sp. **Lower:** 80% cover on average 0.1m high. *Sarga plumosum*, *Chrysopogon fallax*, *Aristida holathera*, with Spinifex
Mountain Creek Site 2 Zone 53, 468297 E 8336254 N Photo taken: 25/05/2011 	**Vegetation description:** *Corymbia polycarpa* Mid Woodland **Landform:** Back plain **Soil:** Clay over sand **Drainage potential:** 1% slope poor to imperfectly drained with seasonal inundation expected most years **Fire:** Low incidence of fire > 2 years since the previous fire **Weeds:** Absent **Ferals:** Buffalo present and pig damage evident **Other features:** Scattered tree hollows and fallen logs with moderate leaf litter in places and sparse magnetic mounds of >1m.	**Upper:** 25-30% cover, on average 12m high. *Corymbia polycarpa* **Mid:** 5% cover on average 4m high. *Pandanus spiralis*, *Grevillea pteridifolia* and *Erythrophleum chlorostachys* with *Vitex sp*. **Lower:** 90% cover on average 0.3m high. *Arthrostylis aphylla* and various sedges

Mountain Creek Site 3 Zone 53, 467591 E 8336915 N Photo taken: 25/05/2011 	**Vegetation description:** Eucalyptus leucophloia Mid Open Woodland **Landform:** Hill Rise (<30m high) **Soil:** Sandy loam with 2-3% slope and 45% gravel cover **Drainage potential:** Rapidly draining **Fire:** Low incidence of fire > 2 years since the previous fire **Weeds:** Absent **Ferals:** No visible disturbance by feral grazers but a nearby track has evidence of donkey and buffalo presence **Other features:** < 5% litter cover with, shallow leaf litter, scattered living and dead tree hollows. Scattered fallen logs present	**Upper:** 5% cover, on average 8m high. *Eucalyptus leucophloia* with scattered *E. phoenicea* and *E. ferruginea* **Mid:** <5% cover, on average 3m high. *Terminalia canescens*, *Acacia conspera*, *Acacia sublanata* and *Wrightia saligna* **Lower:** 40% cover, on average 0.35m high. *Jacksonia odontoclada* and *Spinifex bitextura* with *Grevillea angulata*, *Calytrix exstipulata* and *Schizachyrium fragile*

Appendix 2– Fauna records recorded during the field surveys for Sherwin Iron

Scientific Name	Common Name	Deposit C	Deposit W	Deposit X	Blackwater Creek	Hodgson River	LD Creek	Little Towns River	Mountain Creek	TPWC	Migratory
ACANTHIZIDAE											
Gerygone albogularis	White-throated Gerygone		X	X	X		X			LC	0
Gerygone chloronota	Green-backed Gerygone								X	LC	0
Smicrornis brevirostris	Weebill	X	X	X	X	X	X		X	LC	0
ACCIPITRIDAE											
Accipiter cirrhocephalus	Collared Sparrowhawk		X				X			LC	0
Accipiter fasciatus	Brown Goshawk	X	X	X	X	X	X	X		LC	0
Aquila audax	Wedge-tailed Eagle	X	X	X		X	X			LC	0
Circus approximans	Swamp Harrier							X		LC	0
Haliaeetus leucogaster	White-bellied Sea-eagle		X							LC	1
Haliastur sphenurus	Whistling Kite	X	X	X	X	X	X	X	X	LC	0
Hamirostra melanosternon	Black-breasted Buzzard	X				X	X			LC	0
Milvus migrans	Black Kite	X				X	X	X	X	LC	0
AEGOTHELIDAE											
Aegotheles cristatus	Australian Owlet-nightjar			X	X	X	X			LC	0
ALCEDINIDAE											
Ceyx azureus	Azure Kingfisher	X			X	X		X		LC	0
ANATIDAE											
Dendrocygna eytoni	Plumed Whistling-Duck				X					LC	0
ANHINGIDAE											
Anhinga novaehollandiae	Australasian Darter						X			LC	0
ANSERANATIDAE											
Anseranas semipalmata	Magpie Goose						X	X		LC	0

Scientific Name	Common Name	Deposit C	Deposit W	Deposit X	Blackwater Creek	Hodgson River	LD Creek	Little Towns River	Mountain Creek	TPWC	Migratory
ARDEIDAE											
Ardea intermedia	Intermediate Egret		X			X				LC	0
Ardea pacifica	White-necked Heron					X	X		X	LC	0
Egretta novaehollandiae	White-faced Heron	X				X				LC	0
Ixobrychus flavicollis	Black Bittern					X		X	X	LC	0
Nycticorax caledonicus	Nankeen Night Heron				X	X	X	X	X	LC	0
ARTAMIDAE											
Artamus cinereus	Black-faced Woodswallow	X	X	X	X		X	X	X	LC	0
Artamus leucorynchus	White-breasted Woodswallow					X				LC	0
Artamus minor	Little Woodswallow	X		X				X	X	LC	0
Cracticus nigrogularis	Pied Butcherbird	X	X	X	X	X	X	X	X	LC	0
Cracticus tibicen	Australian Magpie	X	X			X				LC	0
BURHINIDAE											
Burhinus grallarius	Bush Stone-curlew		X	X	X		X	X	X	NT	0
CACATUIDAE											
Cacatua galerita	Sulphur-crested Cockatoo	X	X			X	X	X	X	LC	0
Cacatua sanguinea	Little Corella						X			LC	0
Calyptorhynchus banksii	Red-tailed Black-cockatoo	X	X	X	X	X	X	X	X	LC	0
Eulophus roseicapilla	Galah		X	X	X	X	X	X		LC	0
CAMPEPHAGIDAE											
Coracina novaehollandiae	Black-faced Cuckoo-shrike	X	X	X	X	X	X	X	X	LC	0
Coracina papuensis	White-bellied Cuckoo-shrike	X	X	X	X	X	X	X	X	LC	0
Lalage sueurii	White-winged Triller			X	X				X	LC	0
CHARADRIIDAE											
Vanellus miles	Masked Lapwing			X						LC	0
CICONIIDAE											
Ephippiorhynchus asiaticus	Black-necked Stork					X		X	X	LC	0

Scientific Name	Common Name	Deposit C	Deposit W	Deposit X	Blackwater Creek	Hodgson River	LD Creek	Little Towns River	Mountain Creek	TPWC	Migratory
CISTICOLIDAE											
Cisticola juncidis	Zitting Cisticola		X							LC	0
CLIMACTERIDAE											
Climacteris melanura	Black-tailed Treecreeper	X	X			X				LC	0
COLUMBIDAE											
Geopelia cuneata	Diamond Dove	X			X	X				LC	0
Geopelia humeralis	Bar-shouldered Dove	X	X		X		X	X	X	LC	0
Geopelia striata	Peaceful Dove	X	X	X	X	X	X	X	X	LC	0
Phaps chalcoptera	Common Bronzewing	X	X	X	X		X			LC	0
CORCORACIDAE											
Struthidea cinerea	Apostlebird	X	X	X		X	X			LC	0
CORVIDAE											
Corvus orru	Torresian Crow	X	X	X	X	X	X	X	X	LC	0
CUCULIDAE											
Cacomantis pallidus	Pallid Cuckoo					X				LC	0
Cacomantis variolosus	Brush Cuckoo								X	LC	0
Centropus phasianinus	Pheasant Coucal	X					X			LC	0
ESTRILDIDAE											
Heteromunia pectoralis	Pictorella Mannikin		X							NT	0
Lonchura castaneothorax	Chestnut-breasted Mannikin						X			LC	0
Neochmia phaeton	Crimson Finch						X		X	LC	0
Neochmia ruficauda	Star Finch		X							NT	0
Poephila acuticauda	Long-tailed Finch	X	X	X			X	X	X	LC	0
Poephila personata	Masked Finch		X		X	X	X	X	X	LC	0
Taeniopygia bichenovii	Double-barred Finch	X	X		X	X	X		X	LC	0
EUROSTOPDIDAE											
Eurostopodus argus	Spotted Nightjar		X	X	X		X		X	LC	0

Scientific Name	Common Name	Deposit C	Deposit W	Deposit X	Blackwater Creek	Hodgson River	LD Creek	Little Towns River	Mountain Creek	TPWC	Migratory
FALCONIDAE											
Falco berigora	Brown Falcon	X		X	X	X			X	LC	0
Falco hypoleucos	Grey Falcon			X						VU	0
GRUIDAE											
Grus rubicunda	Brolga					X	X	X	X	LC	0
HALCYONIDAE											
Dacelo leachii	Blue-winged Kookaburra	X	X		X	X	X	X		LC	0
Todiramphus pyrrhopygius	Red-backed Kingfisher			X		X				LC	0
Todiramphus sanctus	Sacred Kingfisher		X		X				X	LC	0
HIRUNDINIDAE											
Petrochelidon nigricans	Tree Martin					X				LC	0
MALURIDAE											
Malurus coronatus macgillivrayi	Purple-crowned Fairy-wren (western)								X	NT	0
Malurus lamberti	Variegated Fairy-wren	X					X		X	LC	0
Malurus melanocephalus	Red-backed Fairy-wren	X	X	X	X	X	X	X	X	LC	0
MEGALURIDAE											
Megalurus timoriensis	Tawny Grassbird						X			LC	0
MELIPHAGIDAE											
Cissomela pectoralis	Banded Honeyeater	X			X			X	X	LC	0
Conopophila albogularis	Rufous-banded Honeyeater					X	X			LC	0
Conopophila rufogularis	Rufous-throated Honeyeater					X		X	X	LC	0
Entomyzon cyanotis	Blue-faced Honeyeater						X	X		LC	0
Lichenostomus flavescens	Yellow-tinted Honeyeater	X			X		X		X	LC	0
Lichenostomus keartlandi	Grey-headed Honeyeater		X							LC	0
Lichenostomus plumulus	Grey-fronted Honeyeater	X								LC	0
Lichenostomus unicolor	White-gaped Honeyeater	X			X	X	X	X	X	LC	0
Lichenostomus virescens	Singing Honeyeater								X	LC	0

Scientific Name	Common Name	Deposit C	Deposit W	Deposit X	Blackwater Creek	Hodgson River	LD Creek	Little Towns River	Mountain Creek	TPWC	Migratory
Lichmera indistincta	Brown Honeyeater	X			X	X	X	X		LC	0
Manorina flavigula	Yellow-throated Miner					X				LC	0
Melithreptus albogularis	White-throated Honeyeater	X	X	X	X	X	X	X		LC	0
Philemon argenticeps	Silver-crowned Friarbird	X			X	X	X	X		LC	0
Philemon buceroides	Helmeted Friarbird					X				LC	0
Philemon citreogularis	Little Friarbird				X	X	X	X	X	LC	0
Purnella albifrons	White-fronted Honeyeater	X								LC	0
Ramsayornis fasciatus	Bar-breasted Honeyeater							X	X	LC	0
MEROPIDAE											
Merops ornatus	Rainbow Bee-eater	X	X	X	X	X	X	X	X	LC	1
MONARCHIDAE											
Grallina cyanoleuca	Magpie-lark	X	X		X	X	X		X	LC	0
Myiagra inquieta	Restless Flycatcher		X	X	X		X	X	X	LC	0
Myiagra rubecula	Leaden Flycatcher	X	X	X	X	X				LC	0
NECTARINIIDAE											
Dicaeum hirundinaceum	Mistletoebird				X	X				LC	0
NEOSITTIDAE											
Daphoenositta chrysoptera	Varied Sittella	X	X	X	X	X	X			LC	0
ORIOLIDAE											
Oriolus flavocinctus	Yellow Oriole				X					LC	0
Oriolus sagittatus	Olive-backed Oriole		X	X	X	X			X	LC	0
OTIDIDAE											
Ardeotis australis	Australian Bustard			X		X			X	NT	0
PACHYCEPHALIDAE											
Colluricincla harmonica	Grey Shrike-thrush	X		X	X		X			LC	0
Colluricincla megarhyncha	Little Shrike-thrush	X								LC	0
Colluricincla woodwardi	Sandstone Shrike-thrush	X							X	LC	0
Pachycephala rufiventris	Rufous Whistler	X	X	X	X	X	X	X	X	LC	0

Scientific Name	Common Name	Deposit C	Deposit W	Deposit X	Blackwater Creek	Hodgson River	LD Creek	Little Towns River	Mountain Creek	TPWC	Migratory
PARDALOTIDAE											
Pardalotus rubricatus	Red-browed Pardalote						X		X	LC	0
Pardalotus striatus	Striated Pardalote	X	X	X	X	X	X	X	X	LC	0
PETROICIDAE											
Melanodryas cucullata	Hooded Robin			X						(NL)	0
Microeca fascinans	Jacky Winter	X		X			X	X	X	LC	0
Microeca flavigaster	Lemon-bellied Flycatcher		X		X					LC	0
Poecilodryas cerviniventris	Buff-sided Robin	X							X	NT	1
PHALACROCORACIDAE											
Microcarbo melanoleucos	Little Pied Cormorant						X			LC	0
Phalacrocorax sulcirostris	Little Black Cormorant						X			LC	0
PHASIANIDAE											
Coturnix ypsilophora	Brown Quail		X		X			X		LC	0
PODARGIDAE											
Podargus strigoides	Tawny Frogmouth	X		X	X	X	X	X	X	LC	0
POMATOSTOMIDAE											
Pomatostomus temporalis	Grey-crowned Babbler		X	X	X	X	X	X		LC	0
PSITTACIDAE											
Aprosmictus erythropterus	Red-winged Parrot	X	X	X	X	X	X	X	X	LC	0
Melopsittacus undulatus	Budgerigar	X					X			LC	0
Platycercus venustus	Northern Rosella	X	X				X			LC	0
Psephotus dissimilis	Hooded Parrot		X	X			X			NT	0
Psitteuteles versicolor	Varied Lorikeet	X					X	X	X	LC	0
Trichoglossus haematodus	Rainbow Lorikeet	X	X	X	X	X	X	X		LC	0
PTILONORHYNCHIDAE											
Ptilonorhynchus nuchalis	Great Bowerbird	X		X		X	X	X	X	LC	0
RHIPIDURIDAE											

Scientific Name	Common Name	Deposit C	Deposit W	Deposit X	Blackwater Creek	Hodgson River	LD Creek	Little Towns River	Mountain Creek	TPWC	Migratory
Rhipidura albiscapa	Grey Fantail				X				X	LC	0
Rhipidura dryas	Arafura Fantail		X							LC	0
Rhipidura leucophrys	Willie Wagtail	X	X	X	X	X	X	X	X	LC	0
Rhipidura rufiventris	Northern Fantail	X			X					LC	0
STRIGIDAE											
Ninox novaeseelandiae	Southern Boobook	X					X			LC	0
THRESKIORNITHIDAE											
Threskiornis molucca	Australian White Ibis						X			LC	0
Threskiornis spinicollis	Straw-necked Ibis					X				LC	0
TURNICIDAE											
Turnix pyrrhothorax	Red-chested Button-quail	X								LC	0
Turnix velox	Little Button-quail			X						LC	0
FROG											
BUFONIDAE											
Rhinella marina	Cane Toad	X	X		X	X	X	X	X	(Int)	0
HYLIDAE											
Litoria bicolor	Northern Dwarf Tree-frog		X		X					LC	0
Litoria caerulea	Green Tree-frog	X			X	X				LC	0
Litoria inermis	Peters' Frog	X			X		X	X		LC	0
Litoria nasuta	Rocket Frog							X	X	LC	0
Litoria pallida	Pale Frog	X	X		X	X	X		X	LC	0
Litoria rothii	Roth's Tree-frog				X			X	X	LC	0
Litoria rubella	Red Tree-frog				X	X	X			LC	0
Litoria tornieri	Tornier's Frog				X			X		LC	0
Litoria wotjulumensis	Wotjulum Frog				X			X		LC	0
LIMNODYNASTIDAE											
Limnodynastes convexiusculus	Marbled Frog		X		X					LC	0
Platyplectrum ornatus	Ornate Burrowing Frog				X			X		LC	0

Scientific Name	Common Name	Deposit C	Deposit W	Deposit X	Blackwater Creek	Hodgson River	LD Creek	Little Towns River	Mountain Creek	TPWC	Migratory
MYOBATRACHIDAE											
Uperoleia inundata	Floodplain Toadlet		X		X					LC	0
Uperoleia lithomoda	Stonemason Toadlet	X	X		X				X	LC	0
MAMMAL											
BOVIDAE											
Bos taurus	Cattle	X	X	X	X	X	X	X		(Int)	0
Bubalus bubalis	Swamp Buffalo		X			X		X	X	(Int)	0
CANIDAE											
Canis lupus	Dingo			X		X	X		X	LC	0
DASYURIDAE											
Planigale ingrami	Long-tailed Planigale	X								LC	0
Pseudantechinus bilarni	Sandstone Antechinus	X					X		X	LC	0
Sminthopsis macroura	Stripe-faced Dunnart	X								LC	0
EMBALLONURIDAE											
Saccolaimus flaviventris	Yellow-bellied Sheath-tailed Bat	X								LC	0
Taphozous georgianus	Common Sheath-tailed Bat	X			X					LC	0
EQUIDAE											
Equus asinus	Donkey		X	X			X	X	X	(Int)	0
HIPPOSIDERIDAE											
Rhinonicteris aurantia	Orange Leaf-nosed Bat	X	X		X					NT	0
MACROPODIDAE											
Lagorchestes conspicillatus	Spectacled Hare-wallaby				X					NT	0
Macropus agilis	Agile Wallaby		X	X		X				LC	0
Macropus antilopinus	Antilopine Wallaroo	X		X						LC	0
Macropus robustus	Common Wallaroo	X	X	X	X	X	X			LC	0
Petrogale brachyotis	Short-eared Rock-wallaby	X					X		X	LC	0
MEGADERMATIDE											

Scientific Name	Common Name	Deposit C	Deposit W	Deposit X	Blackwater Creek	Hodgson River	LD Creek	Little Towns River	Mountain Creek	TPWC	Migratory
Macroderma gigas	Ghost Bat	X									
MINIOPTERIDAE											
Miniopterus schreibersii	Large Bent-winged Bat	X								LC	0
MOLOSSIDAE											
Chaerephon jobensis	Northern Free-tailed Bat	X									
MURIDAE											
Pseudomys johnsoni	Central Pebble-mouse								X	NT	0
Pseudomys nanus	Western Chestnut Mouse						X			NT	0
Zyzomys argurus	Common Rock-rat	X	X		X		X	X	X	LC	0
PERAMELIDAE											
Isoodon macrourus	Northern Brown Bandicoot	X					X	X		NT	0
PETAURIDAE											
Petaurus breviceps	Sugar Glider	X				X				LC	0
PSEUDOCHEIRIDAE											
Petropseudes dahli	Rock Ringtail	X								LC	0
PTEROPODIDAE											
Pteropus scapulatus	Little Red Flying-fox					X		X		LC	0
SUIDAE											
Sus scrofa	Pig	X			X	X	X	X	X	(Int)	0
TACHYGLOSSIDAE											
Tachyglossus aculeatus	Echidna	X								LC	0
VESPERTILIONIIDAE											
Chalinolobus gouldii	Gould's Wattled Bat	X	X							LC	0
REPTILE											
AGAMIDAE											
Chlamydosaurus kingii	Frilled Lizard		X		X		X			LC	0
Diporiphora albilabris	White-lipped Dragon				X			X		LC	0
Diporiphora bennettii	Robust Dragon								X	LC	0

Scientific Name	Common Name	Deposit C	Deposit W	Deposit X	Blackwater Creek	Hodgson River	LD Creek	Little Towns River	Mountain Creek	TPWC	Migratory
Diporiphora bilineata	Two-Lined Dragon	X	X		X		X	X	X	LC	0
Diporiphora magna			X	X	X		X	X	X	LC	0
Lophognathus gilberti	Gilbert's Dragon	X			X	X	X	X	X	LC	0
CHELUIDAE											
Chelodina canni	Cann's Long-necked Turtle							X		LC	0
COLUBRIDAE											
Dendrelaphis punctulata	Green Tree Snake						X			DD	0
Tropidonophis mairii	Keelback					X				LC	0
CROCODYLIDAE											
Crocodylus johnstoni	Freshwater Crocodile		X		X					LC	0
ELAPIDAE											
Demansia olivacea	Olive Whip Snake							X		DD	0
Demansia papuensis	Papuan Whip Snake				X					LC	0
Demansia vestigiata	Black Whip Snake					X			X	LC	0
Furina ornata	Orange-naped Snake			X						LC	0
Pseudechis weigeli	Pygmy Mulga Snake				X					DD	0
Pseudonaja nuchalis	Western Brown Snake			X	X					LC	0
Suta punctata	Little Spotted Snake			X						LC	0
GEKKONIDAE											
Gehyra australis	Northern Dtella		X	X	X	X	X	X	X	LC	0
Gehyra nana	Northern Spotted Rock Dtella			X						LC	0
Heteronotia binoei	Bynoe's Gecko			X	X					LC	0
Oedura marmorata	Marbled Velvet Gecko	X			X					LC	0
Oedura rhombifer	Zig-zag Gecko	X		X	X				X	LC	0
Strophurus ciliaris	Spiny-tailed Gecko	X						X		LC	0
PYGOPODIDAE											
Delma borea	Rusty-topped Delma	X			X		X			LC	0
Delma tincta	Black-necked Snake-lizard	X						X		LC	0

Scientific Name	Common Name	Deposit C	Deposit W	Deposit X	Blackwater Creek	Hodgson River	LD Creek	Little Towns River	Mountain Creek	TPWC	Migratory
Lialis burtonis	Burton's Legless Lizard	X				X				LC	0
PYTHONIDAE											
Antaresia childreni	Children's Python			X	X			X		LC	0
Antaresia stimsoni	Stimson's Python	X								LC	0
Aspidites melanocephalus	Black-headed Python					X	X	X		LC	0
Liasis mackloti	Water Python						X			LC	0
Liasis olivaceus	Olive Python	X								LC	0
SCINCIDAE											
Carlia amax	Two-Spined Rainbow Skink	X	X	X	X		X	X	X	LC	0
Carlia munda	Striped Rainbow Skink	X	X	X	X		X			LC	0
Cryptoblepharus metallicus	Metallic Snake-eyed Skink			X			X			(NL)	0
Cryptoblepharus plagiocephalus	Arboreal Snake-Eyed Skink								X		0
Ctenotus inornatus	Plain Ctenotus	X		X	X	X	X	X	X	LC	0
Ctenotus robustus	Robust Ctenotus		X		X	X	X			LC	0
Ctenotus spaldingi	Spalding's Ctenotus	X		X	X		X	X	X	LC	0
Ctenotus vertebralis	Scant-Striped Ctenotus	X						X		LC	0
Menetia greyii	Grey's Menetia				X					LC	0
Proablepharus tenuis	Slender Snake-Eyed Skink				X					LC	0
VARANIDAE											
Varanus acanthurus	Ridge-tailed Monitor	X							X	LC	0
Varanus mertensi	Mertens' Water Monitor						X	X		VU	0
Varanus tristis	Black-tailed Monitor	X								LC	0
VESPERTILIONIDAE											
Vespadelus finlaysoni	Finlayson's cave bat	X									
Grand Total		**103**	**74**	**66**	**97**	**81**	**100**	**78**	**81**		