



# LAKE DISAPPOINTMENT POTASH PROJECT FAUNA MANAGEMENT PLAN

EPA Assessment No 2087

Prepared by Reward Minerals Ltd

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RevA	Submitted as appendix to draft ERD	LC/DT		2/01/2018
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## Summary

This preliminary Fauna Management Plan (FMP) has been prepared to support a revised Environmental Review Document (ERD) submitted to the WA Environmental Protection Authority (EPA) on 7 January 2019. This document has been prepared in accordance with the *Instructions on how to prepare Environmental Protection Act 1986, Part IV Environmental Management Plans* (EPA, 2017). This is a live document that will be regularly reviewed and updated throughout project development as further information becomes available.

Item	Description
Title of the proposal	Lake Disappointment Potash Project
Proponent name	Reward Minerals Ltd.
Ministerial Statement Number	TBA
Purpose	To provide a management framework for terrestrial fauna and their habitats to avoid, minimise and mitigate potential adverse impacts associated with implementation of the Lake Disappointment potash project.
EPA objectives	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.
Condition clauses	TBA
Key provisions in the plan	<i>As described in Table 2-1</i>

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Attachment A – Summary of fauna investigations

Attachment B – Species lists

Attachment C – Vertebrate fauna assemblage monitoring program

Attachment D – Feral and pest animal reduction program

Attachment E – Night Parrot monitoring program

Attachment F – Banded stilt monitoring program

Attachment G - Pre-clearance inspection / fauna relocation procedure

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# 1 CONTEXT, SCOPE AND RATIONALE

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## 1.1 PROPOSAL

The Lake Disappointment Potash Project proposes to produce up to 400,000 tonnes per annum (tpa) sulfate of potash (SOP) over a 20-year life-of-mine by solar evaporation and processing of potassium rich brines abstracted from sediments of the Lake Disappointment playa. Lake Disappointment is located approximately 320km east of the town of Newman WA, in the Little Sandy Desert region of Western Australia (Figure 1-1). The proposal requires establishment of a brine supply network on the Lake Disappointment playa and associated off-playa infrastructure (Figure 1-2, Figure 1-3). Key project elements include:

- A brine supply network to abstract up to 63 million m<sup>3</sup> of hyper-saline brine each year once production reaches full capacity. The network consists of shallow trenches and pipelines to abstract near-surface hypersaline groundwater from sediments of the Lake Disappointment playa.
- A series of evaporation, back-mix and crystalliser ponds to progressively concentrate potassium salts from the hypersaline ((TDS of approximately 300,000 mg/L) brine.
- An SOP plant where harvested salts are leached with process water producing a high-quality SOP product which is dried and transported for sale.
- Process water bore fields (Cory bore field and Northern bore field) to supply up to 3.4 GL per year over a period of 20 years.
- Establishment and use of offices, laboratory, workshop, accommodation village and airstrip.

The Lake Disappointment Potash project is located entirely within the determined Native Title claim area held by the Martu People (WCD2013/002) on vacant crown land. There is no pastoral tenure over any part of the project area. For the purposes of this management plan the development envelope is called the 'project area'.

## 1.2 SCOPE AND OBJECTIVES

This fauna management plan applies to potential direct and indirect impacts of the implementation of the Lake Disappointment potash project on terrestrial vertebrate fauna (including water birds) and to the habitats that support them in and near the project area. The objectives of the plan are to:

- Identify the key project aspects that have the potential to directly or indirectly impact vertebrate fauna;
- Describe what Reward will do to avoid or mitigate adverse impacts on fauna and their habitats;
- Describe the environmental outcomes that would adequately protect fauna, consistent with EPA policy and environment objectives;
- Define a set of indicators and associated criteria which will be used to test the attainment of environmental outcomes; and
- Describe how evidence will be collected – through monitoring and other means – to enable assessment of compliance with the criteria.

Invertebrate and subterranean fauna are not addressed in this plan. A separate subterranean fauna management plan has been prepared for the Lake Disappointment potash project.

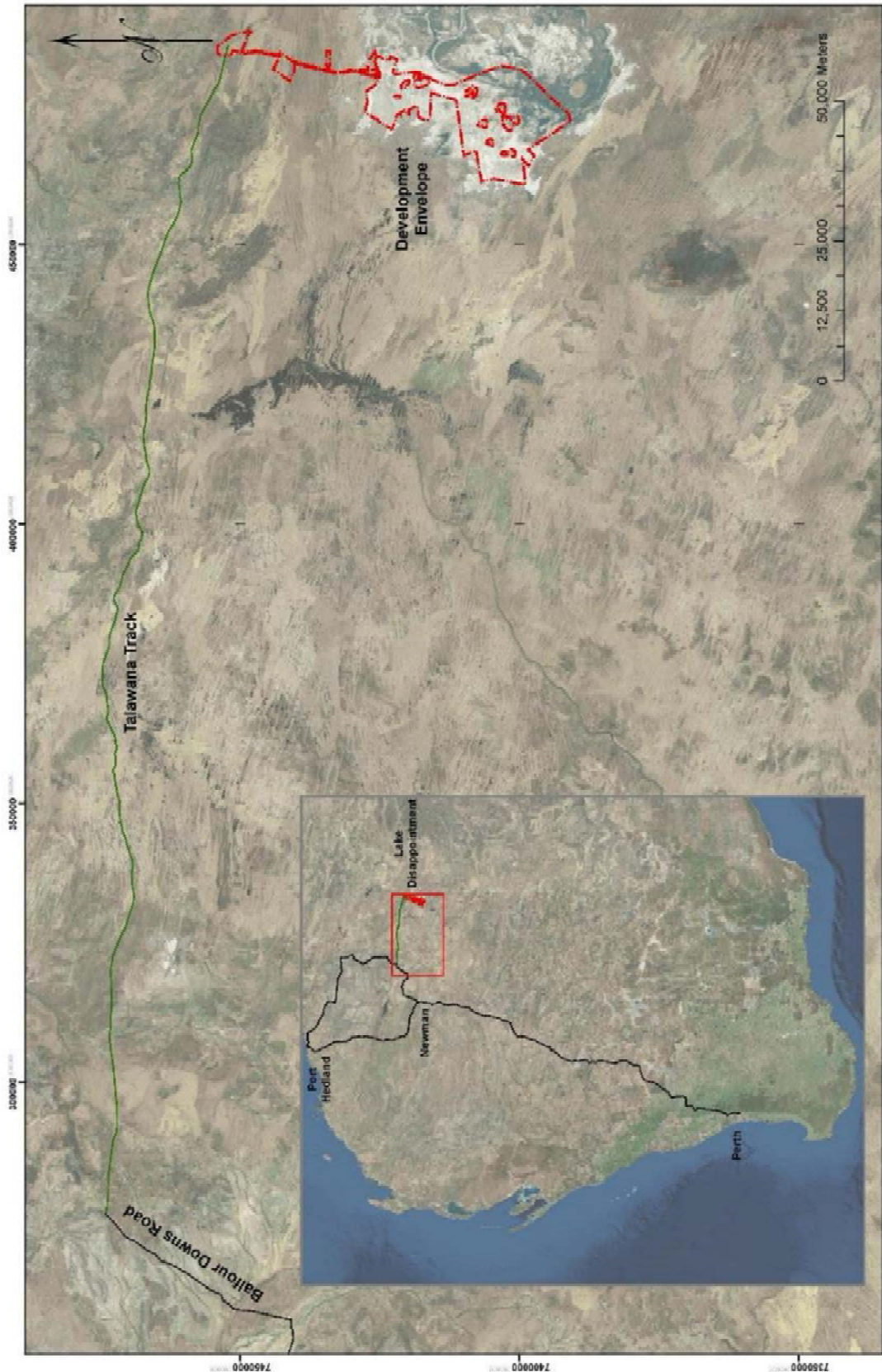


Figure 1-1: Proposal location showing access track and development envelope

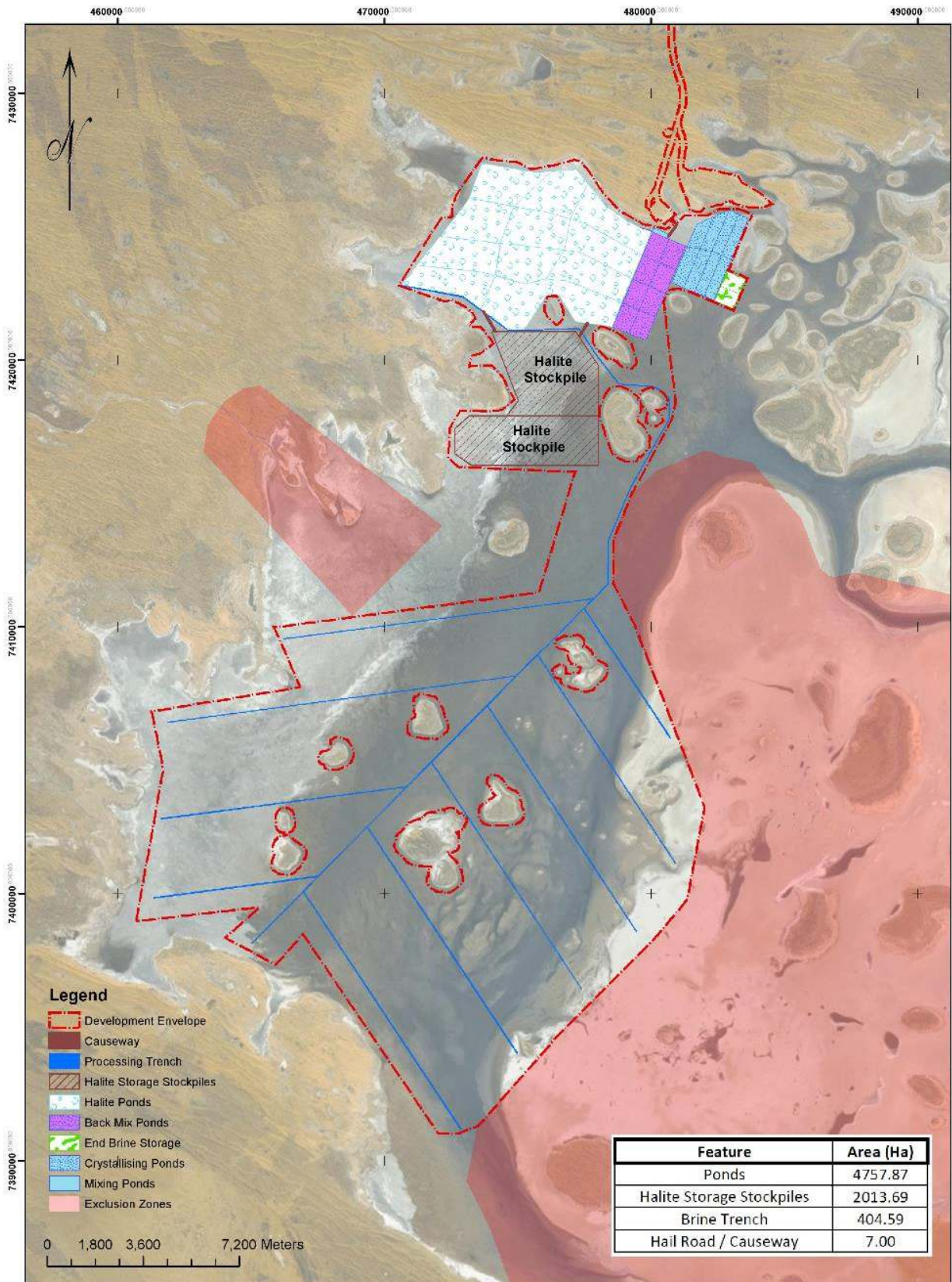


Figure 1-2: On-playa proposal layout (indicative) and development envelope



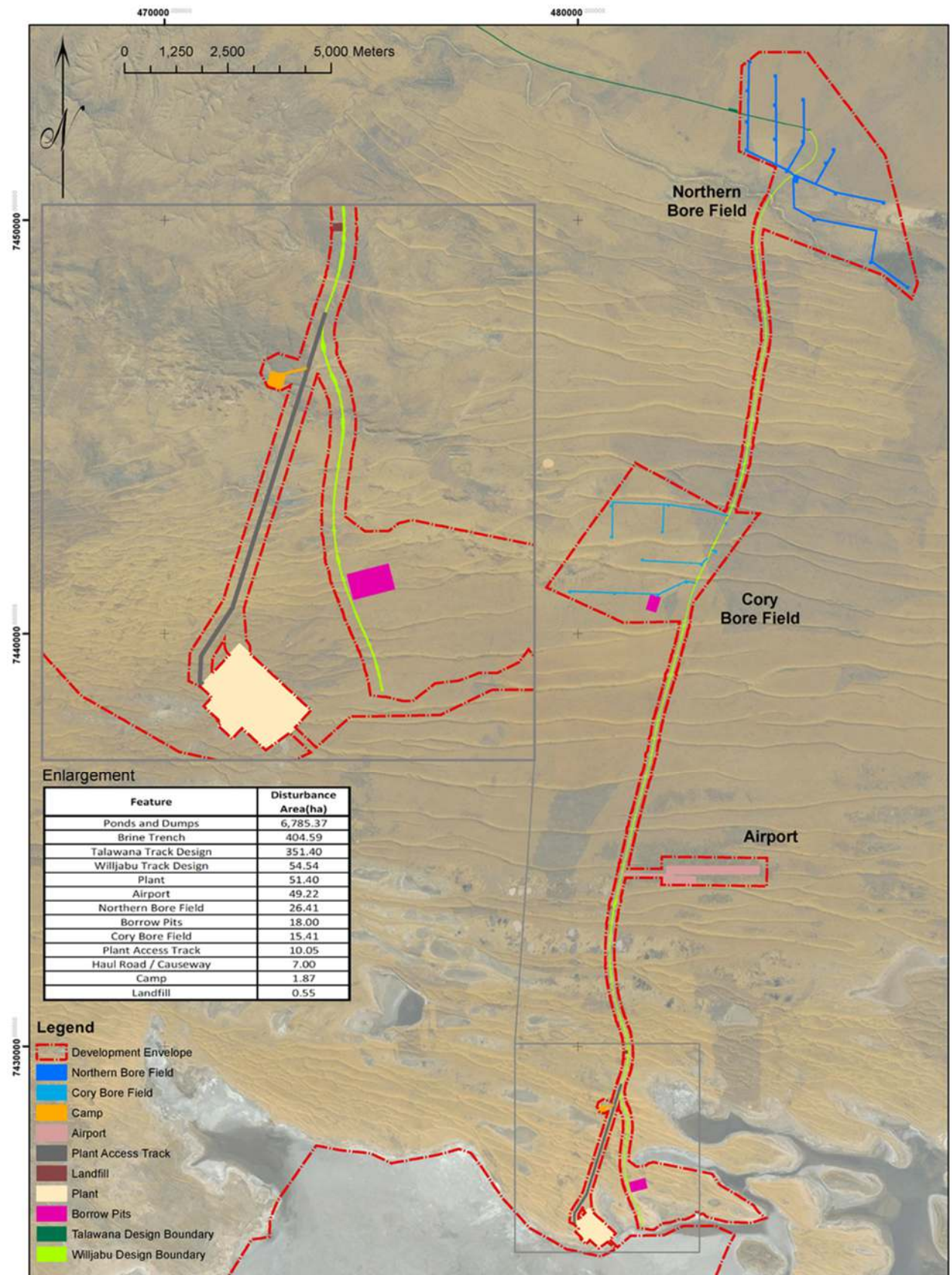


Figure 1-3: Off-playa proposal layout (indicative) and development envelope

### 1.3 KEY ENVIRONMENTAL FACTOR – TERRESTRIAL FAUNA

This Fauna Management Plan (FMP) addresses impacts in the parts of the project area that potentially contain habitat suitable for conservation-significant terrestrial vertebrate fauna, including waterbirds and other vertebrate fauna associated with the Lake Disappointment playa or other ephemeral water bodies. Apart from their inherent and biodiversity values, terrestrial fauna and water birds play a role in maintaining the integrity and functioning of ecosystems. Birds and mammals may act as pollinators for plants or help disperse propagules. Some terrestrial fauna are of cultural importance to Aboriginal people either through their spiritual significance or as sources of traditional food.

For the purposes of this document, conservation significant fauna are those listed:

1. As Matters of National Environmental Significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

MNES under the EPBC Act include threatened species (further classified into Critically Endangered, Endangered or Vulnerable), listed Migratory species and Threatened Ecological Communities.

2. Under the *Western Australian Wildlife Conservation Act 1950*

Fauna listed under the *Wildlife Conservation Act* are listed under a set of schedules:

- Schedule 1: Fauna that is rare or likely to become extinct as critically endangered fauna
- Schedule 2: Fauna that is rare or likely to become extinct as endangered fauna
- Schedule 3: Fauna that is rare or likely to become extinct as vulnerable fauna
- Schedule 4: Fauna presumed to be extinct
- Schedule 5: Migratory birds protected under an international agreement
- Schedule 6: Fauna that is of special conservation need as conservation dependent fauna
- Schedule 7: Other specially protected fauna

3. Priority fauna listed by the Western Australian Department of Biodiversity, Conservation and Attractions (DBCA).

Priority fauna have no legal status and are not listed under State or Commonwealth legislation. In Western Australia, DBCA maintains a list of Priority Fauna made up of species that are not considered threatened under the WC Act, but for which DBCA feels there is cause for concern and require ongoing monitoring by DBCA. There are four levels of priority:

- Priority 1: Poorly known species (on threatened lands)
- Priority 2: Poorly known species in few locations (some on conservation lands)
- Priority 3: Poorly known species in several locations (some on conservation lands)
- Priority 4: Rare, near threatened and other species in need of monitoring

Several significant species occur at Lake Disappointment and its surrounds. Some have significance because of their rarity, others have significance because of their use of, or association with, the Lake Disappointment playa. The conservation significant fauna considered in this plan were identified during fauna surveys between 1998 and 2017 as occurring – or potentially occurring - at or near the Lake Disappointment potash project area (Table 1-1).

Lists of species known to occur – or potentially occurring – in the Lake Disappointment area are provided in Attachments B1 and B2.

Table 1-1: Conservation significant fauna recorded / potentially occurring at Lake Disappointment

Species	Common Name	EPBC Act	Wildlife Conservation Act	Priority species
<i>Pezoporus occidentalis</i>	Night Parrot	En	Cr	
<i>Macrotis lagotis</i>	Greater Bilby	Vu	Vu	
<i>Liopholis kintorei</i>	Great Desert Skink	Vu	Vu	
<i>Polytelis alexandrae</i>	Princess Parrot	Vu		P4
<i>Apus pacificus</i>	Fork-tailed Swift	Migratory	Migratory	
<i>Merops ornatus</i>	Rainbow Bee-eater	Note 1	Migratory	
<i>Peregrinus falco</i>	Peregrine Falcon		OS	
<i>Falco hypoleucos</i>	Grey Falcon		Vulnerable	
<i>Diplodactylus fulleri</i>	Lake Disappointment Gecko			P1
<i>Ctenophorus nguyarna</i>	Lake Disappointment Dragon			P1
<i>Lerista macropisthopus remota</i>	Unpatterned Robust Lerista			P2
<i>Notoryctes caurinus</i>	Northern Marsupial Mole			P4
<i>Dasyercus blythi</i>	Brush-tailed Mulgara			P4
<i>Dasyercus cristicauda</i>	Crest-tailed Mulgara	Vu		P4
<i>Amytornis striatus striatus</i>	Striated Grasswren			P4
<i>Tringa stagnatilis</i>	Marsh Sandpiper	Migratory	Migratory	
<i>Tringa nebularia</i>	Common Greenshank	Migratory	Migratory	
<i>Calidris melanotos</i>	Pectoral Sandpiper	Migratory	Migratory	
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Migratory	Migratory	
<i>Calidris ruficollis</i>	Red-necked Stint	Migratory	Migratory	
<i>Gelochelidon nilotica</i>	Gull-billed Tern	Migratory	Migratory	
<i>Ardea modesta</i>	Great Egret	Migratory	Migratory	
<i>Tringa glareola</i>	Wood Sandpiper	Migratory	Migratory	
<i>Actitis hypoleucos</i>	Common Sandpiper	Migratory	Migratory	
<i>Calidris ferruginea</i>	Curlew Sandpiper	Migratory	Migratory	
<i>Sterna caspia</i>	Caspian Tern	Migratory	Migratory	

Note 1: Incorrectly listed as marine migratory.

The Environmental Scoping Document prepared and approved by EPA (2017) listed the following project aspects to terrestrial fauna: clearing of fauna habitat, alterations and disruptions to surface water flows, vehicle movement, lighting, waste disposal, noise and vibration. These and other potentially relevant aspects are discussed under the individual species in the subsections that follow.

### 1.3.1 Night Parrot (*Pezoporus occidentalis*)

A summary of Night Parrot status, threats and potential impacts is provided in Table 1-2. The Night Parrot was probably originally distributed over much of the semi-arid and arid Australia (Garnett et al. 2011, Threatened Species Scientific Committee 2016), although its current distribution is thought to be much reduced. Garnett et al. (2011) suggested that there were between 50-250 mature individuals in less than 5%

of its previous range. Sightings in northwest Queensland in the early 1990s were in a broad cross section of the habitats available (Garnett *et al.* 1993). There have been sightings in the Pilbara in 1980, 2005 and 2017; central WA in 1979; north-eastern South Australia in 1979; western Queensland (including Pullen-Pullen-Mt Windsor-Diamantina population) in 1980, 1990, 1993, 2006 and 2013-17 (Davis and Metcalf 2008, Garnett *et al.* 2011, Palaszczuk and Miles 2017); and near Lake Eyre in 2017 (McCarthy 2017). There is also a record in the DBCA threatened species database of 12 Night Parrots at a pool approximately 150 km north-west of the project area in 2003. The confidence level for this sighting is low.

The Night Parrot's preferred habitat appears to be in *Triodia* (spinifex) grasslands, chenopod shrublands, shrubby samphire and floristically diverse habitats dominated by large-seeded species (Threatened Species Scientific Committee 2016, McCarthy 2017, Murphy *et al.* 2017b). It nests under *Triodia* and has a runway and a tunnel entrance with an apron of dead *Triodia* sp. leaves. It produces clutches of two to four sub-elliptical, white eggs with a lustrous appearance (Murphy *et al.* 2017a). It is thought that breeding generally occurs between April and October (Murphy *et al.* 2017a).

Kearney *et al.* (2016) suggest that Night Parrots can persist on dry seed during winter conditions without exceeding dangerous levels of dehydration, but would need access to water or succulents during summer. These data have significant implications for where Night Parrot might be found, and its preferred habitat.

Published accounts of Night Parrot behaviour suggest that the Night Parrot may be prone to vehicle strikes, if it is breeding or foraging near roads or tracks in or near the project area: Hamilton *et al.* (2017) observed a bird crouching on a road, 1-1.5m from the road edge. The bird did not fly when approached, but ran under a slow-moving vehicle. A second observation recorded a bird emerging from the base of a group of *Eremophila* shrubs surrounded by small grasses and other plants. The bird ran across the road, then hopped over the road edge into another group of thick *Eremophila*.

Table 1-2: Night parrot – summary of status, threats, potential impacts

Legal conservation status	Listed as Endangered under the EPBC Act and Critically Endangered under the <i>Wildlife Conservation Act</i>
Status at Lake Disappointment Potash Project	Night Parrot calls were heard at multiple sites within an area of 1km by 2.5km either side of an existing track in the swale between two dunes.
Threats	<p>Threats identified by the Threatened Species Scientific Committee (2016) and Murphy <i>et al.</i> (2018) that may be relevant to the Lake Disappointment potash project include:</p> <ul style="list-style-type: none"> <li>• predation by feral cats and foxes;</li> <li>• loss of habitat due to erosion and feral herbivores;</li> <li>• human induced and increased fires;</li> <li>• degradation or reduced watering points;</li> <li>• fences;</li> <li>• collection of eggs; and</li> <li>• bird watching activities.</li> </ul> <p>Although not listed by the committee, clearing of roosts or foraging habitat (if birds are sedentary) is also likely to be a threat. Clearing of a nest with eggs or chicks would be a significant impact. If Night Parrots are prone to sitting and running on roads, rather than flying when disturbed, then they could be struck by moving vehicles. A wildfire through an area containing eggs or chicks will almost certainly result in the loss of these eggs or birds and would be of concern.</p>



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Potential impacts	<ul style="list-style-type: none"> <li>• Direct loss of chicks and eggs during vegetation clearing;</li> <li>• Direct loss of adult birds by vehicle strikes;</li> <li>• Direct loss of chicks and eggs by wildfires;</li> <li>• Direct loss of chicks and eggs by bird watching enthusiasts;</li> <li>• Direct loss of adult birds by collisions with fences;</li> <li>• Increased feral animal predation (foxes and cats) on adults and young with vegetation clearing; and</li> <li>• Decreased vegetation quality due to increased herbivores attracted to the freshwater.</li> </ul>
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### 1.3.2 Greater Bilby (*Macrotis lagotis*)

This nocturnal, medium sized, omnivorous, burrow dwelling marsupial was once widespread in Australian arid and semi-arid areas. Its geographical distribution has now contracted to a few populations in southern Northern Territory, south-eastern Queensland, the Pilbara and sandy deserts of Western Australia. Bilby distribution is now largely restricted to two broad habitat types: mulga woodlands on lateritic red earth and spinifex grasslands with high fire frequency, again on red earth (Johnson 1989, Southgate 1990). Its distribution appears limited by access to suitable burrowing habitat and areas of high plant and food production. Southgate *et al.* (2007) reported that the distribution of Bilbies in the Tanami Desert was related to substrate type, which is probably also true for the Lake Disappointment project area. A summary of Greater Bilby status, threats and potential impacts is provided in Table 1-3.

The DBCA threatened species database has multiple records from 2012 to 2014 of Bilbies east of Lake Dora, approximately 150 km north of the project area. There are other records to the north of Karlamilyi National Park and some from near Trainor Hills, approximately 100 km south-southwest of the project area and others near Well 12 on the Canning Stock Route, which is approximately 170 km southwest of the project area. People from the Kanyirrinpa Jukurrpa organisation have indicated that they know of Bilbies to the north, northeast and southwest of the project area.

Table 1-3: Greater Bilby – summary of status, threats, potential impacts

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Legal conservation status	Listed as Vulnerable under the <i>EPBC</i> and the <i>Wildlife Conservation Acts</i>
Status at Lake Disappointment Potash Project	A single Bilby was recorded by Reward personnel on the Talawana Track near Lake Disappointment.
Threats	<p>Bilby numbers appear to be in significant decline, with only a few small scattered populations existing in the Pilbara and in the adjacent sandy desert areas. Abbott (2001) reported fox predation as the primary reason for the long-term reduction in this species. Pavey (2006) identified various potential threats, with those relevant to the potash project being:</p> <ul style="list-style-type: none"> <li>• predation, particularly of juveniles, by foxes, feral cats, wild dogs and dingoes;</li> <li>• competition with herbivores, in particular rabbits;</li> <li>• habitat degradation and destruction, especially vegetation clearing, where Bilbies are killed in their burrows; and</li> <li>• vehicle strikes</li> </ul>
Potential impacts	<ul style="list-style-type: none"> <li>• direct loss of adults and young in burrows during vegetation clearing;</li> <li>• direct loss of adults and young by vehicle strikes;</li> <li>• direct loss of adults and young by wildfires;</li> </ul>

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- increased feral animal predation (foxes and cats) on adults and young with vegetation clearing; and
- decreased vegetation quality due to increased herbivores attracted to the freshwater.

### 1.3.3 Great Desert Skink (*Liopholis kintorei*)

This is a communal living, ground-burrowing, large skink that is found in the inland sandy deserts. It lives in a large complex burrow system and has a regular defecating site near the burrow entrances.

Pearson (2001) reported that Otto Lipfert collected six specimens along the Canning Stock Route that runs along the western edge of Lake Disappointment in the 1930s. People from the Kanyirninpa Jukurrpa organisation, to the north of the project area, have indicated that they know of Great Desert Skinks to the west, north and east of the project area. The DBCA threatened species database indicates there are multiple records east of Lake Dora, which is approximately 130km to the north of the project area. The species occurs in low abundance and in small populations that are widely distributed, so if any populations were present around Lake Disappointment, they would be particularly important. A summary of Great Desert Skink status, threats and potential impacts is provided in Table 1-4.

Table 1-4: Great Desert Skink – summary of status, threats, potential impacts

Legal conservation status	Listed as Vulnerable under the <i>EPBC</i> and the <i>Wildlife Conservation Acts</i>
Status at Lake Disappointment Potash Project	Not recorded in the Lake Disappointment Potash project area.
Threats	Moore et al. (2015) reported that <i>L. kintorei</i> is adversely affected by fire and predation (including by dingoes, foxes and cats). The (now outdated) recovery plan (McAlpin 2001) for the Great Desert Skink indicated the potential threats are: <ul style="list-style-type: none"> <li>• cessation of traditional land management practices, and particularly the creation of new fire regimes;</li> <li>• predation by foxes and feral cats; and</li> <li>• rabbits destroying and occupying burrow systems.</li> </ul>
Potential impacts	<ul style="list-style-type: none"> <li>• direct loss of skinks during vegetation clearing;</li> <li>• direct loss of skinks post wildfires by predation;</li> <li>• increased feral animal predation (foxes and cats) with vegetation clearing; and</li> <li>• decreased vegetation quality due to increased herbivores attracted to the freshwater.</li> </ul>

### 1.3.4 Lake Disappointment Gecko (*Diplodactylus fulleri*)

All known records of the Lake Disappointment Gecko are from the periphery of Lake Disappointment. Due to its limited geographic distribution, the species has conservation importance.

The actual size of the population is not known, but even if it is only found on the margins of Lake Disappointment, the proposed project will only impact less than 1% of the available fauna habitat for this species. A summary of Lake Disappointment Gecko status, threats and potential impacts is provided in Table 1-5.

Table 1-5: Lake Disappointment Gecko – summary of status, threats, potential impacts

Legal conservation status	Listed as Priority 1 by DBCA
Status at Lake Disappointment Potash Project	The Lake Disappointment Gecko was recorded on six occasions during surveys of the project area, all in a trapping site on the edge of Lake Disappointment.
Threats	Vegetation clearing, and predation are likely to be the most significant threats to this small
Potential impacts	<ul style="list-style-type: none"> <li>• direct loss of individuals during vegetation clearing;</li> <li>• increased feral animal predation (foxes and cats) with vegetation clearing;</li> <li>• decreased vegetation quality due to increased herbivores attracted to the freshwater; and</li> <li>• direct loss of individuals by wildfires.</li> </ul>

### 1.3.5 Lake Disappointment Dragon (*Ctenophorus nguyana*)

All known records of this dragon lizard are from the periphery of Lake Disappointment. Cogger (2014) reports it is primarily found in the saline samphire surrounding the lake edge and Doughty et al. (2007) reported it excavates its burrow below the salt crust. Burrow entrances are typically adjacent to vegetation. Males are often observed perched on the crowns of clumps of vegetation, while females are active on the ground running from one clump of vegetation to another.

The size of *C. nguyana* population is unknown and not able to be estimated based on the available information, but because the species is known from a single location, it is of conservation importance. However, even if it is only found on the margins of Lake Disappointment, the proposed project will only impact less than 1% of the available fauna habitat for this species. A summary of Lake Disappointment Dragon status, threats and potential impacts is provided in Table 1-6.

Table 1-6: Lake Disappointment Dragon – summary of status, threats, potential impacts

Legal conservation status	Listed as Priority 1 by DBCA
Status at Lake Disappointment Potash Project	The Lake Disappointment Dragon was recorded at a trapping site on the edge of Lake Disappointment.
Threats	Vegetation clearing, and predation are likely to be the most significant threats to this small dragon lizard.
Potential impacts	<ul style="list-style-type: none"> <li>• direct loss of individuals during vegetation clearing;</li> <li>• increased feral animal predation (foxes and cats) with vegetation clearing;</li> <li>• decreased vegetation quality due to increased herbivores attracted to the freshwater; and</li> <li>• direct loss of individuals by wildfires.</li> </ul>

### 1.3.6 Princess Parrot (*Polytelis alexandrae*)

This species is found mostly in the inland arid areas of Australia, and in Western Australia in the Gibson, Little Sandy and Great Victoria Deserts (Johnstone and Storr 1998, Pavey *et al.* 2014). However, they occasionally occur in lightly wooded areas adjacent to the sandy deserts (Moriarty 1972). A summary of Princess Parrot status, threats and potential impacts is provided in Table 1-7.

Table 1-7: Princess Parrot – summary of status, threats, potential impacts

Legal conservation status	Listed as listed as Vulnerable under the <i>EPBC Act</i> and Priority 4 with DBCA
Status at Lake Disappointment Potash Project	Four individuals of this species were observed flying overhead during a survey conducted by G Harewood at Lake Disappointment in May 2013 (Harewood 2018). The denser woodland bordering McKay Creek represents potential breeding habitat though it is not known if it is used for this purpose.
Threats	Pavey <i>et al.</i> (2014) indicated that a loss of Marble Gums ( <i>Eucalyptus gongylocarpa</i> ) would have an impact on this species as hollows in these trees appeared to be the preferred nesting sites. Unless nesting, these birds are likely to move away from a disturbance area.
Potential impacts	The Princess Parrot will be unaffected by vegetation clearing as it will readily move to adjacent areas. The only potential impact is that viable eggs and chicks are lost in nests. As they typically nest in Marble Gums, which have not been recorded in the project area, there are no site-specific significant threats to this species.

### 1.3.7 Fork-tailed Swift (*Apus pacificus*)

The Fork-tailed Swift breeds in Asia and northern Australia and winters in Australia and New Guinea. Asian birds occur in Australia from spring through to autumn. The Fork-tailed Swift is an infrequent visitor to arid regions, the DBCA Threatened species database has a few records of this species in the general vicinity of Lake Disappointment.

As this is an aerial species that rarely comes to the ground, vegetation clearing, and infrastructure development will not significantly impact on this species (although it may affect abundance of their prey). No specific avoidance and mitigation strategies are proposed.

Table 1-8: Fork-tailed Swift – summary of status, threats, potential impacts

Legal conservation status	Listed as Migratory under the <i>EPBC Act</i> and the <i>Wildlife Conservation Acts</i>
Status at Lake Disappointment Potash Project	A single Fork-tailed Swift has been reported north of Lake Disappointment (DBCA database, reported in Terrestrial Ecosystems and Bennelongia, 2018).
Threats	The Lake Disappointment Potash Project does not provide a significant threat to this species.
Potential impacts	None identified

### 1.3.8 Rainbow Bee-eater (*Merops ornatus*)

The Rainbow Bee-eater is an abundant, geographically widely distributed species, that digs a burrow in the ground into which it lays its eggs and raises its chicks late in spring and early summer. A search of the DBCA Threatened and Priority Species and Terrestrial Ecosystems' databases indicates that the Rainbow Bee-eater is seasonally widely distributed around the project area.

Table 1-9: Rainbow Bee-eater – summary of status, threats, potential impacts

Legal conservation status	Listed as Marine species under the <i>EPBC Act</i> and Migratory under the <i>Wildlife Conservation Act</i>
Status at Lake Disappointment Potash Project	The Rainbow Bee-eater has been recorded in the Lake Disappointment Potash project area.
Threats	Vegetation clearing during the breeding season (spring-summer) in areas in which the Rainbow Bee-eater digs its burrow is likely to result in the loss of viable eggs and chicks.
Potential impacts	Vegetation clearing is not seen as a significant threat to this species, given its abundance and wide geographical distribution.

### 1.3.9 Peregrine Falcon (*Falco peregrinus*)

The Peregrine Falcon is a medium sized bird of prey that is widespread, with each individual having a large home range. It feeds almost entirely on smaller birds and breeds on cliff edges, granite outcrops, quarries and tall hollow trees.

Table 1-10: Peregrine Falcon – summary of status, threats, potential impacts

Legal conservation status	Listed as a Schedule 7 species (Otherwise specially protected) under the <i>Wildlife Conservation Act</i>
Status at Lake Disappointment Potash Project	One Peregrine Falcon was recorded about 25 km from the project area in the Durba Hills during a survey conducted by G Harewood in 2013 (Harewood, 2018), so it may be seen occasionally flying over the project area. The peregrine falcon was not recorded within the actual project area. The species potentially breeds in the Durba Hills, given the presence there of near vertical rocky cliff faces.
Threats	The Lake Disappointment Potash Project does not provide a significant threat to this species, as it will readily move to adjacent areas if disturbed.
Potential impacts	No site-specific potential impacts on this species.

### 1.3.10 Unpatterned Robust Lerista (*Lerista macropisthopus remota*)

Cogger (2014) reports *L. macropisthopus* inhabiting woodlands and semi-arid scrubs, with the subspecies *remota*, being one of four sub-species from the central interior of Western Australia. When Storr (1991) originally described this sub-species it was known from a single location 40km north-east of Jigalong. The Atlas of Living Australia now has multiple records of this subspecies approximately 250km to the west-south-west of the project area.

The population size of *L. m. remota* is unknown, as there are likely to be numerous individuals between the population shown south-east of Newman in the Atlas of Living Australia and Lake Disappointment. As additional records are recorded from surveys in the region, it is likely that the conservation status of this species will be downgraded.

Table 1-11: Unpatterned Robust Lerista – summary of status, threats, potential impacts

Legal conservation status	Listed as Priority 2 species by DBCA
Status at Lake Disappointment Potash Project	The Unpatterned Robust Lerista was recorded on 12 occasions at three trapping sites in the project area.
Threats	Vegetation clearing, and predation are likely to be the most significant threats to this small fossorial skink.
Potential impacts	<ul style="list-style-type: none"> <li>• Direct loss of individuals during vegetation clearing;</li> <li>• Direct loss of individuals during and after wildfires;</li> <li>• Increased feral animal predation (foxes and cats) with vegetation clearing; and</li> <li>• Decreased vegetation quality due to increased herbivores attracted to freshwater impoundments</li> </ul>

### 1.3.11 Northern Marsupial Mole (*Notoryctes caurinus*)

The Northern Marsupial Mole is known to occur in the Great Sandy Desert, Little Sandy Desert and the northern section of the Gibson Desert. Its listing under the *EPBC Act* was changed in 2015 from Endangered to data deficient (Threatened Species Scientific Committee 2015).

The Northern Marsupial Mole inhabits sand dunes and the adjacent swales where there is deep loose soil (Woinarski et al. 2014, Threatened Species Scientific Committee 2015). When present on the surface they are likely to be eaten by feral cats, foxes and wild dogs and probably raptors.

The DBCA Threatened Species Database contains multiple records of Marsupial Moles around the project area, including Trainor Hills, Telfer mine and parts of the Canning Stock Route. People from the Kanyirrinpa Jukurrpa organisation have indicated that they have records of Marsupial Moles at numerous locations to the west and north-west of the project area.

Table 1-12: Northern Marsupial Mole – summary of status, threats, potential impacts

Legal conservation status	Listed as Priority 4 by DBCA
Status at Lake Disappointment Potash Project	Back-filled subterranean tunnels created by Marsupial Moles were recorded in 19 of 20 trenches dug to find these burrows near the Willjabu Track and surface tracks were observed on dunes crests (Harewood 2015). It is likely that the Northern Marsupial Mole is widespread
Threats	Vegetation clearing, grading the Talawana and the Willjabu Tracks and predators are likely to be the most significant threats to this small fossorial marsupial.
Potential impacts	<ul style="list-style-type: none"> <li>• Direct loss of individuals during vegetation clearing in the dunes and adjacent swales;</li> <li>• Direct loss of individuals during earthworks in the dunes and adjacent swales; and</li> <li>• Increased feral animal predation (foxes and cats) with vegetation clearing.</li> </ul>

### 1.3.12 Crest-tailed Mulgara (*Dasyercus cristicauda*) and Brush-tailed Mulgara (*Dasyercus blythi*)

Both these species are mostly nocturnal, inhabit the arid and semi-arid regions of Australia, digging multiple entrance burrows in the swales or the base of dunes. Once settled they are relatively sedentary with high site fidelity. Like most dasyurids, the majority of males die off after the breeding season and the young are raised by the females.

Table 1-13: Mulgara – summary of status, threats, potential impacts

Legal conservation status	Crest-tailed and Brush-tailed Mulgara are listed as Priority 4 by DBCA and <i>D. cristicauda</i> is listed as Vulnerable under the <i>EPBC Act</i> .
Status at Lake Disappointment Potash Project	Mulgara were not recorded in the fauna surveys, however, the trapping effort was generally insufficient to record these species and their abundance fluctuates based on previous rains, so their presence can be difficult to detect on some occasions. It is potentially in the project
Threats	Vegetation clearing, and predators are likely to be the most significant threats to Mulgara.
Potential impacts	<ul style="list-style-type: none"> <li>• Direct loss of adults and young in burrows during vegetation clearing;</li> <li>• Direct loss of adults and young post wildfires by predation; and</li> <li>• Increased feral animal predation (foxes and cats) with vegetation clearing.</li> </ul>

### 1.3.13 Striated Grasswren (*Amytornis striatus striatus*)

The Striated Grasswren's preferred habitat is spinifex meadows with or without low shrubs (*Thryptomene* sp.) or *Acacia* sp. on sandy or loamy substrate. *Amytornis s. striatus* known distribution is the sandy deserts (i.e. Great Victoria, Gibson and Great Sandy) in central and eastern Western Australia (Johnstone and Storr 2004). The DBCA Threatened Species database contains records of them near Well 24 on the Canning Stock Route, which is approximately 60km to the east of the project area, so they are likely to be recorded at multiple locations in the project area.

Table 1-14: Striated Grasswren – summary of status, threats, potential impacts

Legal conservation status	Listed as Priority 4 by DBCA.
Status at Lake Disappointment Potash Project	The species was recorded north of Lake Disappointment near the Willjabu Track in May 2013, and it is likely to be more widespread in the project area and adjacent areas.
Threats	The two most significant threats to this species are predation, particularly of eggs and chicks by foxes, feral cats, wild dogs and raptors, and inappropriate fire regimes.
Potential impacts	<ul style="list-style-type: none"> <li>• Direct loss of chicks and eggs during vegetation clearing;</li> <li>• Direct loss of individual birds by vehicle strikes;</li> <li>• Direct loss of chicks and eggs by wildfires; and</li> <li>• Increased feral animal predation (foxes and cats) with vegetation clearing</li> </ul>

### 1.3.14 Banded Stilt (*Cladorhynchus leucocephalus*)

Banded Stilts mostly breed in inland salt lakes in Australia. Since 1930, significant species recruitment appears to have occurred at only nine wetlands. The more important of these are: Lakes Torrens and Eyre North in South Australia and Lakes Barlee, Ballard, Marmion and Disappointment in Western Australia. Breeding attempts occur in a greater range of wetlands (Collard *et al.* 2013) and sometimes low or even moderate levels of recruitment may result in these other wetlands. Major breeding events mostly occur at intervals of

about a decade. Many of the breeding attempts fail as the water dries up or the food resource is depleted before the chicks fledge (Pedler et al. (2017).

Banded Stilts require an ephemerally flooded, hypersaline wetland to provide abundant brine shrimp and ostracod food sources. Such lakes usually flood after cyclonic flooding events (or the associated southern rainfall). The wetland must have islands for breeding colonies to form, presumably to isolate the breeding colony from surrounding land where terrestrial predators occur and perhaps to assist in keeping breeding birds cool. The depth of water after flooding must be sufficient to keep the island isolated until after hatching and parts of the wetland must be flooded deeply enough to produce brine shrimps and ostracods until the young have fledged and have sufficient body reserves to move to the coast.

Based on data in Marchant and Higgins (1993), the period required by Banded Stilt to pair up, find a nest site, lay eggs, incubate them and for the chicks to fledge is about 80 days. The equivalent period is about 70 days for the Black-winged Stilt (*Himantopus himantopus*; Marchant and Higgins 1993), and this figure may be a better estimate of the time required by Banded Stilt. There must be plenty of water present as fledging occurs to ensure food remains plentiful. A flooding period of more than 80 days is probably necessary to ensure most young birds survive. There is ample evidence that, under natural conditions, Banded Stilts frequently begin unsuccessful breeding events when water will not last this long.

Bennelongia recorded 94,046 adult birds, 49,321 nests on 10 islands, and 7,388 young chicks on the main saline playa (i.e. Lake Disappointment itself) in March 2017. In addition to the 2017 data, there have been breeding attempts at Lake Disappointment in 1971, 2004, March 2013 and June 2015. It appears the playa dried too soon in 2015, resulting in death of the chicks that had hatched in a colony of about 10,000 nests. This may also have happened in 2013, after February rainfall, with many dead fledglings among the 455 birds seen in May. In 2004, about 1,000 fledgling birds were found dead on the playa but a small number of juveniles were seen at the coast, 1000 km away, suggesting some recruitment occurred (Clarke et al. 2004). It also appears that some recruitment occurred in 1971.

Table 1-15: Banded Stilt – summary of status, threats, potential impacts

Legal conservation status	Not formally listed as a species of conservation significance
Status at Lake Disappointment Potash Project	Lake Disappointment is a significant breeding site for Banded Stilts at the national level.
Threats	<ul style="list-style-type: none"> <li>• Reduction in flood depth, extent or duration</li> <li>• Predation by introduced or native predators</li> </ul>
Potential impacts	<p>Nine of the 10 islands used for breeding by Banded Stilt in 2017 (including the island used in 2015) lie within the development envelope circumscribing the brine collection channels. None of the islands in Lake Disappointment known to support breeding colonies of Banded Stilt will be directly disturbed by the implementation of the potash project.</p> <p>The major threats to Banded Stilt breeding success at Lake Disappointment centre around water depth and persistence, water quality and predation. Major potential impacts on the breeding success of Banded Stilt in the saline playa could occur as a result of altered surface water flow and flooding patterns across the lake as a result of the bunding along the network of drainage channels and, to a lesser extent, the rapid recharge of initial flood waters into the lakebed to replace groundwater removed (by the drainage trenches) for brine production. Banded Stilt breeding events at Lake Disappointment are likely to be sensitive to any reduction in duration of flooding following large rainfall events, especially in summer as water will evaporate faster than after later, autumn cyclones.</p>

Increased predation by Silver Gulls could also result in significant adverse impacts on Banded Stilts.

Disturbance from people moving about on the playa has the potential to threaten breeding success, but this will not occur when the playa is flooded, because it will not be trafficable under these conditions.

### 1.3.15 Gull-billed Tern (*Gelochelidon nilotica macrotarsa*)

Gull-billed Terns occur in northern Australia, and subspecies *G. n. affinis* is migratory from northern Asia. Much of the feeding of Gull-billed Terns when they are breeding probably occurs in the claypans around the main saline playa, as well as a significant proportion of the nesting.

Gull-billed Terns have been recorded breeding at Lakes Percival (three colonies of six, 100, 35 nests), Mackay (one colony of 125 nests) and Dora (one colony of 50 nests) in February 2017 (Bennelongia Environmental Consultants 2017).

Table 1-16: Gull-billed Tern – summary of status, threats, potential impacts

Legal conservation status	Listed as listed as Migratory under the EPBC Act
Status at Lake Disappointment Potash Project	A total of 823 Gull-billed Terns were recorded at Lake Disappointment in 2017, with 214 nests and 93 chicks recorded on 10 small islands, in both the saline playa and associated claypans of varying salinity. It appeared breeding had occurred at an eleventh, unmapped island prior to the survey. This represents a significant concentration of breeding Gull-billed Terns although, for comparison, 6,590 birds and an estimated 1,750 nests were recorded at Mandora Marsh, north of Port Hedland, in the winter of 2000 (Halse <i>et al.</i> 2005) and 1,537 in birds were recorded in Lake Blanche in February 1991 (with 50 nests in December), after flooding of Cooper Creek (Kingsford <i>et al.</i> 1999).
Threats	The dominant process currently threatening Gull-bill Terns at Lake Disappointment is most likely predation by introduced fauna, especially foxes.
Potential impacts	While reductions in water depth during flood events within the project impact area may potentially reduce breeding effort in that part of the lake, breeding in claypans should be unaffected. The extent of the potential impact of project development on Gull-billed Tern is difficult to quantify but it is considered most likely to be minor.

### 1.3.16 Marsh Sandpiper (*Tringa stagnatilis*)

This is essentially a species of freshwater habitats and is seen commonly in Australian wetlands, mostly in small numbers. Three birds were seen in a single sighting during a fauna survey conducted by G Harewood in 2013. The birds were observed at a freshwater claypan that will not be affected by project development (Harewood, 2014). The occurrence of such a low number of birds outside the project, and the widespread distribution of Marsh Sandpiper in Australia, make it unlikely the project will have any impact on the species.

Any impacts are unlikely to be significant and it will benefit from mitigation for Banded Stilts, so no specific mitigation is proposed for this species.

### 1.3.17 Common Greenshank (*Tringa nebularia*)

While using saline water to a greater degree than Marsh Sandpiper, Common Greenshank is essentially a freshwater species seen regularly in Australian wetlands. Three birds were seen in freshwater claypans in



May 2013, two in October 2013 and two in 2017 (Harewood 2014, Bennelongia Environmental Consultants 2017) that will not be affected by project development. The occurrence of such a low number of birds outside the project, and the widespread distribution of Common Greenshank in Australia, make it unlikely the project will have any impact on the species.

Any impacts are unlikely to be significant and it will benefit from mitigation for Banded Stilts, so no specific mitigation is proposed for this species.

### 1.3.18 Pectoral Sandpiper (*Calidris melanotos*)

Pectoral Sandpiper is uncommon in Australia and have the status of an oddity; most of the species overwinters in South America (Watkins 1993). Within Australia, they occur in the same type of habitat as the more common Sharp-tailed Stint. A single Pectoral Sandpiper was observed using a man-made island in the main saline playa in 2017 (Bennelongia Environmental Consultants 2017). While this structure is within the project impact area, the habitat it provides is not expected to change with project development and the island is likely to have been used transiently because it is atypical habitat for the species. The occurrence of a single bird at the Project, in atypical habitat, compared with the annual count of >100 birds in Australia (Watkins 1993) and 1.5 million birds in South America make it unlikely the project will have any impact on the species.

Any impacts are unlikely to be significant and it will benefit from mitigation for Banded Stilts, so no specific mitigation is proposed for this species.

### 1.3.19 Sharp-tailed Sandpiper (*Calidris acuminata*)

Sharp-tailed Sandpiper is a common species in fresh and moderately saline wetlands in Australia. The estimated size of the Australasian flyway population has halved during the last 20 years. In comparison with the count of 10,000 Sharp-tailed Sandpiper in March 1988 (Halse et al. 1998), the maximum count of 364 birds at Lake Disappointment in 2017 is small but it is 0.4% of the flyway population and, thus, Lake Disappointment may be classified as a nationally important site for this listed species under EPBC Policy 3.21. About half the birds in 2017 were observed within the lake development envelope; the remainder were at surrounding claypans. Fifteen birds were seen in freshwater claypans in October 2013 and a single bird was seen at a claypan in 2016 (Bennelongia, 2016). Nationally important levels of use are likely to be infrequent and project development is considered unlikely to alter the habitat used by this shoreline-feeding bird. Consequently, project development is unlikely to have any impact on species abundance.

Any impacts are unlikely to be significant and it will benefit from mitigation for Banded Stilts, so no specific mitigation is proposed for this species.

### 1.3.20 Red-necked Stint (*Calidris ruficollis*)

Red-necked Stint occurs commonly at saline, as well as fresh, wetlands in Australia. It is often found in conjunction with Sharp-tailed Sandpiper, but it is more salt tolerant. A maximum of 26 birds were recorded in 2017 on moist mud amongst samphire. Twenty-one birds were recorded in May 2013, and six birds were recorded on the lake in 2016. The most recent estimate of the size of the Australasian flyway population of Red-necked Stint is 475,000 (Table 30). Project development is considered unlikely to alter habitat greatly for this salt-tolerant bird and is unlikely to have any impact on species abundance.

Any impacts are unlikely to be significant and it will benefit from mitigation for Banded Stilts, so no specific mitigation is proposed for this species.

### 1.3.21 Great Egret (*Ardea modesta*)

The single Great Egret seen in March 2017 was in a freshwater claypan (Bennelongia 2017) that will be unaffected by project development. Great Egret are common through Australia; one was also seen in freshwater claypan in February 2017 (Bennelongia, 2017).

Any impacts are unlikely to be significant and it will benefit from mitigation for Banded Stilts, so no specific mitigation is proposed for this species.

### 1.3.22 Generic vertebrate fauna assemblage

Given that most of the fauna habitats are in good condition, vertebrate fauna assemblages will have only been impacted by naturally occurring fires and introduced predators. The fauna assemblage in the project area will be similar to that in the thousands of square kilometres of similar fauna habitat in adjacent areas.

Table 1-17: Generic native vertebrate fauna – summary of status, threats, potential impacts

Legal conservation	Various
Status at Lake Disappointment Potash Project	Vertebrate species listed in Attachment B1 are potentially present in the project area.
Threats	<p>Currently, the most significant threats to native fauna in the Lake Disappointment area are wildfires and the subsequent predation and ongoing predation by introduced predators. Other potential threats include:</p> <ul style="list-style-type: none"> <li>• Direct impacts during vegetation clearing;</li> <li>• Direct impacts by vehicle strikes; and</li> <li>• Impacts on habitat / vegetation quality due to herbivory by large introduced fauna.</li> </ul>
Potential impacts	<p>It is likely that many of the small native reptiles, mammals and amphibians will be lost during the vegetation clearing process. Some of the large goannas and snakes, and other medium and large mammals will attempt to flee the area once vegetation clearing commences, particularly if it is in the warmer months and they are surface active. However, some will not be able to escape, or they will flee in an inappropriate direction and be injured or killed by machinery or predated on by raptors, corvids, cats and foxes.</p> <p>Unnatural noises, vibration, artificial light sources and vehicle and human movement associated with vegetation clearing, construction and project operations have the potential to disturb and displace a very small number of vertebrate fauna living adjacent to the proposed project area.</p> <p>Feral cats and foxes are abundant around the project area and a reduction program for these introduced predators will result in a significant increase in the abundance of small mammals and reptiles.</p>

## 1.4 CONDITION REQUIREMENTS

This FMP has been submitted in support of the environmental review document submitted to the EPA. As at the date of preparing this draft management plan, EPA had not completed its assessment of the Lake Disappointment potash project. Accordingly, no Ministerial Conditions have yet been recommended.

## 1.5 RATIONALE AND APPROACH

This FMP adopts a risk-based management approach to addressing potential impacts, incorporating both outcome-focused provisions and management-focused provisions. This FMP has been developed using a 'trigger, action, response' framework and includes trigger and threshold criteria, trigger level actions and threshold contingency actions. The management rationale adopted in the FMP considers the relative scarcity of regional information on some fauna of conservation interest in the project area and the large variability in climatic events that drive hydrological processes (and associated biological processes) of the Lake Disappointment wetland system.

For each management action there is a specified objective, a priority and an initiation time, with trigger(s) for review or alternative actions. Where appropriate, targets have been provided. The scale of the impacts and the proposed mitigation described in *Lake Disappointment Potash Project: Potential Impacts on Fauna* have been taken into consideration.

### 1.5.1 Regional conservation context

The proposed Lake Disappointment potash project lies within the Little Sandy Desert Region of the Interim Biogeographic Regionalisation of Australia (IBRA - Thackway and Cresswell 1995). Project elements occur across two IBRA subregions, but the main operational areas occur primarily in the Trainor subregion, with a minor portion intersecting the Rudall subregion.

Lake Disappointment is listed in the Directory of Important Wetlands in Australia (DIWA) as a good example of a wetland type occurring within a biogeographic region in Australia and because it is a wetland that is important as the habitat for animal taxa at a vulnerable stage in their life cycle. The wetland has an area of 150,000 ha, comprising dune field, riparian and claypan communities. Lake Disappointment is within a Schedule 1 Area under the Environmental Protection (Clearing of Vegetation) Regulations 2004 (Figure 1-4). The southern part of Lake Disappointment and the southern extremity of the proposed project area intersects the proposed Lake Disappointment Nature Reserve (EPA Red Book recommendation 1975-1993; Figure 1-4).

The Karlamilyi National Park (Western Australia's largest national park, encompassing more than 1.2 million hectares) is situated approximately 40 km north of the Lake Disappointment potash project area. A small section of the Talawana Track, which will be used by project-related traffic lies within the southern edge of the National Park.

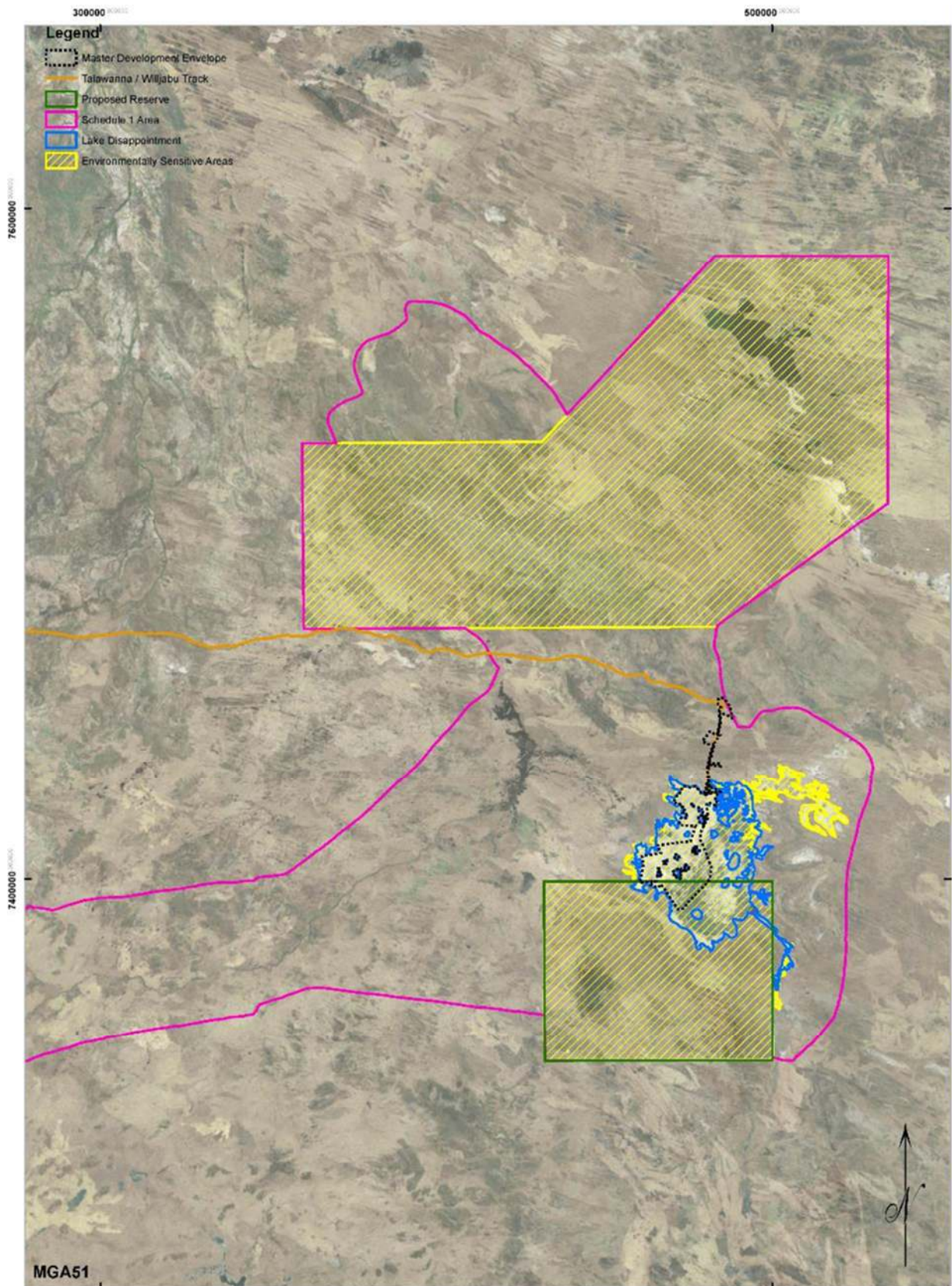


Figure 1-4: Location of project development envelope, relative to existing and proposed reserves

### 1.5.2 Surveys and study findings

Since 2012 there have been multiple fauna surveys and assessments (Attachment A). The results of these studies have contributed to the understanding of the abundance and distribution of the vertebrate fauna, and specifically conservation significant fauna, in the project area.

Surveys at and near the northern shore of Lake Disappointment have recorded 248 species of terrestrial vertebrate (including 36 waterbird species and six introduced mammal species) and 193 species of aquatic invertebrates. Terrestrial vertebrate fauna, waterbirds, subterranean and aquatic invertebrate fauna potentially found in the development envelope and the adjacent areas are shown in Attachment B.

The following seven fauna habitats were mapped and are closely aligned with vegetation communities:

- Flat plain with few to numerous trees over scattered shrubs over spinifex;
- Flat plain with scattered shrubs over spinifex with few or no trees;
- Swales and dune crests with shrubs over spinifex with few or no trees;
- Creek or drainage line;
- Halophytic vegetation;
- Clay or salt pan mostly devoid of vegetation; and
- Rocky area or breakaway.

### 1.5.3 Key assumptions and uncertainties

#### **Key assumptions**

Several assumptions have been made with regards to the response of fauna to the management actions proposed in this FMP. These include, but are not necessarily limited to:

- The fauna surveys undertaken to date accurately report the distribution and status of conservation significant fauna in the project area;
- Potential impacts and mitigation described for conservation significant fauna in the *Lake Disappointment Potash Project: Potential Impacts on Fauna* report are a reasonably accurate representation of the situation and likely outcomes of mitigation;
- Protection of fauna habitat will result in the protection of conservation significant fauna; measures to protect conservation significant fauna will also protect all other native fauna;
- The management actions proposed in this FMP are appropriate and sufficient to protect fauna, fauna habitat, ecological linkages and populations of conservation significant fauna;
- The Lake Disappointment Dragon (*Ctenophorus nguyana*) and the Lake Disappointment Gecko (*Diplodactylus fulleri*) are assumed to be relatively evenly distributed around the edge of Lake Disappointment;
- Night Parrot incubation and fledging times are assumed to be similar to those for the Eastern Group Parrot (Eastern Ground Parrot egg incubation is 21-24 days, and fledging takes another 23-25 days to leave the nest, but can range from 18-28 day (McFarland 1991));
- Successful Banded Stilt recruitment events are assumed to require between 80 and 90 days of flooded conditions on the playa near to the islands where the birds nest;
- Some fauna, particularly the larger vertebrates, will disperse away from vegetation clearing activities;

- The most significant impacts on the vertebrate fauna are wildfires and predation by foxes and cats; and
- Conservation significant fauna are currently susceptible to a range of threatening processes, including predation / competition from introduced species and inappropriate fire regimes. A 'no project' option will not address these threats and may not be the lowest risk option.

### Uncertainties

It has not been possible with the available data to quantify or accurately estimate the populations of conservation significant fauna in the project area (except for breeding water birds), and it is likely that there will be significant temporal and spatial changes in these populations due to a range of factors including:

- natural spatial and temporal variations in populations;
- different trapping or observation techniques;
- daily and seasonal variation in weather conditions; and
- time since the last fire.

Potential impacts have been mostly inferred from the available peer-reviewed literature, recovery plans and Threatened Species Committees advice to Ministers. For some species sufficient research has not been undertaken in Australia to provide reliable causal statements about changes in abundance. For Night Parrots, the following uncertainties apply:

- are the Parrots transient or residents and, if resident, are they still present in the project area?
- are they only roosting and foraging in the project area?
- are they breeding in the project area?
- do they have habitat preferences, and if so what are they?
- where else are they present in the project area and beyond?
- is access to free freshwater important in determining where they forage, nest and roost? and
- the number of Night Parrot in the project area.

The ecological and breeding requirements of Banded Stilts are not yet adequately studied at a national level.

### 1.5.4 Management approach

A risk-based approach has been adopted, based on the available literature and expert opinion, as expressed in technical studies commissioned by Reward for the Lake Disappointment project. Management actions are based on the mitigation hierarchy (avoid → reduce → rehabilitate → offset) and the threats to species identified in the *Lake Disappointment Potash Project: Potential Impacts on Fauna* report (Bennelongia and Terrestrial Ecosystems, 2018).

Many of the potential impacts to conservation-significant fauna in the Lake Disappointment area can be minimised or mitigated to result in a neutral or a positive outcome. For example, the existing vertebrate fauna population is currently subject to by the predatory pressure due to the presence of feral cats and foxes. Therefore, a feral and pest animal reduction program, specifically targeting foxes and feral cats can result in the increased abundance of vertebrate fauna and, in particular, conservation significant fauna, beyond current (pre-development) levels. The increase in a population as a direct result of this management action would be considered as a net positive impact. The *Lake Disappointment Potash Project: Potential*



*Impacts on Fauna* report proposed a series of metrics to quantify the level of impacts of various factors and enable the effectiveness of management actions to be checked.

### 1.5.5 Rationale for choice of provisions

Reward's primary focus in the avoidance and mitigation of impacts on terrestrial fauna has been on actions to protect threatened fauna of most concern (e.g. Night Parrot, Bilby and Great Desert Skink). Management strategies have specifically targeted known threats by adopting actions that are known to work. Where data are deficient, then additional information will be collected to improve the efficacy of management actions in delivering positive outcomes for fauna.

The two most significant threatening processes currently affecting terrestrial fauna in the Lake Disappointment area are: wildfires and predation by feral cats and foxes. Naturally occurring wildfires initiated by lightning strike can have a significant impact on the vertebrate fauna assemblage including conservation significant fauna. Reward is not able to control the ignition or the progress of most of these fires, but will do what is necessary to protect project staff and infrastructure in the event of a wildfire threatening the project.

#### ***Feral and pest animal control***

Project implementation has the potential to increase the existing feral and pest animal pressure on native fauna through the following activities:

- Establishment of access tracks and causeways
- Generation of putrescible waste
- Establishment of freshwater impoundments
- Vegetation clearing

Accordingly, the key provision proposed by Reward for protection of terrestrial fauna relates to actions to control feral and pest animal species. Both outcome-based provisions and management-based provisions are proposed. Effective implementation of these provisions will help to mitigate project impacts and will also serve to reduce existing non-project threats to native fauna. The indicators proposed to enable assessment of the effectiveness of feral and pest animal controls include measures of native fauna abundance and diversity (through a biotic integrity index) as well as measures of feral / pest animal activity or abundance. Because of the importance of feral animal control to native fauna protection, both lead and lag indicators are required. 'Trigger' and 'threshold' metrics are proposed for outcome-based provisions to serve as 'alert' and 'action' levels.

#### ***Clearing control***

All of the vegetation and habitat types within the project's 389 ha disturbance footprint are regionally extensive. The amount of clearing proposed by Reward is an insignificant proportion of the available comparable habitat available in surrounding areas. Some fauna, particularly the larger vertebrates, will disperse away from vegetation clearing activities, however clearing controls are required during the construction phase of the project to prevent direct impacts to some smaller fauna or to occupied nests or burrows. Management-based provisions are proposed to limit the risk of direct impacts on conservation-significant fauna during land clearing.

***Access control***

Management-based provisions are proposed to control access to breeding and roosting sites of some conservation-significant fauna which could otherwise be disturbed by operational activities or by the activities of visitors to the Lake Disappointment area.

***Knowledge gaps***

The ecological requirements of some of the conservation-significant fauna known to exist in the project area – notably Night Parrots and Banded Stilts - are not well understood. Reward proposes to implement a program of targeted research to address information gaps and enable adaptive management of fauna throughout the life of the project. The results of this work will be made available to regulators and to researchers. Management-based provisions are proposed to ensure timely implementation and application of targeted research initiatives.

***Other operational controls***

A range of other operational controls (establishment and enforcement of speed limits, use of hot work permits, provision of egress matting at ponds and trenches, and so on) will be required to complement the key provisions outlined in this FMP. These additional controls will be implemented as standard operating procedures under Reward's environmental management system.



## 2 EMP PROVISIONS

This section describes the key outcome- and management-based provisions proposed by Reward to avoid, mitigate and manage adverse impacts on terrestrial vertebrate fauna, especially fauna of conservation significance.

Table 2-1: Key provisions: protection of terrestrial vertebrate fauna

<p><b>EPA factor and objectives:</b> to maintain representation, diversity, viability and ecological function at the species, population and assemblage level.</p>			
<p><b>Outcomes:</b></p> <ul style="list-style-type: none"> <li>• Pre-development native vertebrate fauna assemblages and ecological processes that support those assemblages are present and viable at the conclusion of the project.</li> <li>• Significantly reduced feral predator / introduced herbivore activity within the development envelope within 10 years of commencement of control program</li> <li>• 25% increase in average abundance of native terrestrial vertebrate fauna assemblages in the project area in 10 years.</li> <li>• Significant increase (10 SE) in biotic integrity score within 10 years, relative to pre-control average</li> <li>• No increase in numbers of Silver Gulls present when playa is dry.</li> </ul>			
<p><b>Key risks and associated impacts:</b> The following direct and indirect impacts on fauna have been identified:</p> <ul style="list-style-type: none"> <li>• clearing results in direct impacts on fauna or on fauna nests / burrows and / or exposes displaced fauna to increased predation</li> <li>• predation or competition from introduced herbivores (including as a result of attraction of feral animal populations to freshwater storages and/or putrescible waste);</li> <li>• alterations to surface water flows affect breeding success of Banded Stilts during extreme flood events, especially in summer; and</li> <li>• direct impacts to fauna as a result of vehicle strikes</li> <li>• fauna entrapment in trenches and ponds</li> </ul>			
Outcome-based provisions			
Environmental criteria	Response actions	Monitoring	Reporting
<p><b>Trigger criterion 1:</b> Feral animal abundance – rabbits observed within project development envelope</p>	<ul style="list-style-type: none"> <li>• Raise incident report(s)</li> <li>• Record abundance of warrens and density of scat piles</li> </ul>	<ul style="list-style-type: none"> <li>• Feral animal observations to be captured in incident reports</li> </ul>	<ul style="list-style-type: none"> <li>• Incident reports</li> <li>• Statistics in annual environmental report</li> </ul>
<p><b>Threshold criterion 1:</b> Feral animal abundance – number of rabbits reported within development envelopment in 3 month period exceeds 20 and/or 3 or more warrens are observed within 200 m of each other</p>	<ul style="list-style-type: none"> <li>• Implement targeted rabbit control: fumigate and collapse burrows; reduce rabbit numbers by shooting and/or baiting</li> <li>• Review reasons for increase in rabbit numbers</li> </ul>	<ul style="list-style-type: none"> <li>• Targeted monitoring as part of Management Action 2 (see below)</li> </ul>	
<p><b>Trigger criterion 2:</b> Feral animal abundance (large introduced herbivores) – large herbivores observed within development envelope</p>	<ul style="list-style-type: none"> <li>• Record numbers of large introduced herbivores</li> <li>• Control opportunistically by shooting during the cat and fox control programs.</li> </ul>	<ul style="list-style-type: none"> <li>• Feral animal observations to be captured in incident reports</li> <li>• Targeted monitoring as part of Management Action 2 (see below)</li> </ul>	<ul style="list-style-type: none"> <li>• Incident reports</li> <li>• Culling contractor reports</li> <li>• Statistics in annual environmental report</li> </ul>
<p><b>Threshold criterion 2:</b> Feral animal abundance (large introduced herbivores) – estimated population exceeds 50 animals</p>	<ul style="list-style-type: none"> <li>• Raise incident report</li> <li>• Ground cull if the estimated population in the development envelope exceeds 50.</li> </ul>		

	<ul style="list-style-type: none"> <li>• Aerial cull if the population in the development envelope exceeds 500.</li> </ul>		
<p><b>Trigger criterion 3:</b> Silver Gulls present in development envelope when playa is dry</p>	<ul style="list-style-type: none"> <li>• Raise incident report(s)</li> <li>• Record abundance of birds</li> </ul>	<ul style="list-style-type: none"> <li>• Opportunistic sighting records</li> <li>• Daily observations at landfill and at freshwater impoundments</li> </ul>	<ul style="list-style-type: none"> <li>• Incident reports</li> <li>• Observation logs (landfill, water storages)</li> <li>• Summary statistics in annual environmental report</li> </ul>
<p><b>Threshold criterion 3:</b> Silver Gull occurrence – 10 or more gulls recorded in project area for a period of more than a week when playa is dry and/or more than 10 breeding pairs of Silver Gulls observed when Banded Stilts or Gull-billed Terns are breeding.</p>	<ul style="list-style-type: none"> <li>• Raise incident report(s)</li> <li>• Engage specialist contractor within 10 days to cull birds and/or destroy nests and chicks</li> <li>• Review reasons for presence of Silver Gulls and take steps to prevent recurrence</li> </ul>	<ul style="list-style-type: none"> <li>• Aerial surveys of breeding and roosting locations during playa wetting events</li> </ul>	<ul style="list-style-type: none"> <li>• Incident reports</li> <li>• Survey reports – nesting observations</li> <li>• Completion reports from culling contractor</li> <li>• Annual environmental reports</li> </ul>
<b>Management-based provisions</b>			
<b>Management actions</b>	<b>Management targets</b>	<b>Monitoring / evidence</b>	<b>Reporting</b>
<p><b>Management action 1a:</b> Address information gaps – implement Night Parrot audio surveillance.  <b>Priority:</b> High  <b>Timing:</b> Beginning of site works</p>	<p>Minimise risk of vehicle strike and direct impacts to Night Parrot nests, eggs or chicks.</p>	<p>As per Attachment E</p>	<p>As per Attachment E</p>
<p><b>Management action 1b:</b> Address information gaps – playa bathymetry, hydroperiods and Banded Stilt breeding behaviour  <b>Priority:</b> High  <b>Timing:</b> When 150mm of rain is recorded at Lake Disappointment</p>	<p>No reduction in ponding depth, duration or extent within 200 m of islands following significant inflow events.</p>	<p>As per Attachment F</p>	<p>As per Attachment F</p>
<p><b>Management action 2:</b> Implement active program of feral and pest animal control  <b>Priority:</b> High  <b>Timing:</b> Base line monitoring in the October before the project commences. Feral pest management from the beginning of the project.</p>	<ul style="list-style-type: none"> <li>• Significant reduction in fox and cat numbers by Year 10</li> <li>• 25% increase in average abundance of native vertebrate fauna by Year 10.</li> <li>• Biotic integrity index shows a 10% improvement within 10 years.</li> </ul>	<ul style="list-style-type: none"> <li>• 1080 bait uptake and bait theft</li> <li>• Camera trap records</li> <li>• Vertebrate fauna monitoring records (as per Attachment C)</li> </ul>	<ul style="list-style-type: none"> <li>• Incident reports</li> <li>• Culling contractor completion reports</li> <li>• Native fauna survey and monitoring reports (as per Attachment C)</li> <li>• Statistics in annual environmental report</li> </ul>
<p><b>Management action 3:</b> Control access to exclusion areas  <b>Priority:</b> High  <b>Timing:</b> Beginning of the site works.</p>	<ul style="list-style-type: none"> <li>• No unauthorized access to exclusion areas (including, but not limited to, 200m exclusion area surrounding islands on playa)</li> </ul>	<ul style="list-style-type: none"> <li>• Spatial files: delineation of exclusion areas</li> <li>• Induction records: information about 'no go' rules</li> </ul>	<ul style="list-style-type: none"> <li>• Incident reports</li> <li>• ILUA compliance reports</li> </ul>

Management-based provisions			
Management actions	• Management targets	• Monitoring / evidence	• Reporting
<p><b>Management action 4:</b> Minimise disturbance to waterbird and Night Parrot breeding, nesting and roosting areas  <b>Priority:</b> High  <b>Timing:</b> Beginning of the site works.</p>	<ul style="list-style-type: none"> <li>• Cessation of on-playa works during potential major breeding events</li> <li>• No unauthorized access to Night Parrot nesting / roosting areas</li> </ul>	<ul style="list-style-type: none"> <li>• Meteorological records: rainfall &gt;100mm in less than a week</li> <li>• Operations records: closure of on-playa access</li> <li>• Signage erected to advise restricted access</li> <li>• Video surveillance of no go areas</li> </ul>	<ul style="list-style-type: none"> <li>• Incident reports</li> <li>• Annual environmental reports</li> </ul>
<p><b>Management action 5:</b> Prevent fauna mortality and damage to occupied nests / burrows during clearing: implement internal clearing permit procedure  <b>Priority:</b> High  <b>Timing:</b> Beginning of the site works.</p>	<ul style="list-style-type: none"> <li>• No loss of Night Parrot nests, eggs or chicks during clearing</li> <li>• No Night Parrot mortality from vehicle strike</li> <li>• No loss of Bilbies, Great Desert Skink, Northern Marsupial Moles or Mulgara in occupied burrows during clearing</li> <li>• No loss of the Lake Disappointment Dragon in their burrows.</li> <li>• No loss of Princess Parrot chicks, eggs or occupied nests during clearing</li> </ul>	<ul style="list-style-type: none"> <li>• Pre-clearing inspection records</li> <li>• Night Parrot monitoring actions (as per Attachment E)</li> <li>• Clearing permit documentation (as per Attachment G)</li> <li>• Permits to take</li> </ul>	<p>Annual environmental reports</p>
<p><b>Management action 6:</b> Minimise habitat fragmentation and impact of surface pipeline barriers  <b>Priority:</b> Low  <b>Timing:</b> Beginning of the site works.</p>	<ul style="list-style-type: none"> <li>• All surface water pipelines will be elevated ≥100mm above the ground every 100m</li> </ul>	<ul style="list-style-type: none"> <li>• As-built pipeline observations</li> </ul>	<p>Inspection records</p>
<p><b>Management action 7:</b> Minimise fauna mortality as a result of vehicle strikes by imposing traffic controls and promoting driver awareness  <b>Priority:</b> Low  <b>Timing:</b> Beginning of the site works.</p>	<ul style="list-style-type: none"> <li>• Site speed limits established, communicated and enforced</li> <li>• Records maintained of vehicle strikes (fauna register)</li> </ul>	<ul style="list-style-type: none"> <li>• Fauna mortality register</li> <li>• Periodic compliance checks with site speed limits</li> <li>• Induction records</li> <li>• Signage in place</li> </ul>	<ul style="list-style-type: none"> <li>• Incident reports</li> <li>• Statistics in annual environmental reports</li> </ul>

### 3 ADAPTIVE MANAGEMENT AND REVIEW OF THE EMP

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Reward will review all processes and procedures upon completing its Annual Environmental Report for the Lake Disappointment operation. The annual report will consider achievements against specified targets, and implementation of agreed actions. The outcomes of monitoring will be compared against proposed targets and reported as part of the annual report.

Management actions, mitigation measures and monitoring (where required) to meet specified outcomes and objectives will be reviewed on an on-going basis and more formally at the time of the annual performance and compliance review to assess what has been learned and how improvements can be made and implemented, from:

- evaluation of monitoring data;
- reviewing of assumptions and uncertainties;
- review new information about species and their ecology;
- re-evaluation of risks;
- review all events that tripped a trigger; and
- changes to the proposed operations.

It is envisaged that over the life of the project, fauna monitoring sites should remain, unless they are affected by wildfires, in which case they will need to be replaced in suitable similar habitat. It is probable that monitoring results and observations by Reward staff and specialist contractors will provide new insights so that changes and improvements will be made to this plan.

If targets are not being achieved or are easily achieved, then the reasons for this will be investigated, and management actions reviewed. Targets may be amended, in consultation with regulators. Similarly, if new information becomes available on the ecology of species or procedures for surveying, identifying or managing species, then these will be reviewed and where appropriate incorporated into this plan.

This fauna management plan will be reviewed at the end of Years 1 and 2 and then at least every three years or when major changes are made to the project. The outcome of all reviews of this plan will be documented in the Annual Environmental Report. Where appropriate, changes to this plan or the monitoring program will be discussed with DBCA, DMIRS and OEPA/DWER. If this EMP is a requirement of a condition, it is acknowledged that Reward will need to seek approval from the OEPA before significantly modifying the plan.

## 4 STAKEHOLDER CONSULTATION

Reward has actively engaged on fauna matters with a range of stakeholders since 2012. A summary of consultation relevant to Reward's assessment and management of fauna impacts is provided in Table 4-1. Consultation on this FMP has not yet occurred. This initial version of the FMP is intended to serve as the basis for stakeholder discussions on the measures required to avoid, manage, and mitigate potential impacts of project implementation on fauna values at Lake Disappointment.

Table 4-1: Stakeholder consultation (fauna and fauna habitats)

Stakeholder	Dates	Issues/topics raised	Reward response/outcomes
DMP, DoW, OEPA, DPaW, DAA, WDLAC	16/04/2012 – 7/12/2012	RML provided a brief overview of the LD project and objectives. Discussed trial ponds, camp locations, access tracks and tenure to support exploration and development activity. Sought guidance on requirements for clearing permits and Section 18 Heritage approvals. DPaW raised concerns regarding access track layout and potential impact on threatened fauna species. Recommended consulting with DSEWPaC as the activities will likely trigger	Site access track location to remain as it is in agreement with Aboriginal land holders. Reward commissioned further flora/fauna work to assess impacts on threatened species. Commenced gathering further information for referral of project to DSEWPaC for EPBC Act assessment.
DMP, DoW, OEPA, DPaW, DER, WDLAC, DSEWPaC	1/2/2013 – 20/5/2013	Guidance sought relating to requirements for undertaking flora / fauna surveys at Lake Disappointment as well as ongoing environmental monitoring during exploration activities.	Prepared and (after several reviews) finalised a conservation management plan, environmental impact assessment and monitoring plans for the PoW. Botanica Consulting commissioned to commence flora and fauna survey work in May 2013.
Conservation Council of Western Australia	16/05/2013	Jim Williams (Botanica Consulting) and M Ruane (Reward) provided brief overview of the proposed project to CCWA	Continue consultation as project progresses.
DAFWA	18/10/2013	Discussed project briefly on site while DAFWA were conducting camel aerial cull. Discussed feral species records obtained by Botanica Consulting. DAFWA recommended sending data to DPaW.  DAFWA advised of current and proposed feral species eradication/management programs in the area, fox and rabbit burrow sightings and Brolga/tern sightings. Camel numbers are reducing however large number of cats, dogs and foxes identified by Botanica Consulting and DAFWA. Also rabbits now in the area. Migratory birds observed by both Botanica Consulting and DAFWA.	BC to continue camera monitoring and provide records of ferals to DPaW (as specified EIA and Monitoring Plan).

Stakeholder	Dates	Issues/topics raised	Reward response/outcomes
DPAW	26/02/2015	Reward email to DPaW seeking input into haulage route options offsite. Sandra Thomas (DPaW) advised that DPaW preference was to use existing track infrastructure (Talawana Track)	Advice taken into account when planning route
Kanyirninpa Jukurrpa (KJ), DPaW	15/07/2016 – 24/04/2017	Fire management programs conducted with Martu and DPaW adjacent to the Lake Disappointment Project area. Discussion about logistics of flying over East Pilbara lakes to survey migratory birds following record rainfalls early in 2017	Reward offer to assist where possible (accommodation / fuel).
DotEE	15/07/2016 – 7/09/2016	EPBC 2016/7727: Clock stopped pending a request for more information clarifying if the proposed action could be considered a nuclear action and a discussion concerning the potential for the proposed action to impact matters of national environmental significance including listed migratory birds (1. mobilisation, bioavailability and toxicity of heavy metals including Thorium and Uranium, 2. hydrogeochemical changes to lake sediments and waters during wet and dry episodes, 3. generation of acid sulphate	Reward commissions independent technical studies by JHRC Enterprises and Hydrobiology together with in-house data collated by Pendragon Environmental. Reports Issued to DoTEE and copied to EPA.  Reports find negligible radioactivity or ecotoxicity hazard.
DotEE	12/10/2016 – 23/02/2017	EPBC 2016/7727: Clock stopped pending a request for more information regarding the Talawana Track Upgrade component of the Lake Disappointment Project. Specifically, potential impacts to the Northern Quoll, Ghost Bats, Bilby and EPBC Act listed species including results of any fauna / habitat surveys and proposed avoidance and mitigation measures.	Reward commissions Botanica Consulting (BC) to commence targeted surveys along the Talawana Track from Balfour Downs to the Willjabu Track (site access track).
DMP, DPaW	27/03/2017	From photos of the migratory bird flyover early in 2017, DPaW queries the potential for tracks (created by the amphibious excavator and Argo) around the pilot pond area to influence surface water flow on the lake.	Reward advises there was no impedance to water flows as evident from site monitoring, photos and also from satellite imagery. Tracks were washed away by subsequent water flows and the surface covered by salt

Stakeholder	Dates	Issues/topics raised	Reward response/outcomes
DotEE	3/04/2017	EPBC 2016/7727: Clock stopped - insufficient information regarding potential impacts to threatened species. DotEE requests that Reward undertake targeted surveys for night parrots.	Reward provides DoTEE with additional data on 16/05/2017 derived from downloads of camera traps installed during the Talawana Track for fauna survey purposes. Reward commissions Botanica Consulting to commence targeted surveys within the Lake Disappointment Project Area from
Australian Wildlife Conservancy	15/09/2017	Reward invites AWC to discuss an overview of the proposed operation, regional environmental values, results from environmental studies, opportunities to work together and post operational impacts and ongoing care for the region.	Receptive to discussions about collaborative opportunities which might exist following Reward's further consultation with Martu people. Reward to follow up.
DWER / OEPA	25/10/2017	Discussion with OEPA officers about targeted surveys for night parrots in the Lake Disappointment region.	Summary reports to be completed for ERD submission. Ongoing field studies post submission.
Birdlife Australia	10 & 18/10/2018	Project briefing and preliminary discussions concerning avifauna research at Lake Disappointment	Birdlife Australia amenable to further discussions and possible site visit. Reward to facilitate site visit.

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**Table A1: Summary of fauna studies – Lake Disappointment potash project**

Author and Title	Scope of and outcome of the survey
Alacran Environmental Science (2016). Taxonomy and short range endemic Assessment of Invertebrates from Lake Disappointment. December 2016.	Taxonomic identification and SRE assessment of 13 samples (12 scorpion samples and one isopod sample) from the Lake Disappointment area.
Alacran Environmental Science (2017). Taxonomy and short range endemic Assessment of Invertebrates from Lake Disappointment. May 2017.	Taxonomic identification and SRE assessment of a collection of 38 invertebrate samples obtained from dry pitfall traps from the Lake Disappointment area.
Bennelongia Environmental Consultants, (2016). Ecological Character of Lake Disappointment June 2016.	<p>Ecological characterisation of aquatic biota and key ecological and biophysical attributes of the Lake Disappointment / Savory Creek system, based on published information, consultant reports and studies undertaken for the Lake Disappointment project. Study included a site visit and sampling of aquatic biota in January 2016.</p> <p>This report summarises information on waterbird surveys prior to 2016 and presents results of waterbird and aquatic invertebrate surveys in 2016 on the main playa at Lake Disappointment and some claypans to the north. Twenty-nine species of waterbird had been recorded at Lake Disappointment by 2016, with records of breeding of Banded Stilt in 2004, 2013 and 2015 considered to be the most conservation significant occurrence of waterbirds or shorebirds.</p> <p>Sixty-nine species of aquatic invertebrate were collected. Several species have been recorded only from Lake Disappointment but were considered</p>
Bennelongia Environmental Consultants, (2017). Aquatic Ecology and Waterbirds at Lake Disappointment: Additional Studies, report number 301, prepared for Reward Minerals Limited, 20 July 2017.	<p>A characterisation of ecological values of Lake Disappointment following a major flooding event. Study aimed to characterise aquatic invertebrate assemblages, diatom assemblages and post-flood use of the lake by waterbirds. The field survey comprised sampling for aquatic invertebrates (250 µm and 50 µm sweep netting), diatoms and macrophytes at 18 sites in and around Lake Disappointment, including less-saline claypans around the hypersaline main playa. A comprehensive waterbird survey of the main playa and some surrounding claypans was undertaken by helicopter.</p> <p>This report provides the results of waterbird and aquatic invertebrate surveys in 2017 after major flooding of the main saline playa and adjacent claypans at Lake Disappointment. A total of 109,812 waterbirds of 28 species were counted, including 94,336 adult Banded Stilt that were mostly breeding. It was estimated 70,000 nests were seen on 10 islands, although nest numbers of five islands were very small. In total, 35 species of waterbird have been recorded at Lake Disappointment in all surveys to date. Sampling in 2017 collected 148 aquatic invertebrate species. When added to the species collected in 2016, at least 193 species of aquatic invertebrate are known from the main playa lake and (mostly) surrounding claypans at Lake Disappointment.</p>

Author and Title	Scope of and outcome of the survey
Harewood, G. (2012). Targeted Fauna Survey Proposed Access Track, Camp Site and Borrow Pit Lake Disappointment. Unpublished report for Reward Minerals Ltd.	Presents results of a targeted field survey conducted in October 2012 as a condition of clearing permit CPS 5111/1, which authorised clearing of up to 32.5 ha for the purpose of exploration track upgrades, camp establishment and related exploration activities. This report provides the results of searches for burrows, tracks, scats, diggings and other definitive signs of the Great Desert Skink, Mulgara, Marsupial Mole and Bilby on three four-wheel motorcycles (ATVs). Areas searched included either side of the 28km access track from the Talawana Track to Lake Disappointment and along the fringe of the existing Talawana Track at the Parngurr turnoff to the new access track. No evidence was found of the Great Desert Skink, Mulgara and Bilby, but tunnels created by Marsupial Moles were recorded in three trenches.
Harewood, G. (2015). Marsupial Mole Monitoring Survey (April 2014). Lake Disappointment Potash Project. Unpublished report for Reward Minerals Ltd.	Presents results of field survey conducted in April 2014 in the Lake Disappointment area to provide a baseline dataset on marsupial mole activity. This report provides results of digging 20 trenches (120cm x 80cm x 40cm wide) along approximately 22km of the Willjabu Track near Lake Disappointment. A total of 76 tunnels with a diameter of greater than 20mm and attributed to Marsupial Moles were recorded. Two tunnels were considered fresh and three were considered recent.
Harewood, G (2017a). Conservation Significant Vertebrate Fauna Assessment, Talawana Track Upgrade. Lake Disappointment Potash Project Reward Minerals Ltd, October 2017.	Presents results of a vertebrate fauna assessment (desktop review and field survey) over sections of the Talawana Track proposed for upgrade. Includes information from multiple field surveys – including targeted surveys for EPBC-listed species – conducted between 2012 and June 2017.  This report summarises conservation significant species potentially impacted by the Talawana Track upgrade. These are: <i>Macrotis lagotis</i> (Bilby; Vulnerable), <i>Lerista macropisthopus remota</i> (Unpatterned Robust Lerista; P2), <i>Merops ornatus</i> (Rainbow Bee-eater; Sch. 5), <i>Polytelis alexandrae</i> (Princess Parrot; P4), <i>Falco peregrinus</i> (Peregrine Falcon; other specially protected), <i>Notoryctes caurinus</i> (Northern Marsupial Mole; P4), <i>Dasyercus blythi</i> (Brush-tailed Mulgara; P4) and the <i>Pseudomys chapmani</i> (Western Pebble-mound Mouse; P4).

## Author and Title

## Scope of and outcome of the survey

Harewood, G (2017b). Fauna Survey Report - Lake Disappointment Potash Project, Report number 01-000018-1, Reward Minerals Ltd. October 2017.

Consolidated report summarising the results of fauna surveys conducted in the Lake Disappointment project area and surrounds between 2012 and 2017.

This report provides results of two surveys (May 2013 and October 2013) for an area of 89,130ha (60,886ha is covered by Lake Disappointment) and included the Talawana Track, the Willjabu Track and the most northern and western sections of Lake Disappointment. There were eight trapping sites in four fauna habitats (interdunal swale, dune crest, riparian salt-lake edge, minor drainage line). Trapping sites were clustered together near where the southern end of the Willjabu Track meets Lake Disappointment. For each survey period, there were 550/560 small aluminium box trap-nights, 110/112 large aluminium box trap or cage trap-nights, 1,110/1,200 funnel trap-nights and 550/560 pit-trap nights. In addition, there was a bird survey at each trapping site, 41 camera traps were deployed for approximately 170 camera-days, nocturnal spotlighting and non-systematic opportunistic observations. A summary of the fauna in higher taxonomic groups recorded in this survey are shown in Table 1.

Conservation significant species recorded in or near the potash project area (other than on the Talawana Track) include: *Ctenophorus nuyana* (Lake Disappointment Dragon; P1), *Diplodactylus fulleri* (Lake Disappointment Gecko; P1), *Lerista macropisthopus remota* (Unpatterned Robust Lerista; P2), *Merops ornatus* (Rainbow Bee-eater; Sch. 5), *Polytelis alexandrae* (Princess Parrot; P4), *Falco peregrinus* (Peregrine Falcon; other specially protected) and *Notoryctes caurinus* (Northern Marsupial Mole; P4).

Author and Title	Scope of and outcome of the survey
Harewood, G (2017c). Night Parrot Survey Report - Lake Disappointment Potash Project, Version 2, Reward Minerals Ltd, December 2017.	Presents results of three targeted night parrot surveys conducted near Lake Disappointment in June, August/September and October/November 2017. This reports summaries the methods and results of Night Parrot surveys from June 2017 to November 2017.  The June 2017 survey targeted various points along the Talawana and Willjabu Tracks, at the proposed processing plant site and around the edge of north western edge of Lake Disappointment, near sections of Savory Creek, and used automatic recording units (ARUs), listening surveys and searches around waterholes/bores. ARUs were located at 14 sites from one to eight nights and listening surveys, undertaken by Greg Harewood and George Swann, were undertaken at six locations. Night Parrot calls were recorded at a single location.  The August / September 2017 surveys used ARUs at three sites on the west side of the Willjabu Track for eight nights and then the ARUs were moved to the eastern side of the Willjabu Track and left for 12 nights. Three units were then moved to Lake Dora and left for nine nights before again being moved and left for 11 nights. Night Parrot calls were recorded at six locations.  The September / October 2017 ARUs were left at eight locations for 12 nights. No Night Parrot calls were recorded.
Hydrobiology (Hydrobiology 2016). Memorandum report: Lake Disappointment – Ecotoxicity Hazard Assessment, 2 September 2016.	Risk based review of acid sulphate soil test results and relevant fauna reports to assess ecotoxicological hazard of proposed operations at Lake Disappointment.
Phoenix Environmental Sciences (2014). Short-range endemic invertebrate fauna survey of the Disappointment Potash Project. Prepared for Botanica Consulting on behalf of Reward Minerals Ltd. September 2014	Desk top review and field survey of short range endemic invertebrates in the Lake Disappointment area. Field survey consisted of foraging, combined soil/leaf litter sifting and opportunistic trapping of invertebrates at 15 primary survey sites and 14 opportunistic sites in May 2013. Habitats from which samples were collected included: playa, samphire/riparian zone and sand dunes.
Scorpion ID (2016). Taxonomy and short-range endemic assessment of invertebrates from lake disappointment, January 2016.	Taxonomic identification and SRE assessment of 70 invertebrate samples from the Lake Disappointment area.
Terrestrial Ecosystems and Bennelongia (2018). Lake Disappointment Potash Project: Potential Impacts on Fauna, Version 7. August 2018.	Consolidated fauna impact assessment report for the Lake Disappointment potash project.



Table B1: Terrestrial fauna species potentially found at / near to the Lake Disappointment Potash Project

Family	Species	Common Name	
<b>Birds</b>			
Casuariidae	<i>Dromaius novaehollandiae</i>	Emu	
Phasianidae	<i>Coturnix pectoralis</i>	Stubble Quail	
Columbidae	<i>Phaps chalcoptera</i>	Common Bronzewing	
	<i>Ocyphaps lophotes</i>	Crested Pigeon	
	<i>Geopelia plumifera</i>	Spinifex Pigeon	
	<i>Geopelia cuneata</i>	Diamond Dove	
Podargidae	<i>Podargus strigoides</i>	Tawny Frogmouth	
Caprimulgidae	<i>Eurostopodus argus</i>	Spotted Nightjar	
Aegothelidae	<i>Aegotheles cristatus</i>	Australian Owlet-nightjar	
Aopodidae	<i>Apus pacificus</i>	Fork-tailed Swift	
Otididae	<i>Ardeotis australis</i>	Australian Bustard	
Threskiornithidae	<i>Threskiornis spinicollis</i>	Straw-necked Ibis	
Accipitridae	<i>Elanus axillaris</i>	Black-shouldered Kite	
	<i>Lophoictinia isura</i>	Square-tailed Kite	
	<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	
	<i>Haliastur sphenurus</i>	Whistling Kite	
	<i>Milvus migrans</i>	Black Kite	
	<i>Accipiter fasciatus</i>	Brown Goshawk	
	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk	
	<i>Circus assimilis</i>	Spotted Harrier	
	<i>Circus approximans</i>	Swamp Harrier	
	<i>Aquila audax</i>	Wedgetail Eagle	
	<i>Hieraaetus morphnoides</i>	Little Eagle	
	Falconidae	<i>Falco cenchroides</i>	Nankeen Kestrel
		<i>Falco berigora</i>	Brown Falcon
		<i>Falco longipennis</i>	Australian Hobby
<i>Falco subniger</i>		Black Falcon	
<i>Falco peregrinus</i>		Peregrine Falcon	
Burhinidae	<i>Burhinus grallarius</i>	Bush Stone-curlew	
Charadriidae	<i>Charadrius ruficapillus</i>	Red-capped Plover	
	<i>Euseyonornis melanops</i>	Black-fronted Dotterel	
	<i>Erythrogonyx cinctus</i>	Red-kneed Dotterel	
	<i>Vanellus tricolor</i>	Banded Lapwing	
Turnicidae	<i>Turnix velox</i>	Little Button-quail	
Cacatuidae	<i>Eolophus roseicapillus</i>	Galah	
	<i>Nymphicus hollandicus</i>	Cockatiel	
Psittacidae	<i>Barnardius zonarius</i>	Australian Ringneck	
	<i>Pezoporus occidentalis</i>	Night Parrot	
	<i>Polytelis alexandrae</i>	Princess Parrot	
	<i>Melopsittacus undulatus</i>	Budgerigar	
	<i>Neophema splendida</i>	Scarlet-chested Parrot	
Cuculidae	<i>Cacomantis pallidus</i>	Pallid Cuckoo	
	<i>Chalcites basalus</i>	Horsfield's Bronze-cuckoo	
Strigidae	<i>Ninox novaeseelandiae</i>	Boobook Owl	
Tytonidae	<i>Tyto alba</i>	Barn Owl	
Halcyonidae	<i>Dacelo leachi</i>	Blue-winged Kookaburra	
	<i>Todiramphus pyrrophygius</i>	Red-backed Kingfisher	
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater	
Maluridae	<i>Malurus leucopterus</i>	White-winged Fairy-wren	
	<i>Malurus lamberti</i>	Variogated Fairy-wren	

Family	Species	Common Name
	<i>Stipiturus ruficeps</i>	Rufous-crowned Emu-wren
	<i>Amytornis striatus</i>	Striated Grasswren
Acanthizidae	<i>Calamanthus campestris</i>	Rufous Fieldwren
	<i>Gerygone fusca</i>	Western Gerygone
	<i>Smicronis brevirostris</i>	Weebill
	<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill
	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill
	<i>Acanthiza apicalis</i>	Inland Thornbill
	<i>Aphelocephala nigricinta</i>	Banded Whiteface
Pardalotidae	<i>Pardalotus rubricatus</i>	Red-browed Pardalote
	<i>Pardalotus striatus</i>	Striated Pardalote
Meliphagidae	<i>Certhionyx variegatus</i>	Pied Honeyeater
	<i>Lichenostomus virescens</i>	Singing Honeyeater
	<i>Lichenostomus keartlandi</i>	Grey-headed Honeyeater
	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater
	<i>Purnella albifrons</i>	White-fronted Honeyeater
	<i>Manorina flavigula</i>	Yellow-throated Miner
	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater
	<i>Epthianura tricolor</i>	Crimson Chat
	<i>Epthianura aurifrons</i>	Orange Chat
	<i>Lichmera indistincta</i>	Brown Honeyeater
Pomatostomidae	<i>Pomatostomus temporalis</i>	Grey-crowned Babbler
	<i>Pomatostomus superciliosus</i>	White-browed Babbler
Psophodidae	<i>Cinlosoma cinnamomeum</i>	Cinnamon Quail-thrush
	<i>Cinlosoma castaneothorax</i>	Chestnut-breasted Quail-thrush
	<i>Psophodes occidentalis</i>	Chiming Wedgebill
Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella
Campephagidae	<i>Corina maxima</i>	Ground Cuckoo-shrike
	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike
	<i>Lalage sueurii</i>	White-winged Triller
Pachycephalidae	<i>Pachycephala rufiventris</i>	Rufous Whistler
	<i>Colluricincla harmonica</i>	Grey Shrike-thrush
	<i>Oreoica gutturalis</i>	Crested Bellbird
Artamidae	<i>Artamus personatus</i>	Masked Woodswallow
	<i>Artamus cinereus</i>	Black-faced Woodswallow
	<i>Artamus minor</i>	Little Swallow
	<i>Cracticus nigrogularis</i>	Pied Butcherbird
	<i>Cracticus torquatus</i>	Grey Butcherbird
	<i>Cracticus tibicen</i>	Australian Magpie
Rhipiduridae	<i>Rhipidura albiscapa</i>	Grey Fantail
	<i>Rhipidura fuliginosa</i>	New Zealand Fantail
	<i>Rhipidura leucophrys</i>	Willie Wagtail
Corvidae	<i>Corvus bennetti</i>	Little Crow
	<i>Corvus orru</i>	Torresian Crow
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark
Petroicidae	<i>Petroica goodenovii</i>	Red-capped Robin
	<i>Melandryas cucullate</i>	Hooded Robin
Alaudidae	<i>Mirafra javanica</i>	Horsfield' Bushlark
Megaluridae	<i>Cincloramphus mathewsi</i>	Rufous Songlark
	<i>Cincloramphus cruralis</i>	Brown Songlark
	<i>Eremiornis carteri</i>	Spinifexbird
Hirundinidae	<i>Cheramoeca leucosterna</i>	White-backed Swallow
	<i>Hirundo neoxena</i>	Welcome Swallow

Family	Species	Common Name
	<i>Petrochelidon ariel</i>	Fairy Martin
	<i>Hirundo nigricans</i>	Tree Martin
Nectariniidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird
Estrildidae	<i>Taeniopygia guttata</i>	Zebra Finch
	<i>Emblema pictum</i>	Painted Finch
Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian Pipit
<b>Reptiles</b>		
Agamidae	<i>Gowidon longirostris</i>	Long-nosed Dragon
	<i>Ctenophorus caudicinctus</i>	Ring-tailed Dragon
	<i>Ctenophorus isolepis</i>	Crested Dragon
	<i>Ctenophorus nuyarna</i>	Lake Disappointment Dragon
	<i>Ctenophorus nuchalis</i>	Central Netted Dragon
	<i>Diporiphora paraconvergens</i>	Grey-striped Western Desert Dragon
	<i>Moloch horridus</i>	Thorny Devil
	<i>Pogona minor</i>	Dwarf Bearded Dragon
	<i>Diporiphora valens</i>	Pilbara Tree Dragon
	<i>Tympanocryptis centralis</i>	Pebble Dragon
Boidae	<i>Antaresia stimsoni</i>	Stimson's Python
	<i>Aspidites ramsayi</i>	Woma
	<i>Aspidites melanocephalus</i>	Black-headed Python
Carphodactylidae	<i>Nephrurus laevis</i>	Smooth Knob-tail
	<i>Nephrurus levis</i>	Three-lined Knob-tail
	<i>Nephrurus wheeleri</i>	Banded Knob-tail
Diplodactylidae	<i>Crenadactylus ocellatus</i>	Clawless Gecko
	<i>Diplodactylus conspicillatus</i>	Fat-tailed Diplodactylus
	<i>Diplodactylus fulleri</i>	Lake Disappointment Ground Gecko
	<i>Lucasium stenodactylum</i>	Crowned Gecko
	<i>Oedura marmorata</i>	Marbled Gecko
	<i>Strophurus ciliaris</i>	Spiny-tailed Gecko
	<i>Strophurus elderi</i>	Jewelled Gecko
	<i>Strophurus jeanae</i>	Southern Phasmid Gecko
Elapidae	<i>Acanthopis pyrrhus</i>	Desert Death Adder
	<i>Brachyuropsis fasciolata</i>	Narrow-banded Burrowing Snake
	<i>Furina ornata</i>	Orange-naped Snake
	<i>Pseudechis australis</i>	Mulga Snake
	<i>Pseudonaja mengdeni</i>	Gwardar
	<i>Pseudonaja modesta</i>	Ringed Brown Snake
	<i>Simoselaps anomalus</i>	Desert Banded Snake
Gekkonidae	<i>Gehyra pilbara</i>	Pilbara Delta
	<i>Gehyra punctata</i>	Spotted Delta
	<i>Gehyra purpurascens</i>	Purplish Dtella
	<i>Gehyra variegata</i>	Tree Dtella
	<i>Heteronotia binoei</i>	Bynoe's Prickly Gecko
	<i>Rhynchoedura ornata</i>	Western Beaked Gecko
Pygopodidae	<i>Delma desmosa</i>	Desmosa
	<i>Delma haroldi</i>	Neck-barred Delma
	<i>Delma nasuta</i>	Sharp-snouted Delma
	<i>Lialis burtonis</i>	Burton's Snake-lizard
	<i>Pygopus nigriceps</i>	Western Hooded Scaly-foot
Scincidae	<i>Carlia munda</i>	Shade-Litter Rainbow Skink
	<i>Ctenotus ariadnae</i>	Ariadna's Ctenotus
	<i>Ctenotus brooksi</i>	Wedgnout Ctenotus
	<i>Ctenotus calurus</i>	Blue-tailed Finesnout Ctenotus

Family	Species	Common Name
	<i>Ctenotus dux</i>	Fine Side-lined Ctenotus
	<i>Ctenotus grandis</i>	Grand Ctenotus
	<i>Ctenotus hanloni</i>	Nimbel Ctenotus
	<i>Ctenotus helenae</i>	Clay-soil Ctenotus
	<i>Ctenotus leae</i>	Orange-tailed Finesnout Ctenotus
	<i>Ctenotus leonhardii</i>	Leonhardi's Ctenotus
	<i>Ctenotus nasutus</i>	Nasute Finsnout Ctenotus
	<i>Ctenotus pantherinus</i>	Leopard Skink
	<i>Ctenotus piankai</i>	Coarse Sands Ctenotus
	<i>Ctenotus quattuordecimlineatus</i>	Fourteen-lined Ctenotus
	<i>Ctenotus saxatilis</i>	Stony-soil Ctenotus
	<i>Ctenotus schomburgkii</i>	Schomburgk's Ctenotus
	<i>Egernia eos</i>	Central Pygmy Spiny-tailed Skink
	<i>Eremiascincus fasciolatus</i>	Narrow-banded Sand Swimmer
	<i>Eremiascincus richardsonii</i>	Broad-banded Sand-swimmer
	<i>Lerista bipes</i>	North-western Sandslider
	<i>Lerista desertorum</i>	Central Desert Robust Slider
	<i>Lerista ips</i>	Robust Duneslider
	<i>Lerista macropisthopus</i>	Unpatterned Robust Slider
	<i>Lerista xanthura</i>	Yellow-tailed Plain Slider
	<i>Liopholis inornata</i>	Desert Skink
	<i>Liopholis kintorei</i>	Great Desert Skink
	<i>Liopholis striata</i>	Nocturnal Desert Skink
	<i>Menetia greyii</i>	Common Dwarf Skink
	<i>Morethia ruficauda</i>	Lined Firetail Skink
	<i>Notoscincus ornatus</i>	Ornate Soil-crevice Skink
	<i>Tiliqua multifasciata</i>	Centralian Blue-tongued Lizard
Typhlopidae	<i>Anilius endoterus</i>	Interior Blind Snake
	<i>Anilius grypus</i>	Long-beaked Blind Snake
Varanidae	<i>Varanus acanthurus</i>	Ridge-tailed Monitor
	<i>Varanus brevicauda</i>	Short-tailed Pygmy Monitor
	<i>Varanus eremius</i>	Pygmy Desert Monitor
	<i>Varanus giganteus</i>	Perentie
	<i>Varanus gilleni</i>	Pygmy Mulga Monitor
	<i>Varanus gouldii</i>	Gould's Goanna
	<i>Varanus tristis</i>	Black-headed Monitor
<b>Amphibians</b>		
Hylidae	<i>Cyclorana maini</i>	Sheep Frog
	<i>Cyclorana platycephala</i>	Water-holding Frog
	<i>Litoria rubella</i>	Desert Tree Frog
Limnodynastidae	<i>Neobatrachus aquilonius</i>	Northern Burrowing Frog
	<i>Neobatrachus sutor</i>	Shoemaker Frog
	<i>Notaden nichollsi</i>	Desert Spadefoot Toad
	<i>Platyplectrum spenceri</i>	Spencer's Burrowing Frog
Myobatrachidae	<i>Uperoleia glandulosa</i>	Glandular Toadlet
	<i>Uperoleia micromeles</i>	Tanami Toadlet
	<i>Uperoleia russelli</i>	Russell's Toadlet
	<i>Uperoleia saxatilis</i>	Pilbara Toadlet
<b>Mammals</b>		
Bovidae	<i>Bos taurus*</i>	Cow
Camelidae	<i>Camelus dromedarius*</i>	Dromedary
Canidae	<i>Canis lupus</i>	Dingo / Wild dog
	<i>Vulpes vulpes*</i>	Red Fox

Family	Species	Common Name
Felidae	<i>Felis catus</i> *	House Cat
Emballonuridae	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail Bat
	<i>Taphozous georgianus</i>	Common Sheath-tail Bat
	<i>Taphozous hilli</i>	Hill's Sheath-tail Bat
Hipposideridae	<i>Rhinonictis aurantia</i>	Pilbara Leaf-nosed Bat
Molossidae	<i>Austronomus australis</i>	White-striped Free-tail Bat
	<i>Chaerephon jobensis</i>	Northern Free-tail Bat
	<i>Mormopterus lumsdenae</i>	
Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat
	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat
	<i>Scotorepens greyii</i>	Little Broad-nosed Bat
	<i>Vespadelus finlaysoni</i>	Finlayson's Cave Bat
Thylacomyidae	<i>Macrotis lagotis</i>	Bilby
Dasyuridae	<i>Dasyurus cristicauda</i>	Crest-tailed Mulgara
	<i>Dasyurus blythi</i>	Brush-tailed Mulgara
	<i>Dasykaluta rosamondae</i>	Kaluta
	<i>Dasyurus hallucatus</i>	Northern Quoll
	<i>Ningauai ridei</i>	Wongai Ningauai
	<i>Ningauai timealyi</i>	Pilbara Ningauai
	<i>Planigale</i> sp.	Planigale sp.
	<i>Pseudantechinus macdonnellensis</i>	Fat-tailed False Antechinus
	<i>Pseudantechinus roryi</i>	Rory Cooper's False Antechinus
	<i>Pseudantechinus woolleyae</i>	Woolley's False Antechinus
	<i>Sminthopsis hirtipes</i>	Hairy-footed Dunnart
	<i>Sminthopsis macroura</i>	Stripe-faced Dunnart
	<i>Sminthopsis ooldea</i>	Ooldea Dunnart
<i>Sminthopsis youngsoni</i>	Lesser Hairy-footed Dunnart	
Macropodidae	<i>Macropus robustus</i>	Euro
	<i>Macropus rufus</i>	Red Kangaroo
	<i>Petrogale lateralis lateralis</i>	Black-flanked Rock-wallaby
Notoryctidae	<i>Notoryctes caurinus</i>	Northern Marsupial Mole
Muridae	<i>Mus musculus</i>	House Mouse
	<i>Notomys alexis</i>	Spinifex Hopping Mouse
	<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse
	<i>Pseudomys desertor</i>	Desert Mouse
	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse

\* Introduced species

Table B2: Waterbird species potentially found at / near to the Lake Disappointment Potash Project

Common name	Scientific name
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>
Australasian Shoveler	<i>Anas rhynchotis</i>
Australian Wood Duck	<i>Chenonetta jubata</i>
Banded Lapwing	<i>Vanellus tricolor</i>
Banded Stilt	<i>Cladorhynchus leucocephalus</i>
Black-fronted Dotterel	<i>Charadrius melanops</i>
Black-tailed Native Hen	<i>Gallinula ventralis</i>
Black-winged Stilt	<i>Himantopus leucocephalus</i>
Brolga	<i>Grus rubicunda</i>
Caspian Tern	<i>Sterna caspia</i>
Common Greenshank	<i>Tringa nebularia</i>
Common Sandpiper	<i>Actitis hypoleucos</i>
Curllew Sandpiper	<i>Calidris ferruginea</i>
Eurasian Coot	<i>Fulica atra</i>
Freckled Duck	<i>Stictonetta naevosa</i>
Great Egret	<i>Ardea alba</i>
Grey Teal	<i>Anas gracilis</i>
Gull-billed Tern	<i>Gelochelidon nilotica</i>
Hardhead	<i>Aythya australis</i>
Hoary-headed Grebe	<i>Poliiocephalus poliocephalus</i>
Little Egret	<i>Egretta garzetta</i>
Little Pied Cormorant	<i>Phalacrocorax melanoleucos</i>
Marsh Sandpiper	<i>Tringa stagnatilis</i>
Nankeen Night Heron	<i>Nycticorax caledonicus</i>
Pacific Black Duck	<i>Anas superciliosa</i>
Pectoral Sandpiper	<i>Calidris melanotos</i>
Pink-eared Duck	<i>Malacorhynchus membranaceus</i>
Red-capped Plover	<i>Charadrius ruficapillus</i>
Red-kneed Dotterel	<i>Erythrogonys cinctus</i>
Red-necked Avocet	<i>Recurvirostra novaehollandiae</i>
Red-necked Stint	<i>Calidris ruficollis</i>
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>
Silver Gull	<i>Chroicocephalus novaehollandiae</i>
Straw-necked Ibis	<i>Threskiornis spinicollis</i>
Whiskered Tern	<i>Chlidonias hybrida</i>
White-faced Heron	<i>Ardea novaehollandiae</i>
White-necked Heron	<i>Ardea pacifica</i>
Wood Sandpiper	<i>Tringa glareola</i>

### Attachment C: Vertebrate fauna assemblage monitoring program

It is expected that the feral and pest animal management program will result in a significant, measurable increase in the abundance of the small vertebrate fauna and conservation significant species. This increase will compensate for the potential loss of vertebrate fauna associated with project activities, including vegetation, vehicular traffic and other anthropogenic activity in the project area.

#### Expected outcomes

It is expected that there will be a significant increase in the abundance of vertebrate species, but changes are unlikely to be measurable until at least three years after the commencement of the feral and pest animal management program (Attachment D) has been implemented.

#### Targets:

- 1 A 25% increase in average abundance of the vertebrate fauna assemblages in the project area in 10 years; and
- 2 a 10-point change in the biotic integrity index (rehabilitation and degradation index or equivalent, Thompson *et al.* 2008) over a 10 year period.

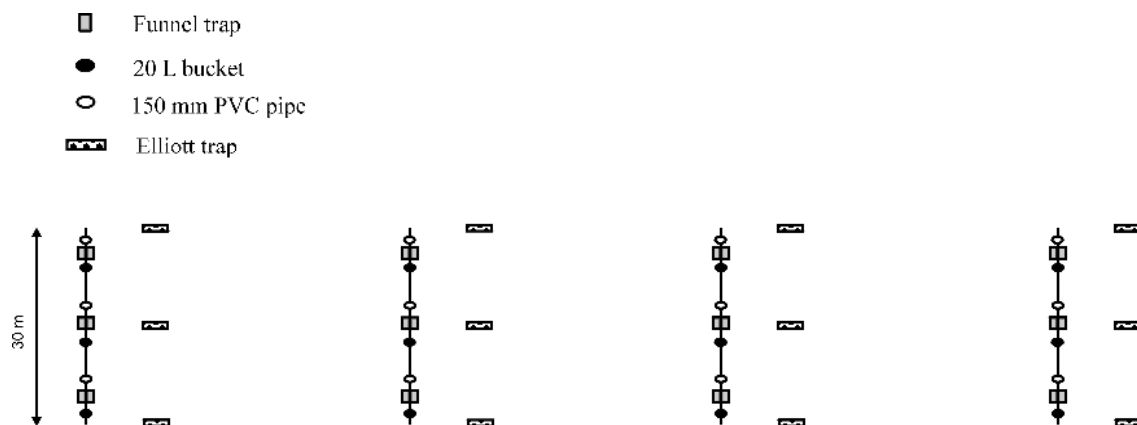
#### Survey protocols

A trapping program based on the Before After Control Impact (BACI) model will be implemented to measure changes in the vertebrate fauna assemblage.

Two fauna habitat types will be surveyed: i) halophytic vegetation and ii) swales and dune crests with shrubs over spinifex with few or no trees. There will be five replicate sites in each of the control and disturbance areas for each of the two fauna habitats (i.e. 5 x 2 x 2 sites – 20 sites in total).

Each trapping site will consist of four trap lines. Each trap line will contain three 20L PVC buckets, three 150mm by 500mm deep PVC pipes as pit-traps and three pair of funnel traps evenly spaced along a 30m fly-wire drift fence (300mm high; Diagram 1). In addition, three aluminium box traps will be set adjacent to each drift fence. Aluminium box traps will be baited with a mixture of sardines, rolled oats and peanut butter (i.e. universal bait).

Diagram 1: Trap layout at each site on the sand plain and eucalypt woodland





The trapping program will be undertaken for 10 nights / days, preferably in October to provide comparable data among successive years of monitoring.

Most caught animals will be marked with a permanent dark coloured marking pen to determine recaptures. For lizards, this will normally be on the abdomen, and for mammals along the tail. Marked recaptured animals will be recorded. However, as large snakes (if present) will not be handled, no snakes will be marked.

Baseline monitoring will be undertaken during the first October after the project has been approved. Monitoring survey will be undertaken in years 1 and 2 and thereafter every second year until the targets have been reached. Once the targets have been reached then the trapping program will be undertaken every five years.

A comprehensive report will be prepared at the conclusion of each trapping program indicating results changes in the fauna assemblages.

#### *Monitoring*

Trapping data will be used to determine progress toward stated targets.

#### *Analysis and Reporting*

The consultants undertaking the trapping program will use the Rehabilitation and Degradation Index (or agreed equivalent biotic integrity measure) to quantify changes in the fauna assemblage. A written report will be prepared at the conclusion of each trapping program. This report will be available upon request to the Environmental Protection Authority and the Department of Biodiversity, Conservation and Attractions.

#### *Reference*

Thompson, S. A., G. G. Thompson, and P. C. Withers. 2008. Rehabilitation index for evaluating restoration of terrestrial ecosystems using the reptile assemblage as the bio-indicator. *Ecological Indicators* 8:530-549.

## Attachment D: Feral and pest animal reduction program

Feral and pest fauna, specifically feral cats and foxes have been implicated in the significant decline of multiple species of vertebrate fauna. A program that reduces predation pressure of foxes and feral cats should see an increase in the abundance of vertebrate fauna species. Large feral herbivores (i.e. camels, donkeys and horses) are also known to reduce fauna habitat, and if they are present in large numbers (e.g. attracted to free freshwater) then this impact can be significant.

### *Expected outcomes*

It is expected that the number of feral cats and foxes in the project area would be significantly reduced. This reduction in the number of feral cats and foxes should see a positive increase in the abundance of the vertebrate fauna assemblage. The initial reduction of foxes and cats in the project area will result in cats and foxes from the adjacent areas increasing their home ranges to include the unoccupied territory and some individuals from adjacent areas will move into the project area. The feral pest reduction program will be an annual event and it will be undertaken twice in the first winter period to significantly knockdown feral and pest animal numbers.

### *Targets*

- 1 A 25% increase in average abundance of the native vertebrate fauna assemblages in the project area in 10 years; and
- 2 a 10 standard error improvement, relative to the pre-control average biotic integrity index score (rehabilitation and degradation index or equivalent, Thompson et al. 2008) over a 10 year period.

### *Feral pest reduction program – foxes and cats*

Five hundred 1080 baits will be buried along the edge of tracks in the project area at 0, 2, 4 and 6 weeks in winter. The baiting program will be complemented by a shooting program of foxes and feral cats. The use of thermal spotting scopes will be considered, as it will increase the number of cats observed as they rarely present themselves in front of spotlights in spinifex meadows. Bait theft can be a significant problem; however, this can be minimised by burying baits and undertaking the baiting program in winter when goannas are less active. Camera traps will be used in Year 1 to determine bait uptake and bait theft, and any change in the number of cats and foxes over the trapping period.

A cat trapping program will be implemented for two, two-week periods during the baiting period. This cat trapping program will be repeated in year one (total of four two-week trapping periods). One hundred and fifty large baited cage traps (at least 250mm x 300mm x 800mm) will be deployed along tracks in the project area and left open for up to two weeks, closed for up to two weeks and again left open for up to two weeks. This will coincide with the 1080 baiting and shooting program.

Table D1: Schedule for baiting, shooting and trapping

Activity	Week 0	Week 2	Week 4	Week 6
Baiting	First baiting	Second baiting	Third baiting	Final baiting
Deployment of cameras to establish baseline numbers	Camera traps deployed to determine bait uptake			Removal of camera traps
Trapping	Cat trapping commences	Cat trapping concludes	Cat trapping commences	Cat trapping concludes
Culling	Feral cat and fox shooting program commences	Feral cat and fox shooting program concludes	Feral cat and fox shooting program commences	Feral cat and fox shooting program concludes

#### *Large feral herbivores*

Large feral herbivores will be incidentally shot in the project area when seen during the baiting and trapping program. If the number of camels, donkeys or horses exceeds 50 in the project area, then a dedicated program will be implemented to cull these animals.

#### *Damage licence*

No damage licence is required to shoot camels or donkeys as they are declared pests under the *Biosecurity and Agriculture Management Act 2007*; however, Reward Minerals may have to apply for a Damage licence from the Department of Biodiversity, Conservation and Attractions to cull horses and will have to apply for a damage permit to control Silver Gulls in the project area.

#### *Licences*

Only persons that have a Registered Pest Management Technician Licence will be able to undertake the feral pest reduction program.

#### *Monitoring*

1080 bait theft and bait uptake will be monitored in the first year using 100 camera traps to ensure the target species are taking baits.

The success of the feral and pest animal reduction program will be measured by changes in the vertebrate fauna assemblage. Camera traps will also be deployed for one month prior to and after the feral and pest animal management program to determine the relative abundance in feral cat and fox numbers. The use of sand traps to estimate feral animal activity will be considered.

#### *Reporting*

The specialist contractors undertaking the feral and pest animal reduction program will provide Reward Minerals with a written report at the conclusion of each program. This report will quantify the outcomes of the control program. This results of the control activities will be summarised in Reward's annual

## Attachment D: Feral and pest animal reduction program

environmental reports. Contractor reports will be available upon request to the Environmental Protection Authority and the Department of Biodiversity, Conservation and Attractions.

### *Adaptive management*

Results of the monitoring program will be reviewed annually by Reward. Where required, modifications to the program will be implemented to achieve the stated targets. Details of material changes to the feral animal management approach will be described in Reward Minerals' annual environmental reports.

### Attachment E: Night Parrot acoustic surveillance

A separate Night Parrot Monitoring and Management plan ('Night Parrot Plan') is being prepared as part of the assessment of the Lake Disappointment Potash Project under the *Environment Protection and Biodiversity Conservation Act 1999*. This attachment summarises elements of the Night Parrot Plan, which is currently under development.

Surveillance of night parrot activity will be conducted in a series of quarterly campaigns, with a more intensive campaign scheduled following the wet season (nominally between March and April each year). Reward has provisionally allowed for deployment of 20 automatic recording units (ARUs) for three periods of 6 nights in the post-wet season campaign (corresponding to a monitoring intensity of at least 1 ARU per 10 hectares). For other quarterly monitoring campaigns, the programme will include deployment of 20 ARUs for two periods of 6 nights. ARUs will be placed 500m apart and will preferentially target highly prospective habitat in the project disturbance footprint or within 2.5 km of the disturbance footprint. Habitat suitability for night parrots at Lake Disappointment has provisionally been defined as follows.

Time since last burnt	Distance to freshwater source/ foraging habitat	
	>10 km	<10 km
< 5 years	Low	Moderate
5 - 10 years	Low	High
>10 years	Moderate	High

ARUs will be powered by a solar panel so they are able to run continuously. Data will be downloaded at the completion of each campaign and data will be analysed for Night Parrot calls within 3 weeks of completion of the field monitoring.

There will be no new tracks into the ARUs. People installing and collecting the SD cards will walk from the road into the ARU. This will reduce impact on the vegetation and the likelihood of impacting a Night Parrot nest.

A report of all ARU recordings will be prepared within 5 weeks of completion of each monitoring event. This report will be available to the EPA and the DBCA. If a night parrot call is identified in proximity to any access or haulage routes (not including the Canning Stock Route, which will not be used by project vehicles), a reduced speed zone will be established for a distance of 2.5 km along the road on either side of the nearest ARU. The reduced speed will be 40 km/hr and this will be enforced until after the next quarterly monitoring campaign or one month after no further Night Parrot calls are recorded from that location (if Reward elects to conduct additional monitoring between the planned quarterly campaigns).

If no Night Parrots calls are captured for a period of three years, then all monitoring will cease, and no further action will be taken to mitigate impacts on Night Parrots.