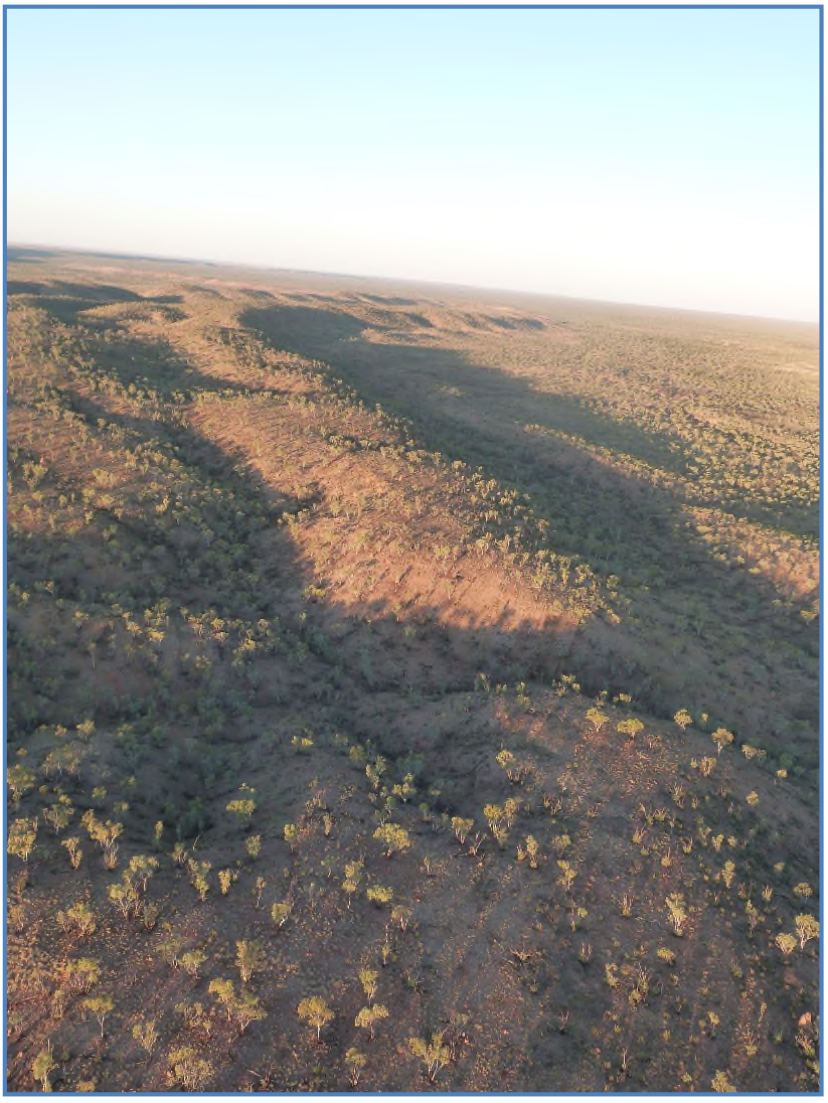
PHOSPHATE AUSTRALIA LIMITED

2016

Mining Management Plan

End of Year Update
Tenement EL25068



Contents

AMENDMENTS

Section	Amendment
1.1 Project Name and Location	The Nicholson Iron JVOA with Jimpec Pty Ltd has expired.
1.2 Mining Interests	Changed company name from Phosphate Australia Limited to POZ Minerals limited (Appendix F)
Figure 1	Updated to show current EL25068 shape
2.2 Exploration Activities by Phosphate Australia with MMP Approval to Date	Section 13) – references to Figures 2 to 4 removed; Figures 2 to 4 removed from the document; downstream figures renumbered as necessary.
2.2 Summary of Total Project Activity for the current reporting period	Updated to discuss 2015-2016 work.
Figure 2	Figure updated to show current EL25068 outline and targets
4.1.5 Consultation	Reference to Appendix G (below) added
5.9 Corrections to the 2011 MMP and Addendum	This section not relevant to the 2016 MMP and was removed.
Table 2: Proposed Drilling	Five drillholes removed, remaining drillholes renumbered to avoid gaps in sequencing
Appendix C	Environmental Policy and EMP updated.
Appendix F	Subsequent to the 2016 MMP reporting date, on 28th October 2016 Phosphate Australia Limited changed its name to POZ Minerals Limited. Appendix F contains POZ's ASIC Certificate of Registration on Change of Name, and Application for Variation of Authorisation. All POZ names and contact details are otherwise unchanged.
Appendix G	Access agreement to the project area with relevant landholders

1.0 INTRODUCTION

1.1 Project Name and Location

Tenement EL25068 is prospective for both phosphate and iron mineralisation. The Highland Plains Phosphate Project is located in the northeastern part of the tenement over a historical phosphate occurrence. The company has been working on this project since July 2008 and has built a JORC compliant resource over the deposit and completed a Scoping Study for the project. A number of regional phosphate exploration targets also exist on the tenement.

The Highland Plains Project is located approximately 150km north northwest from the town of Camooweal in Queensland. Access is via station tracks and unsealed gazetted roads.

1.2 Mining Interests

Title number	Owner	Grant Date	Expiry Date
EL25068	Phosphate Australia Limited	8 August, 2006	7 August, 2018

1.3 Operator Details

Address: Suite 1, 16 Ord St, West Perth, WA 6005
Postal: PO Box 1235, West Perth, WA 6872
Phone: 08 9422 9555
Fax: 08 9422 9599
Email: jrichards@phosphateaustralia.com.au

Key Personnel/Contact Person

Jim Richards, Chairman
Phone: 9422 9555
Email: jrichards@phosphateaustralia.com.au

1.4 Statutory Requirements

1) Mining Management Act 2011 (State)
2) NT Mining Act 2007 (State)
3) Weeds Management Act 2001 (State)
4) Bushfires Act 2004 (State)
5) Australasia Railway (Special Provisions) Act 2004 (State)
6) Heritage Conservation Act 2000 (State)
7) NT Sacred Sites Act 2006 (State)
8) Native Title Act 1999 (State)
9) Aboriginal Land Act 2004 (State)
10) Environment Protection & Biodiversity Conservation Act 1999 (Commonwealth)
11) Reporting Requirements
12) Lease Conditions
13) Requirements for reporting to any other statutory bodies (DoR)
14) Mineral Titles Act 2010

1.5 Non-Statutory Requirements

1) Pastoralists are informed about Phosphate Australia's exploration activities at Highland Plains and on the iron project, and kept informed of Company plans as necessary. POZ aims to keep an ongoing relationship with all stakeholders.
   This includes:
   Social calls to Iris and Jack Hogan (Traditional Owners).
   Phone calls to Clint and Shelly Hawkins at Herbertvale.

1.6 Identified Stakeholders

1) Tenement EL25068 is 100% held by Phosphate Australia Limited.

2) Phosphate Australia is a publicly listed company made up of shareholders.

3) Tenement EL25068 is situated on the Mittiebah Station. Access is via unsealed station tracks and unsealed gazetted roads through Herbertvale Station (QLD), Gallipoli Station (NT), and Mittiebah Station (NT). Preferred access is via Herbertvale.

   Contacts for the relevant stations include:
   Herbertvale – Clint and Shelly Hawkins 07 4748 4998
   Mittiebah – Martie Doyle c/o NAPCO 08 8964 5562
   Gallipoli – "Ray" c/o NAPCO 08 8964 5560

4) Traditional Landowners are updated and visited to discuss proposed activities as necessary. AAPA Clearances have been sought. Jack Hogan is listed as the contact on the approval document. Traditional Owners regularly contacted are:

   Jack Hogan and Iris Hogan c/o Burketown or Borroloola
   Ian Hogan, Burketown
   Noel Hogan – Northern Land Council, Borroloola
   Gavin Hogan, Burketown

5) In programmes involving technical operations, Traditional Landowners have up to two workers at the site at any one time. These are selected by Jack Hogan in conjunction with the Northern Land Council.

   Jack and Iris Hogan are always welcomed at the site for a visit. When available they pass through the site with family.

6) Austwide Mining Title Management Services Pty Ltd – Tenement Manager

2.0 PROJECT DETAILS

2.1 History of Exploration

The Highland Plains phosphate occurrence within EL25068 was delineated by Australian Geophysical Pty Ltd ("AG") in 1968. The work involved the drilling of 36 holes for 1,184 metres which uncovered two major tabular phosphatic zones containing primary collophane similar to the economic phosphatic ores north of the Lancewood Creek fault, also in the Georgina Basin.

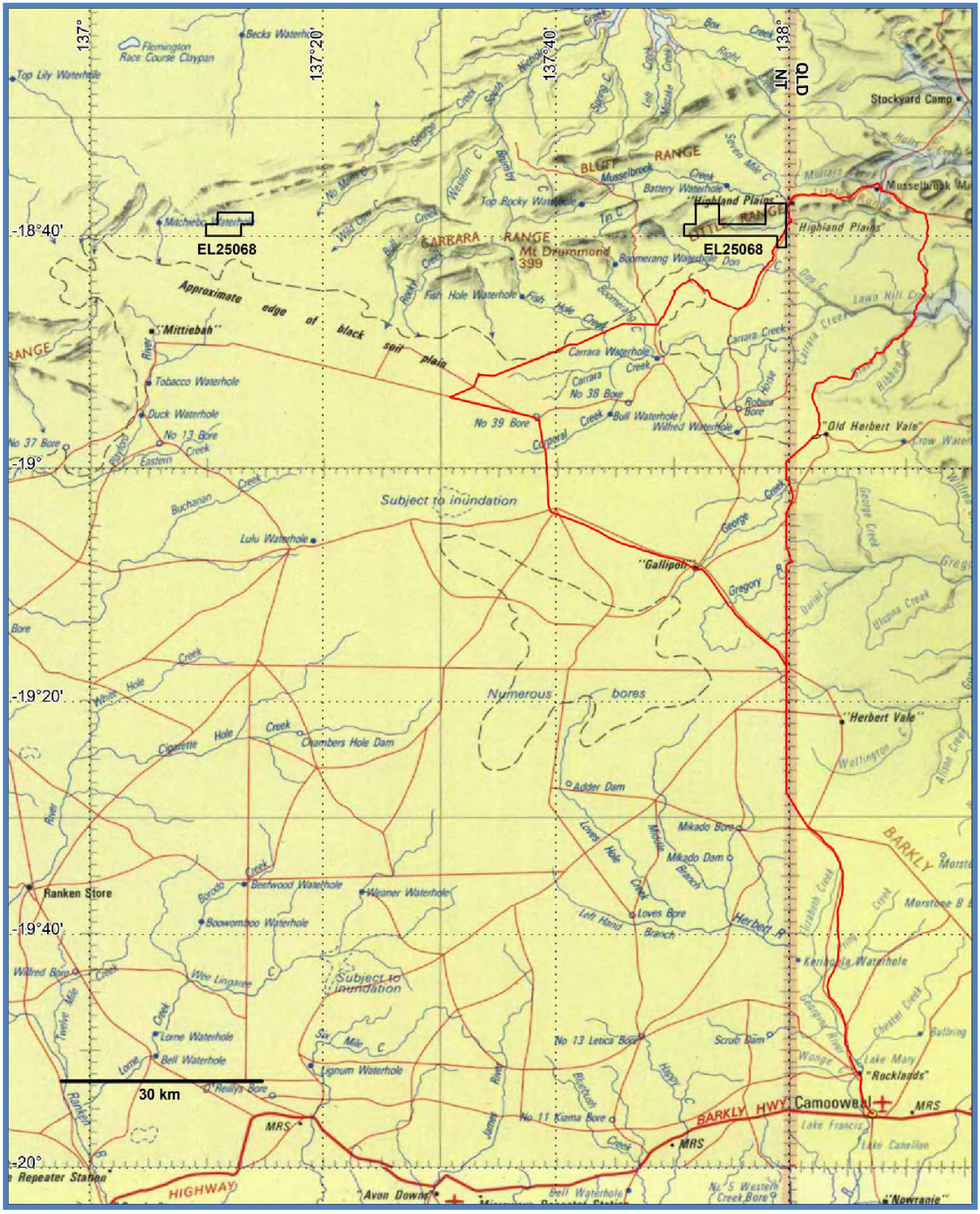
AG delineated a bulk mineralisation estimate of 82,600,000 tonnes @ 20% P_2O_5. This is a non-JORC complaint resource.

Despite further work being "strongly recommended", the weakened price of phosphate at the time discouraged any further work. This exploration by AG and the work undertaken by POZ remains the only work carried out to date on the prospect.

Iron exploration has been carried out within the tenement for Clinton style iron mineralisation, typical of the Constance Range Iron province of northwest Queensland. These deposits in Queensland were explored in the 1960s by BHP and resulted in substantial historical iron ore mineralisation being defined. This has been previously reported as 365 million tonnes at 45-55% Fe (Harms 1965). In the late 1960s the project was mothballed and focus was shifted to the Pilbara Iron Ore region of Western Australia. More recently, the increased demand for iron has led to a renewed interest in this style of iron deposit in the Northern Territory.

Tenement EL25068 contains iron-hosting units within the South Nicholson Basin which are analogous to the iron occurrences of the adjoining Northwest Queensland province, home to the Constance Range Iron Deposits. There is some reference to the ironstone potential of the South Nicholson Basin by the Bureau of Mineral Resources in the 1950s, which was also recently verified during mapping by the Northern Territory Geological Survey ("NTGS"). These targets mapped were the starting point for current reconnaissance exploration for iron by POZ.

Figure 1



Regional Map, EL25068

2.2 Exploration Activities by Phosphate Australia with MMP Approval to Date

In 2008 a Mining Management Plan was submitted outlining the company's proposed exploration activities. This included drilling Reverse Circulation ("RC") drill holes to a maximum depth of 50 metres. A total of 163 holes at 200 metre spacing were proposed as well as 94 holes at 100 metre spacing. In addition a diamond drilling programme at around 800 metre spacing for 45 holes was proposed.

Actual exploration work conducted from September 2008 to the current date has included the following:

1) 94 RC holes at 100 metre spacing

2) 28 RC holes at random spacing on the 200 metre proposed grid

3) 2 RC holes for attempted water bores

4) 6 HQ diameter diamond drill holes

5) 10 PQ diameter diamond drill holes

6) Geophysical Electromagnetic Survey

7) Topographic airborne "LIDAR" Survey

8) Ground Surveying – 2 base station points

9) Development of a sea container camp for up to 18 people. This included ensuite accommodation with full plumbing and electrics. The camp was decommissioned and rehabilitated in November 2012 (see item 14 below)

10) Hydrogeological Survey. Subsequent to permission being granted by the landholder, a water bore and observation bore were drilled in order for the camp to have a water source close by and so a first pass assessment of the flow rate of the aquifer could be assessed in case Highland Plains is developed one day. Two other bores were drilled about 1km from camp however the bore closest to camp had the best yield and will be used for camp purposes.

    Details of the bores are as follows:

Bore	Depth (m)	Easting	Northing	Comment
WB01	78	815065	7933059	Observation bore.
WB02	148	815079	7932795	Pump Tested. Completed for camp supply.
WB03	138	813520	7932888	Pump Tested. Suspended for future use.
WB04	102	815994	7935071	Test Bore. Suspended for future use.
Total	466			

11) Environmental Survey. EcOZ Environmental Consultants conducted a dry season field flora and fauna study in September 2009 over a three day and three night period. Details of this report are given in Appendix B.

    In April, 2010, EcOZ conducted an end of wet season flora and fauna field study over the Highland Plains project. Details of this report are also given in Appendix B.

    In summary, Highland Plains is not considered to be a habitat of conservation significance and a few things were recommended for the Company to improve on environmental awareness as a proactive approach. These included implementing bushfire management strategies, and developing washdown

facilities for vehicles entering and leaving site. These have been added to the POZ Environmental Management Plan and Environmental Induction. Copies of these documents are given in Appendices C and D respectively.

12) Bulk Sample Extraction of up to 1 tonne of material from HAC001.
In March, 2010 an application was submitted to the NT Mines Department for the extraction of up to ten tonnes of phosphate material from the area around drillhole HAC001. An amendment was also submitted for up to 1 tonne of material to be extracted in a short turnaround, which was subsequently approved.

One tonne of material was extracted from HAC001 and sent to Amdel Laboratories in Adelaide for metallurgical testwork.

13) Bulk Sample – Extraction of 1 tonne of material from Sticky Fly
In August 2010 one tonne of mineralised iron ore was collected from the Sticky Fly prospect. The sample was mostly collected from surface float, with approximately 100kg collected from small scrapings.

14) Closure and rehabilitation of the Highland Plains exploration camp
In October-November 2012 the Highland Plains exploration camp was completely demobilised and all structures, installations and disturbances removed and/or rehabilitated. Future exploration activities will be conducted from fly camps.

Additional Notes:

- All POZ tracks on site have been rehabilitated.
- Fly camp areas for 2017/2018 work have not yet been chosen. The fly camps will be tent-based and sited in areas where minimal clearing is necessary.
- Water bores have not been rehabilitated as POZ intends using them in future programs.

Summary of Total Project Activity for the current reporting period:

During the reporting period the tenements were managed until the March quarter by Jimpec Resources under a Joint Venture Option Agreement covering the Manganese and Iron rights for EL25068 and EL28152-28153.

On 15th July 2016 POZ granted an Option to P2O5 Ltd over the Highland Plains project. The Option is for ninety days from the commencement date and entitles the incoming party to enter into a Joint Venture with POZ over the project.

No ground disturbing activities were undertaken in EL25068 during the reporting period.

2.3 Proposed Exploration

The ground disturbing activities proposed in the 2015 MMP were not undertaken.

The following drilling plans are dependent on Phosphate Australia acquiring a Strategic Partner to progress the development and implementation of further exploration and/or mining at the Highland Plains phosphate deposit. A list of 159 proposed drillholes is given in Table 1. No drillholes are expected to intersect groundwater.

The Company proposes to undertake field activities in 2016 which would include:

1) Drilling of Regional Phosphate Targets on EL25068.

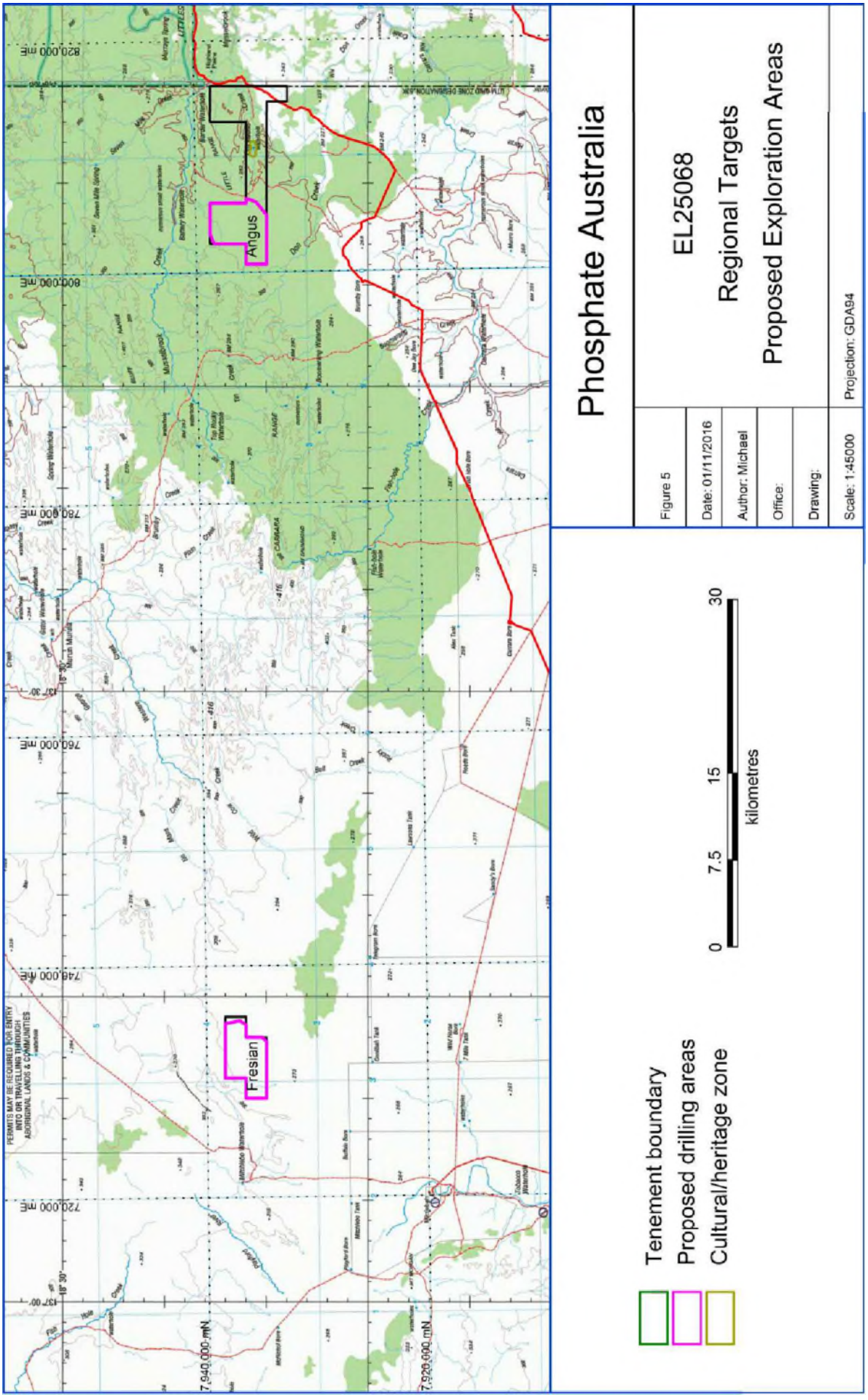
   An 800m drillhole grid is proposed over the targets. These areas have been approved by the Aboriginal Areas Protection Authority. No land clearing will be proposed for this work and exploration will be conducted in the environmentally responsible manner that POZ has conducted exploration at Highland Plains in the past. In this way no clearing will be undertaken and all rubbish will be removed from the site.

   Drilling will use a multipurpose drill rig and support vehicles. Holes will be to a maximum of 60 metres depth. All will commence with casing. Holes will be capped at the end of the programme and rehabilitated by cutting the collar below surface, plugging and covering over with topsoil. This program will be implemented when a strategic partner is found. A security calculation is included with this MMP.

   Figure 2 shows a map of proposed regional targets in EL25068.

These proposed activities are unchanged from the 2015 MMP.

Figure 2



Regional targets – proposed exploration areas

2.4 Material Reserves/Target Material/Minerals

The drilling for phosphate mineralisation at Highland Plains, conducted by POZ during 2008 and 2009, has realised a JORC Compliant Inferred Resource figure of **56 Million Tonnes at 16% P2O5,** which includes **14 Million Tonnes at 20% P2O5**

No further resource figures have been realised in the reporting year.

2.5 Expected Mine Life and Mining Schedule/Exploration Schedule

The proposed work programme in Section 2.3 will be conducted between September 2016 and August 2017, and will be used further progress resource potential and modelling on phosphatic material within the tenement. The Company is working towards a pre-feasibility study for the Highland Plains Phosphate project.

2.6 Workforce:

For this works programme it is anticipated that up to 8 people may be at the Highland Plains site. Staff will include:

1) Management and directors from Phosphate Australia Limited.
2) Drilling personnel from a contracted company.

2.7 Site Infrastructure & Location

Following rehabilitation of the Highland Plains exploration camp in November 2012, exploration in EL25068 will require a fly camp setup. This will include tented accommodation. Water will be supplied in Intermediate Bulk Containers for the duration of the activities for domestic use. Drinking water bottles will be supplied to staff as potable water. All rubbish and accessories will be cleared up when the work is completed so that nothing is left.

Water is sourced from the camp bore which was drilled late in 2009.

2.8 Transportation and Site Access

Access to the site is via the unsealed but gazetted Rocklands Road and thereafter by station tracks belonging to Herbertvale Station, if following the Border, or via Gallipoli and Mittiebah Stations belonging to NAPCO, if accessing the site through the Northern Territory.

Access is via 4WD vehicles with supplies brought in by a 10 tonne 2WD truck.

2.9 Other Relevant Information

All contractors are coordinated at the Highland Plains site by POZ management. Inductions are held at the start of the campaign. Each day a pre-start safety meeting is conducted to discuss safety issues and each person's tasks for the day. All contractors report to the POZ persons in charge.

At the regional drill sites all staff will also be required to attend a pre start safety and task meeting. Regular toolbox meetings will also be undertaken.

3.0 CURRENT PROJECT SITE CONDITIONS

3.1 Land Area Type

The Highland Plains area is a flat to rolling embayment of Cambrian Georgina Basin sediments that onlapped the Proterozoic units of the South Nicholson Basin. The occurrence has a distinctive "C" shape embayment topography concave to the west that is bounded by the topographically outstanding Proterozoic units.

Locally the geology of interest is within the Cambrian sediments and consists of phosphate-rich, cherty siltstone as well as phosphatic siltstone. The mineralisation, in the form of collophane, occurs in tabular lenses of basal and upper zones within the Lower Border Waterhole Formations. Topographically the area consists of hummocky hills that can easily be accessed by 4WD vehicle and drill rigs without clearing vegetation. The hummocks have been created by erosion of water drainage systems of little significance over time, which have incised the hills. The nearest significant water feature on the tenement is the Lancewood Creek in the south of the project area.

The western parts of the tenement show iron enrichment similar to the Clinton style iron mineralisation delineated just over the border in Queensland by BHP in the 1960s. Iron enriched areas occur within the sandstone layers most likely by wave activity accumulating iron around a general nucleus of quartz.

Figure 3 shows the Topography at Highland Plains.

3.2 Hydrology

The nearest watercourse is the Lancewood Creek which flows through the southern area of the project area at Highland Plains, where drilling and the bulk sampling has occurred. Off the tenement, around 1 kilometre to the northeast, is the Border Waterhole. This feature has a waterfall flowing off the Proterozoic cliffs into the catchment area which then drains via a creek system to the east of the project and tenement.

The nearest bores occur to the south at Brumby Bore, some 40 kilometres from Highland Plains. This station bore has been sunk to around 120m depth. Water testing indicates non-sinister elements, but the water is hard and contains iron. Down at the old Highland Plains homestead, which was burnt and no longer exists, is the old Homestead Bore. This has water at 35 metres depth but is unusable because of the poor recharge.

In late 2009 four water bores were drilled close to the Highland Plains camp. The best bore has shown yield possibilities of 12 Litres per second with potential up to 25 Litres per second as the test was limited by the capacity of the pump. The drawdown over a 100 hour pump testing period was 20cm, which recharged within a 2 minute period following the extraction of 5,000m^3 of water. Water testing showed this to be potable water with moderately elevated calcium

The area undergoes a wet season from November to April every year. Although the area has experienced drought more recently, 2008 saw the wettest rainfall since the early 1900s. The 2009 to 2012 wet seasons also saw heavy rains and cyclones crossing the Gulf towards the NT Border.

When rain falls at Highland Plains, one hour of direct rainfall can cause flash flooding in the Lancewood Creek, resulting in 1.5m of rapidly flowing water and rending the uncrossable for a couple of days. This is also the case for most other watercourses in the vicinity.

Figure 4 shows flash flooding in Lancewood Creek.

Figure 3

Topography at Highland Plains

Figure 4

Flooding at Lancewood Creek

3.3 Flora and Fauna

See attached Flora and Fauna desktop study in Appendix A and Flora and Fauna Survey Report in Appendix B.

The study indicates that the only species of current conservation significance recorded during the survey was the **Australian Bustards** Ardeotis australis and Pictorella Mannekin. All sightings were outside the project area and to the south of the potential impact area. As these are birds can fly the project works at Highland Plains are anticipated to have no effect on them. Since the study was conducted **Australian Bustards** Ardeotis australis have been identified as present in the area. Drill sites will be monitored for nesting areas of birds of conservation significance.

Though not recorded within the project area, desktop research has indicated that there is a chance that **Gouldian Finch** Erythrura gouldiae will utilise the north-eastern corner of the project area during the dry season. Also the Rainbow Bee-Eater has potential to occur within the area. Environmental management procedures have been made on the basis that this nationally endangered species may be present.

Several aquatic critters of conservation significance, including the **Gulf Snapping Turtle** (Endangered), the **Freshwater Sawfish** (Vulnerable), and the **Merten's Water Monitor** (Vulnerable) may inhabit watercourses downstream of the ephemeral waterways within the project area. As no work is being conducted in waterways and the ore zone occurs to the north of the Lancewood Creek, their habitat will not be impacted.

Other species that may become threatened in the future whose presence was confirmed through surveys, or deemed likely through desktop research, include:

- **Gravelly Soil Ctenotus** Ctenotus lateralis (Data Deficient); and
- **Long-haired Rat** Rattus villosissimus (Near Threatened).

All measures have been taken to ensure staff will be aware of these important species, both by education provided during environmental inductions, and by providing a copy of the POZ EMP for perusal. The POZ Environmental Management Plan is given in Appendix C and the POZ Environmental Induction in Appendix D.

Recommendations have been made for monitoring of buffel grass and limiting the spread. POZ will be implementing washdowns for entering and leaving the project area which will be based at the camp site.

In summary, the study has concluded that exploration work will have little impact on the environment.

3.4 Current Land Use

The Highland Plains project occurs on Native Title Land. All Heritage requirements have been carried out by AAPA before commencing work in 2008. An Authority Certificate was issued for the Highland Plains area of tenement EL25068 on the 1st of September, 2008. A copy of this is given in Appendix E.

There are no National Parks or Reserves occurring within tenement EL25068.

Exploration was carried out at Highland Plains during the 1960s in the area Phosphate Australia is currently exploring.

3.5 Historical, Aboriginal, Heritage Sites

There are no Aboriginal Heritage Sites occurring on the project works area of EL25068. All areas of project work have undergone Aboriginal Areas Protection Clearance Approvals (see Appendix E – AAPA clearance letter for EL25068)

4.0 ENVIRONMENTAL MANAGEMENT

4.1 Environmental Management System

4.1.1 Environment Policy and Responsibilities

Phosphate Australia Limited is committed to fulfilling its social and regulatory environmental responsibility. The company acknowledges that exploration is a temporary land use and will strive to plan, implement and monitor activities so as to prevent or minimize potentially adverse environmental impacts.

Phosphate Australia Limited will:

- Strive for continual improvement in environmental performance,
- Recognise and protect areas of special environmental and social value,
- Meet, and where appropriate, exceed state and national legislation,
- Identify, assess and mange risks to the environment,
- Establish environmental objectives and targets, implement environmental management plans and monitor effects of all activities,
- Ensure that project personnel maintain a practical knowledge of good environmental procedures and practices relevant to their activities,
- Only communicate with employees, government and the wider community in relation to environmental performance.

Phosphate Australia Limited will regularly review and report on the environmental performance of the company and will ensure that this policy remains relevant to achieving its target of minimal impact to the environment.

Phosphate Australia is committed to raising environmental awareness with all personnel and conducting exploration works in an environmentally responsible fashion. All project works will be carried out in accordance with the company's Environmental Management Plan ("EMP"), which details the management of all aspects of project works at and exploration site. A copy of this EMP may be found in Appendix C.

In general, all activities are conducted under the supervision of a Project Manager in conjunction with the Technical Director, who are responsible for:

- Implementing and monitoring the effectiveness of the Project EMP;
- Providing training for those involved in activities with environmental management procedures;
- Managing environmental aspects of the project;
- Managing contractors and monitoring their compliance with the EMP;
- Facilitating communication with government agencies and stakeholders;
- Investigating incidents and ensuring appropriate corrective actions are completed.

4.1.2 Identification of Environmental Aspects and Impacts

A desktop flora and fauna study and two flora and fauna field surveys have been conducted by EcOZ Environmental Consultants. Copies of these reports are given in Appendices A and B. Details of this study have been outlined in section 3.3. In summary, the study has concluded that exploration work will have little effect on environmental aspects and impacts.

All necessary measures have been taken to include relevant information in the EMP and Environmental Inductions for Highland Plains; see Appendices C and D respectively for more detailed information on steps taken to minimise environmental impacts by POZ staff and contractors.

4.1.3 Objectives and Targets

1) To minimise exploration impact on the environment.
2) To conduct exploration in an environmentally aware fashion.
3) To train staff on environmental policies of POZ.
4) To train staff on recognition of species of conservation significance.
5) To encourage incident reporting when an animal is killed or injured by a vehicle.
6) To clean all rubbish around drill sites.
7) To rehabilitate drill sites including capping drillholes below surface and scraping topsoil back from the bottom up so that the surface is contoured to the environment.

4.1.4 Induction and Training

All staff commencing work at Highland Plains project will undergo a Health, Safety & Environment Induction. This induction covers:

1. Policy
2. Principles and Practices
3. Induction Information
4. Duty of Care
5. Incident Reporting & Investigation
6. Communications
7. Emergency & Evacuation
8. First Aid
9. Fire Prevention
10. Remote Area Requirements
11. Housekeeping
12. PPE
13. Office Safety
14. Drilling Safety
15. Vehicle Safety
16. Heat Stress
17. Manual Handling
18. Radiation
19. Hazardous Substance/Dangerous Goods
20. Community Relations
21. Pastoral Leases
22. Environment
23. Alcohol and Drugs
24. General
25. General Behaviour
26. Non-Smoking Areas

27. Fire Arms
28. Unauthorized Removal of Plant/Equipment
29. Confidential Information
30. Meetings
31. Safety Checks
32. Emergency Response

As well as this, the company's Environmental Induction is presented to personnel and a copy of both the Safety and Environmental Inductions and the EMP are made available to staff to view.

A copy of Phosphate Australia's Environmental Induction may be found in Appendix D.

4.1.5 Consultation

Consultation with station owners is made on a regular basis, although less frequently when there are no on-ground activities planned. POZ has a good rapport with Mittiebah and Herbertvale stations. In addition, the Traditional Owners are kept updated on activities, usually through Jack or Iris Hogan. Regular phone calls and visits are made during periods of activity to make sure they understand what tasks are being carried out by Phosphate Australia.

Jack Hogan is consulted as to who would be likely candidates for employment when field campaigns are being undertaken that require considerable staff.

Appendix G provides written evidence that agreement has been reached with relavant landholders regarding access to the project area.

4.1.6 Emergency Procedures and Incident Reporting

All injuries will be reported and kept on record. Any fauna killed while working on the exploration lease will be humanely killed if necessary and an incident report filled out.

Any observation of species of conservation significance is to be reported to the Project Manager and a report filled out.

All emergency procedures will be managed according to the Phosphate Australia Environmental Management Plan.

Hydrocarbons are stored in a designated area with a bund. All fuel tanks are double skinned in order to contain breaches. Regular checks are undertaken.

Any oil/fuel spills are to be cleaned up using the hydrocarbon spill kits located on site or dug up. This will then be bagged and disposed of in suitable area (Mount Isa Landfill) according to NT regulations.

Excess water from drilling will be contained in sumps. These are left to dry and then the sump will be filled in with the topsoil being returned to the top. In particular if the water is found to be saline then containment is required.

Any emergency intersections will be channelled away from potentially damaging flora.

4.1.7 Environmental Audits and Inspections

The Project Manager carries out in-house inspections with regard to drill sites. Anything of significance is reported at the Pre-Start Meetings and documented in Daily Reports.

All staff undergo site inductions when entering site which includes an Environmental Induction.

The latest Flora and Fauna survey has indicated the presence of Buffel Grass weed occurring within the project area, as well as some non-declared exotic species. Buffel Grass is not a declared weed and does not have to be controlled by Landowners, however recommendations are for POZ to prevent the spread of the species. As such POZ will implement washdowns for vehicles entering and leaving the site to prevent the potential spread of the species. A location for a transportable washpad and pump will be determined in accordance with local requirements when an appropriate site has been identified. The site will be monitored for weeds.

During a visit by the Department of Resources it was noted that Common Sowthistle (Sonchus oleraceus), Aloe (species unknown) and an unknown species of paddy melon had been identified. The presence and identification of the weeds will be discussed at pre-start meetings. Pictures will be placed at camp so continual monitoring can occur. Any identified weeds will be destroyed immediately.

No items of significance have been noted since exploration commenced in 2008.

4.1.8 Documentation

All copies of the Staff Induction and the Environment Management Plan are made available to staff after the formal induction at site. These are stored in the staff common room. These reports detail all Policies and Practises of the company which should be implemented through the course of exploration.

Incident reports and Daily Reports are kept on management files and copies are sent to the Perth Office.

4.2 Environmental Management Plan

4.2.1 Water Management

No drilling is carried out in watercourses throughout the project area. This includes major and minor creek systems.

Water for living purposes now comes from the camp bore.

Water testing shows this to be potable, high-Calcium water with no deleterious elements.

Water is rarely intersected during drilling due to the shallow nature of the drilling. Water, when intersected, turns to clay/mud and drilling is abandoned as there is no sample return. There is little impact on the environment except around the drillhole and it is contained so as not to intrude on vegetation.

In the case of wet drilling for diamond drilling purposes, a sump is used where necessary to contain the water.

In the case of storm water management, rains hit fast in the wet season and flash flooding is common. The camp is situated on high ground so this is not a problem to the camp.

Water is managed in accordance with the POZ EMP.

4.2.2 Invasive Species Management

Invasive species are managed as part of the POZ Environmental Management Plan. New species are noted for their location and type and then destroyed.

Vegetation clearing is to be done only where absolutely necessary, removing topsoil first and storing it. When rehabilitating a site this soil is spread over the top of the rehabilitated area.

According to our flora/fauna survey, Buffel Grass weed (non-declared) and exotic species do occur within the project area. Recommendations are to control the spread of Buffel Grass, however this is not a requirement to Landowners. POZ will implement washdowns at the camp to prevent weed spread to and from the project site and across station boundaries.

Good housekeeping is regularly promoted in order to keep rubbish contained and thus lessen the likelihood of feral animals being attracted to the camp.

4.2.3 Flora and Fauna Management

Monitoring of flora and fauna is done via the EMP. All staff will be made familiar with the species listed in 4.1.2 as part of the company's Induction. Both the Safety and Environmental Inductions and the EMP will be made available to staff in the staff common room.

4.2.4 Waste Management

Waste from general camp use will be burned in a designated pit surrounded by a fire break.

Mobile latrines will be installed for the duration of the drilling program.

4.2.5 Noise and Air Quality Management

All drill rigs at site must have noise and dust suppression. In addition automatic splitters are used where possible to prevent direct handling by offsiders. PPE will be used in accordance with site induction policy and procedures and dust masks will be compulsory in unpreventable dusty situations.

4.2.6 Culture and Heritage Management

There are no heritage sites within the Highland Plains project area. Nonetheless, when drilling campaigns are carried out, the company employs people appointed by Jack Hogan, Traditional Owner to work as field assistants. This way they are aware of the Company's activities.

4.2.7 Hazardous Materials and Hydrocarbon Management

All fuel is kept in a self-bunded tank. Spills are cleaned up by digging out the area and disposing of at a suitable refuse site (Mount Isa Landfill). A hydrocarbon spill kit will also located at site. The hydrocarbon transfer is managed according to bulk handling procedures in the EMP.

MSDS sheets are required for all materials at camp and are kept on file for viewing purposes.

4.3 Environmental Performance Reporting

Environmental monitoring is done by the Project Manager in accordance with the EMP.

Daily pre-start Health, Safety and Environment meetings are held as well as weekly toolboxes and all aspects are reported.

Incidents regarding flora and fauna are reported as incident reports and kept on file at the camp.

Notifiable environmental incidents will be reported to the Department of Resources.

All rehabilitation is to be monitored by Project Manager in accordance with the Mining Management Plan. The company aims to rehabilitate exploration sites by removing all rubbish, all drilling indicators such as pegs and flagging tape, and to cap and/or plug drillholes below the surface and cover with soil to restore the area to its natural environment.

5.0 MINE/EXPLORATION CLOSURE AND REHABILITATION

5.1 Status of Current Rehabilitation

The wet seasons have been quite heavy since 2008. Noticeably the drill areas have rehabilitated well and the area became quite lush with green vegetation, not seen previously. Previous experience at Highland Plains has shown that direct seeding of rehabilitated areas is not necessary as the disturbed areas are very small and regrowth occurs quickly through a high natural seed inventory in the soils. Native vegetation and fallen branches were spread over infilled sumps. Sumps will be revisited and photographed as opportunity allows to check rehabilitation progress.

All drillholes, sumps and bulk sample locations have been fully rehabilitated. This included cutting casing below the surface, plugging the holes, and infilling them with soil. Sumps have been filled in and contoured to the natural environment. Some drillholes show minor amounts of drill spoil running away from the holes; this is an inevitable result of RC and AC drilling, whereby some drill chips are ejected onto the ground via the outside return external to the drill casing. It is important to note that *all* drill spoil collected from the cyclone was either freighted to off-site laboratories or returned down the drill hole. The drill spoil noted at Highland Plains contains no deleterious elements, covers a very small area, is isolated to a minor percentage of drillholes, and has only a temporary cosmetic effect on the environment.

In October 2012 the Company decided to demobilise and rehabilitate the Highland Plains exploration camp and rehabilitate all ground disturbance associated with the camp. Items removed include:

- Eight dongas (five sleeping, one kitchen, one administrative, one entertainment)
- Shower block
- Two sea containers
- Genset
- Several water tanks and containers
- Roofing, guttering, plumbing, wiring
- All contaminated soil

The septic tanks were pumped clean, filled with clean fill, and the tops of the tanks removed to prevent them becoming exposed by erosion. All buried cables and plumbing leading into the tanks were dug up and removed.

Fencing around the rubbish tip was removed and the tip infilled.

Roads leading into the tip and into the camp site were ripped and had spinifex grass and branches from native trees strewn over them. The tip and entire camp footprint were ripped. NB: both the camp and the tip were situated on flat ground; groundwater falling on these areas pools and does not run off and the chance of erosional damage is effectively nil.

The Company has conducted exploration and ground disturbing activities at Highland Plains since 2008 and has had extensive opportunity to observe the process of natural vegetation rehabilitation and plant re-establishment in the area. It is consistently very rapid; in all areas, spinifex and native grasses re-establish themselves during the first wet season following ground disturbing activities, to the extent that it is often difficult to find historic drill pads or drill sites after only one wet season. The regrowth noted in DoR Site Inspection M2008/0253 had grown in the few months between rehabilitation taking place and the site visit, and had not yet seen a wet season.

A helicopter photographic survey was commissioned to ensure the rehabilitation had been completed to the standard required. This survey also confirmed the high standard of rehabilitation from previous years and closes out the rehabilitation record.

5.2 Rehabilitation Planning

All work has now finished for the scoping study of the project. All 152 drillholes and all sumps have been rehabilitated in accordance with the POZ Environmental Management Plan.

A security bond is being held for future drilling activities.

5.3 Topsoil Management

In the case of removal of topsoil during construction of the pit for bulk sample purposes, the soils is stored top down as close by as possible. In this way when it is replaced the top goes bottom first thus restoring the topsoil to its natural state.

5.4 Revegetation Methods

Flora to be replaced where possible and seedlings of appropriate species scattered to ensure growth.

5.5 Fire Management

All vehicles are equipped with fire extinguishers. All drill rigs have fire extinguishers.

Fires are to be reported as a notifiable incident to the Department.

Fire management systems for safety of personnel to be discussed and practised. Good communications to be constantly instilled for such emergency times.

All staff are inducted to site before commencing work. The induction consists of a section on fire hazards.

5.6 Closure Planning

The Highland Plains exploration camp has been closed. As documented in previous MMPs, closure included:

1) Camp shutdown, all rubbish and equipment removed.

2) Sewage covered and tanks left in place, as stated in all previous MMPs. EcOz Consulting have provided Phosphate Australia with advice that it is not necessary to remove the sewerage tanks at Highland Plains, with the proviso that “rehab of the tank would include pumping out waste and cleaning, followed by filling the tank

with clean fill. The surface vegetation should re-establish if you rip the surface and ensure the area does not become eroded to expose the tank." POZ has fully complied with these requirements.

3) Drillholes capped below surface, sumps filled in and topsoil returned in correct order so that uppermost is at top. All holes covered over with soils and drill spoils removed.

4) Any changes to surface such as sumps will have natural contour of environment restored, this has been addressed.

5.7 Rehabilitation Activities Conducted

No rehabilitation activities were undertaken in the reporting period. At the time of writing Highland Plains is fully rehabilitated and there are no outstanding rehabilitation commitments, as documented in the 2011 and 2012 MMPs.

5.8 Costing of Closure Activities

The below security calculation is for the drilling liabilities proposed in this MMP.

Management Area	Technique	Unit of Measure (UOM)	Range per UOM ($)	Cost per UOM ($)	Estimated Quantity	Sub Total ($)	Comment (eg when $/UOM differs from RDPIFR)
Drillholes, Pads, sumps, costeans	capping drillholes 30cm below ground	@					
	grout with concrete	@					
	empty and remove plastic sample bags	hole					
	ripping/scarifying pads	ha					
	reshape drill pads	@					
	infilling costeans	m^3					
	bulk sample pits	m^3					
	contouring for erosion control	ha					
	topsoil replacement if applicable	m^3					
	revegetation by tube stock	ha					
	revegetation by direct seeding	ha					
	fertiliser application	ha					
Tracks and Gridlines	ripping/scarifying minor tracks and gridlines	km					
	ripping major tracks and roads	km					
	removal of gridpegs	item					
	topsoil replacement if applicable	m^3					
	revegetation by tube stock	ha					
	revegetation by direct seeding	ha					
	fertiliser application	ha					
						0.00	
DOMAIN 7 TOTAL							

6.0 PERFORMANCE OBJECTIVES

To rehabilitate all exploration areas to their natural environment by removing rubbish, plugging all drillholes below surface and by covering over old drillholes with topsoil. In addition, no clearing is to be carried out unless there is a potential safety risk, so that tracks will rehabilitate naturally.

This performance objective was achieved by the Company in November 2012. All drillholes and sumps are now fully rehabilitated as documented in the 2011 MMP. Details of the Highland Plains exploration camp rehabilitation were given in Appendix E of the 2012 MMP.

Table 1: Drillhole Coordinates – Highland Plains Project

DRILLED HOLES

Hole	TD	Type	Easting	Northing	Elevation	Azimuth	Dip
HAC001	15	AC	813901.99	7936399.77	243.873	0	90
HAC002	8	AC	813800.57	7936400.41	247.722	0	90
HAC003	1	AC	813799.2	7936499.69	237.258	0	90
HAC004	10	AC	813909.77	7936500.55	240.059	0	90
HAC005	3	AC	813699.41	7936199.91	232.152	0	90
HAC007	6	AC	813799.17	7936200.56	238.145	0	90
HAC008	3	AC	813800.26	7936100.59	234.936	0	90
HAC009	2	AC	813897.58	7936001.96	236.62	0	90
HAC010	3	AC	813900.54	7936100.71	231.477	0	90
HAC011	5	AC	813901.66	7936203.72	238.988	0	90
HAC012	14	AC	813900.79	7936297.12	237.943	0	90
HAC013	15	AC	813901.46	7936601.47	250.113	0	90
HAC014	15	AC	813905.14	7936702.69	245.456	0	90
HAC015	24	AC	813859.78	7936654.95	255.904	0	90
HAC016	11	AC	813771.95	7936768.79	259.848	0	90
HAC019	14	AC	813998.58	7936700	240.439	0	90
HAC020	22	AC	813999.54	7936603.96	242.069	0	90
HAC021	18	AC	814001.27	7936499.19	245.278	0	90
HAC023B	4	AC	813999.84	7936300.3	240.394	0	90
HAC024	15	AC	814001.35	7936203.43	233.477	0	90
HAC025	2	AC	813998.73	7936102.86	230.143	0	90
HAC026	4	AC	814009.31	7936002.97	233.606	0	90
HAC030	19	AC	814195.8	7936698.67	239.175	0	90
HAC031	30	AC	814248.65	7936514.27	241.981	0	90
HAC032	6.5	AC	814200.17	7936385.99	238.779	0	90
HAC033	3	AC	814197.34	7936214.38	235.893	0	90
HAC034	25	AC	814201.36	7936005.97	236.782	0	90
HAC044	26	AC	814662.6	7937417.16	250.933	0	90
HAC045	7	AC	814639.92	7937217.92	234.691	0	90
HAC052	9	AC	814796.36	7937603.87	247.702	0	90
HAC053	45	AC	814796.94	7937206.35	233.254	0	90
HAC054	18	AC	814800.27	7936786.84	223.824	0	90
HAC055	49	AC	814813.57	7936401.77	222.932	0	90
HAC056	43	AC	815834.59	7937007.62	229.38	0	90
HAC057	27	AC	815147.25	7937000.87	223.506	0	90
HAC058	10	AC	815169.5	7937811.24	242.395	0	90
HPDD001	3.9	DDH - HQ	815898	7938394	227.604	0	90
HPDD002	31.6	DDH - HQ	815595	7936632	225.441	0	90
HPDD003	18.2	DDH - HQ	813900.6	7936396.33	244.065	0	90
HPDD004	11.2	DDH - HQ	815237	7936109	224.789	0	90
HPDD005	20.2	DDH - HQ	814869	7935737	241.441	0	90
HPDD006	24.2	DDH - HQ	814947	7936673	228.61	0	90
HPDD007	15.4	DDH - PQ	813900.91	7936400.42	243.942	0	90
HPDD008	15.4	DDH - PQ	813902.02	7936398	243.942	0	90
HPDD009	22.5	DDH - PQ	813999.04	7936603.91	242.187	0	90

Hole	TD	Type	Easting	Northing	Elevation	Azimuth	Dip
HPDD010	22.6	DDH - PQ	813998.26	7936603.82	242.261	0	90
HPDD011	18.3	DDH - PQ	814001.83	7936204.57	233.56	0	90
HPDD012	16.8	DDH - PQ	814000.94	7936205.79	233.588	0	90
HPDD013	29.8	DDH - PQ	814661.43	7937420.89	251.243	0	90
HPDD014	30	DDH - PQ	814411.23	7937206.14	241.077	0	90
HPDD015	29.8	DDH - PQ	814413	7937204.95	241.055	0	90
HPDD016	36.1	DDH - PQ	814194.1	7937000.1	246.051	0	90
HRC004B	21	RC	813907.68	7936501.27	240.031	0	90
HRC017	21	RC	813987.09	7936893.75	252.605	0	90
HRC018	13	RC	814000.35	7936797.95	243.273	0	90
HRC022	21	RC	813994.45	7936400.21	240.652	0	90
HRC023C	28	RC	813999.67	7936299.42	240.387	0	90
HRC027	25	RC	814189.68	7937200.63	256.188	0	90
HRC028	31	RC	814197.37	7936998.62	245.958	0	90
HRC029	24	RC	814205.64	7936896.82	240.82	0	90
HRC035	22	RC	814406.68	7937439.41	258.295	0	90
HRC036	31	RC	814410.79	7937204.15	240.926	0	90
HRC037	37	RC	814402.75	7937003.23	233.838	0	90
HRC038	26	RC	814403.8	7936810.88	230.557	0	90
HRC039	22	RC	814402.03	7936601.49	232.859	0	90
HRC040	35	RC	814395.64	7936405.93	237.415	0	90
HRC041	34	RC	814403.3	7936208.73	230.483	0	90
HRC042	31	RC	814421.2	7935998.88	229.751	0	90
HRC043	16	RC	814394.76	7935844.71	239.046	0	90
HRC046	25	RC	814620.96	7937016.95	229.752	0	90
HRC047	29	RC	814594	7936780	230.357	0	90
HRC047B	57	RC	814613.69	7936779.31	230.282	0	90
HRC048	40	RC	814620	7936600	222.288	0	90
HRC048B	57	RC	814585.57	7936605.49	225.335	0	90
HRC049	41	RC	814622.04	7936399.2	225.378	0	90
HRC050	22	RC	814618.6	7936202.51	223.1	0	90
HRC051	13	RC	814607.12	7936037.42	226.613	0	90
HRC051B	28	RC	814679.59	7935920.71	237.815	0	90
HRC054B	46	RC	814796.95	7936780.85	224.228	0	90
HRC057B	51	RC	815141.58	7936999.33	223.721	0	90
HRC058B	25	RC	815167.22	7937810.79	242.428	0	90
HRC059	28	RC	814098.33	7936601.09	236.831	0	90
HRC060	29	RC	814194.28	7936593.11	233.585	0	90
HRC061	28	RC	814099.67	7936501.69	245.066	0	90
HRC062	29	RC	814107.12	7936405.17	243.005	0	90
HRC063	31	RC	814200.38	7936402.03	237.519	0	90
HRC064	40	RC	814195.57	7936298.87	238.891	0	90
HRC065	27	RC	814104.24	7936197.72	232.984	0	90
HRC066	47	RC	814338.46	7936298.91	235.996	0	90
HRC067	45	RC	814397.91	7936600.41	232.974	0	90
HRC068	41	RC	814299.35	7936708.4	231.871	0	90
HRC069	35	RC	814246.44	7936790.72	234.927	0	90

Hole	TD	Type	Easting	Northing	Elevation	Azimuth	Dip
HRC070	43	RC	814348.1	7936801.35	231.616	0	90
HRC071	42	RC	814509.7	7936801.43	229.482	0	90
HRC072	40	RC	814503.75	7936888.31	229.992	0	90
HRC073	39	RC	814296.94	7936895.57	238.034	0	90
HRC074	22	RC	814098.89	7936901.51	241.842	0	90
HRC075	31	RC	814097.43	7936997.34	243.331	0	90
HRC076	36	RC	814304.57	7937008.15	233.903	0	90
HRC077	30	RC	814151.24	7937109.21	241.831	0	90
HRC078	32	RC	814244.25	7937113.42	241.431	0	90
HRC079	38	RC	814348.18	7937112.06	237.447	0	90
HRC080	43	RC	814448.41	7937109.59	235.157	0	90
HRC081	43	RC	814495.26	7937199.89	238.997	0	90
HRC082	43	RC	814554.71	7937300.6	248.399	0	90
HRC083	40	RC	814639.56	7937302.16	236.298	0	90
HRC084	40	RC	814710.77	7937347.13	245.295	0	90
HRC085	37	RC	814787.91	7937302.62	238.86	0	90
HRC086	39	RC	814852.22	7937247.28	232.45	0	90
HRC087	40	RC	814854.46	7937413.11	235.949	0	90
HRC088	34	RC	814761.66	7937418.47	242.589	0	90
HRC089	34	RC	814560.89	7937420.54	254.203	0	90
HRC090	28	RC	814600.8	7937504.99	248.681	0	90
HRC091	30	RC	814802.01	7937507.46	243.287	0	90
HRC092	33	RC	814901.09	7937499.33	236.169	0	90
HRC093	22	RC	814802.09	7937608.15	247.32	0	90
HRC094	16	RC	814702.88	7937608.84	247.487	0	90
HRC095	13	RC	814650.25	7937611.26	247.608	0	90
HRC096	46	RC	814673.35	7936303.09	224.417	0	90
HRC097	38	RC	814797.14	7936310.05	219.877	0	90
HRC098	43	RC	814900.22	7936307.81	217.865	0	90
HRC099	47	RC	814903.65	7936200.47	221.849	0	90
HRC100	41	RC	814771.35	7936112.27	225.494	0	90
HRC101	39	RC	815008.01	7936100.3	224.417	0	90
HRC102	46	RC	815141.61	7936001.09	225.407	0	90
HRC103	40	RC	815233.95	7935901.33	225.622	0	90
HRC104	35	RC	815566.4	7935908.74	220.938	0	90
HRC105	43	RC	815418.09	7936000.91	218.436	0	90
HRC106	55	RC	815344.6	7936184.63	221.694	0	90
HRC107	31	RC	815143.06	7936192.96	223.441	0	90
HRC108	28	RC	814641.07	7935636.58	251.764	0	90
HRC109	22	RC	814870.57	7935736.53	241.476	0	90
HRC110	40	RC	815222.77	7935598.75	240.274	0	90
HRC111	22	RC	815570.17	7935653.72	230.884	0	90
HRC112	28	RC	814981.58	7935489.14	249.976	0	90
HRC113	25	RC	815384.7	7935395.98	233.826	0	90
HRC114	28	RC	814650.79	7935402.5	250.864	0	90
HRC115	31	RC	814909.32	7935881.07	235.831	0	90
HRC116	40	RC	815743.06	7936176.29	215.314	0	90

Hole	TD	Type	Easting	Northing	Elevation	Azimuth	Dip
HRC117	43	RC	815913.19	7936622.18	223.232	0	90
HRC118	57	RC	815461.83	7936880.77	230.77	0	90
HRC119	43	RC	815572.84	7937399.73	227.547	0	90
HRC120	46	RC	815185.56	7937463.1	235.952	0	90
HRC121	31	RC	815351.29	7938115.13	241.174	0	90
HRC122	25	RC	815862.89	7938152.82	220.303	0	90
T1-35	37	RC	816084.8	7937543.11	229.746	0	90
TD35	26.9	DDH - HQ	816083	7937538	229.776	0	90
TH01	0	RC	815014.18	7932967.55	0	0	90
TH02	0	RC	814066	7933975	0	0	90
WB01	78	RC	815065	7933059	0	0	90
WB02	148	RC	815079	7932795	0	0	90
WB03	138	RC	813527	7932889	0	0	90
WB04	102	RC	815994	7935071	0	0	90

PROPOSED DRILLING

Hole	TD	Type	Northing	Easting	Elevation	Azimuth	Dip
Proposed_001		RC	7934800	814000		0	90
Proposed_002		RC	7935000	814000		0	90
Proposed_003		RC	7937000	814000		0	90
Proposed_004		RC	7934600	814200		0	90
Proposed_005		RC	7935000	814200		0	90
Proposed_006		RC	7935200	814200		0	90
Proposed_007		RC	7936400	814200		0	90
Proposed_008		RC	7937000	814200		0	90
Proposed_009		RC	7937200	814200		0	90
Proposed_010		RC	7934600	814400		0	90
Proposed_011		RC	7934800	814400		0	90
Proposed_012		RC	7935000	814400		0	90
Proposed_013		RC	7935200	814400		0	90
Proposed_014		RC	7936200	814400		0	90
Proposed_015		RC	7936400	814400		0	90
Proposed_016		RC	7936600	814400		0	90
Proposed_017		RC	7937000	814400		0	90
Proposed_018		RC	7937200	814400		0	90
Proposed_019		RC	7934600	814600		0	90
Proposed_020		RC	7934800	814600		0	90
Proposed_021		RC	7935000	814600		0	90
Proposed_022		RC	7935200	814600		0	90
Proposed_023		RC	7936200	814600		0	90
Proposed_024		RC	7936400	814600		0	90
Proposed_025		RC	7936600	814600		0	90
Proposed_026		RC	7936800	814600		0	90
Proposed_027		RC	7937000	814600		0	90
Proposed_028		RC	7937200	814600		0	90
Proposed_029		RC	7937400	814600		0	90
Proposed_030		RC	7934600	814800		0	90

Hole	TD	Type	Easting	Northing	Elevation	Azimuth	Dip
Proposed_031		RC	7934800	814800		0	90
Proposed_032		RC	7935000	814800		0	90
Proposed_033		RC	7936000	814800		0	90
Proposed_034		RC	7936200	814800		0	90
Proposed_035		RC	7936400	814800		0	90
Proposed_036		RC	7936600	814800		0	90
Proposed_037		RC	7936800	814800		0	90
Proposed_038		RC	7937000	814800		0	90
Proposed_039		RC	7937200	814800		0	90
Proposed_040		RC	7937400	814800		0	90
Proposed_041		RC	7937600	814800		0	90
Proposed_042		RC	7937800	814800		0	90
Proposed_043		RC	7934600	815000		0	90
Proposed_044		RC	7934800	815000		0	90
Proposed_045		RC	7935000	815000		0	90
Proposed_046		RC	7935200	815000		0	90
Proposed_047		RC	7935400	815000		0	90
Proposed_048		RC	7935600	815000		0	90
Proposed_049		RC	7935800	815000		0	90
Proposed_050		RC	7936000	815000		0	90
Proposed_051		RC	7936200	815000		0	90
Proposed_052		RC	7936400	815000		0	90
Proposed_053		RC	7936600	815000		0	90
Proposed_054		RC	7936800	815000		0	90
Proposed_055		RC	7937000	815000		0	90
Proposed_056		RC	7937200	815000		0	90
Proposed_057		RC	7937400	815000		0	90
Proposed_058		RC	7937600	815000		0	90
Proposed_059		RC	7937800	815000		0	90
Proposed_060		RC	7938000	815000		0	90
Proposed_061		RC	7934600	815200		0	90
Proposed_062		RC	7934800	815200		0	90
Proposed_063		RC	7935000	815200		0	90
Proposed_064		RC	7935200	815200		0	90
Proposed_065		RC	7935400	815200		0	90
Proposed_066		RC	7935600	815200		0	90
Proposed_067		RC	7935800	815200		0	90
Proposed_068		RC	7936000	815200		0	90
Proposed_069		RC	7936200	815200		0	90
Proposed_070		RC	7936400	815200		0	90
Proposed_071		RC	7936600	815200		0	90
Proposed_072		RC	7936800	815200		0	90
Proposed_073		RC	7937000	815200		0	90
Proposed_074		RC	7937200	815200		0	90
Proposed_075		RC	7937400	815200		0	90
Proposed_076		RC	7937600	815200		0	90
Proposed_077		RC	7937800	815200		0	90

Hole	TD	Type	Easting	Northing	Elevation	Azimuth	Dip
Proposed_078		RC	7938000	815200		0	90
Proposed_079		RC	7934600	815400		0	90
Proposed_080		RC	7934800	815400		0	90
Proposed_081		RC	7935000	815400		0	90
Proposed_082		RC	7935200	815400		0	90
Proposed_083		RC	7935400	815400		0	90
Proposed_084		RC	7935600	815400		0	90
Proposed_085		RC	7935800	815400		0	90
Proposed_086		RC	7936000	815400		0	90
Proposed_087		RC	7936200	815400		0	90
Proposed_088		RC	7936400	815400		0	90
Proposed_089		RC	7936600	815400		0	90
Proposed_090		RC	7936800	815400		0	90
Proposed_091		RC	7937000	815400		0	90
Proposed_092		RC	7937200	815400		0	90
Proposed_093		RC	7937400	815400		0	90
Proposed_094		RC	7937600	815400		0	90
Proposed_095		RC	7937800	815400		0	90
Proposed_096		RC	7938000	815400		0	90
Proposed_097		RC	7938200	815400		0	90
Proposed_098		RC	7934800	815600		0	90
Proposed_099		RC	7935000	815600		0	90
Proposed_100		RC	7935200	815600		0	90
Proposed_101		RC	7935400	815600		0	90
Proposed_102		RC	7935600	815600		0	90
Proposed_103		RC	7935800	815600		0	90
Proposed_104		RC	7936000	815600		0	90
Proposed_105		RC	7936200	815600		0	90
Proposed_106		RC	7936400	815600		0	90
Proposed_107		RC	7936600	815600		0	90
Proposed_108		RC	7936800	815600		0	90
Proposed_109		RC	7937000	815600		0	90
Proposed_110		RC	7937200	815600		0	90
Proposed_111		RC	7937400	815600		0	90
Proposed_112		RC	7937600	815600		0	90
Proposed_113		RC	7937800	815600		0	90
Proposed_114		RC	7938000	815600		0	90
Proposed_115		RC	7938200	815600		0	90
Proposed_116		RC	7938400	815600		0	90
Proposed_117		RC	7934800	815800		0	90
Proposed_118		RC	7935000	815800		0	90
Proposed_119		RC	7935200	815800		0	90
Proposed_120		RC	7935400	815800		0	90
Proposed_121		RC	7935600	815800		0	90
Proposed_122		RC	7935800	815800		0	90
Proposed_123		RC	7936000	815800		0	90
Proposed_124		RC	7936200	815800		0	90

Hole	TD	Type	Easting	Northing	Elevation	Azimuth	Dip
Proposed_125		RC	7936400	815800		0	90
Proposed_126		RC	7936600	815800		0	90
Proposed_127		RC	7936800	815800		0	90
Proposed_128		RC	7937000	815800		0	90
Proposed_129		RC	7937200	815800		0	90
Proposed_130		RC	7937400	815800		0	90
Proposed_131		RC	7937600	815800		0	90
Proposed_132		RC	7937800	815800		0	90
Proposed_133		RC	7938000	815800		0	90
Proposed_134		RC	7938200	815800		0	90
Proposed_135		RC	7938400	815800		0	90
Proposed_136		RC	7934800	816000		0	90
Proposed_137		RC	7935000	816000		0	90
Proposed_138		RC	7935200	816000		0	90
Proposed_139		RC	7935400	816000		0	90
Proposed_140		RC	7935600	816000		0	90
Proposed_141		RC	7935800	816000		0	90
Proposed_142		RC	7936000	816000		0	90
Proposed_143		RC	7936200	816000		0	90
Proposed_144		RC	7936400	816000		0	90
Proposed_145		RC	7936600	816000		0	90
Proposed_146		RC	7936800	816000		0	90
Proposed_147		RC	7937000	816000		0	90
Proposed_148		RC	7937200	816000		0	90
Proposed_149		RC	7937400	816000		0	90
Proposed_150		RC	7937600	816000		0	90
Proposed_151		RC	7937800	816000		0	90
Proposed_152		RC	7938000	816000		0	90
Proposed_153		RC	7938200	816000		0	90
Proposed_154		RC	7938400	816000		0	90
Proposed_155		RC	7934600	812200		0	90
Proposed_156		RC	7934600	812400		0	90
Proposed_157		RC	7934600	812600		0	90
Proposed_158		RC	7934600	812800		0	90
Proposed_159		RC	7934600	813000		0	90

Note: if a drillhole is within a watercourse the collar will be moved to the nearest suitable site outside of the watercourse.

APPENDICES

Appendix A: Flora and Fauna Desktop Study

Desktop Flora and Fauna Study, Highland Plains Phosphate Project

August 2009

Prepared for: **Phosphate Australia Limited**

Prepared by: **EcOz Environmental Services**

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LIMITATIONS

This study, report and analyses have been based on the information available to EcOz at the time of the study. EcOz accepts responsibility for the report and its conclusions to the extent that the information was sufficient and accurate. EcOz does not take responsibility for errors and omissions due to incorrect information or information not available to EcOz at the time of the study.

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

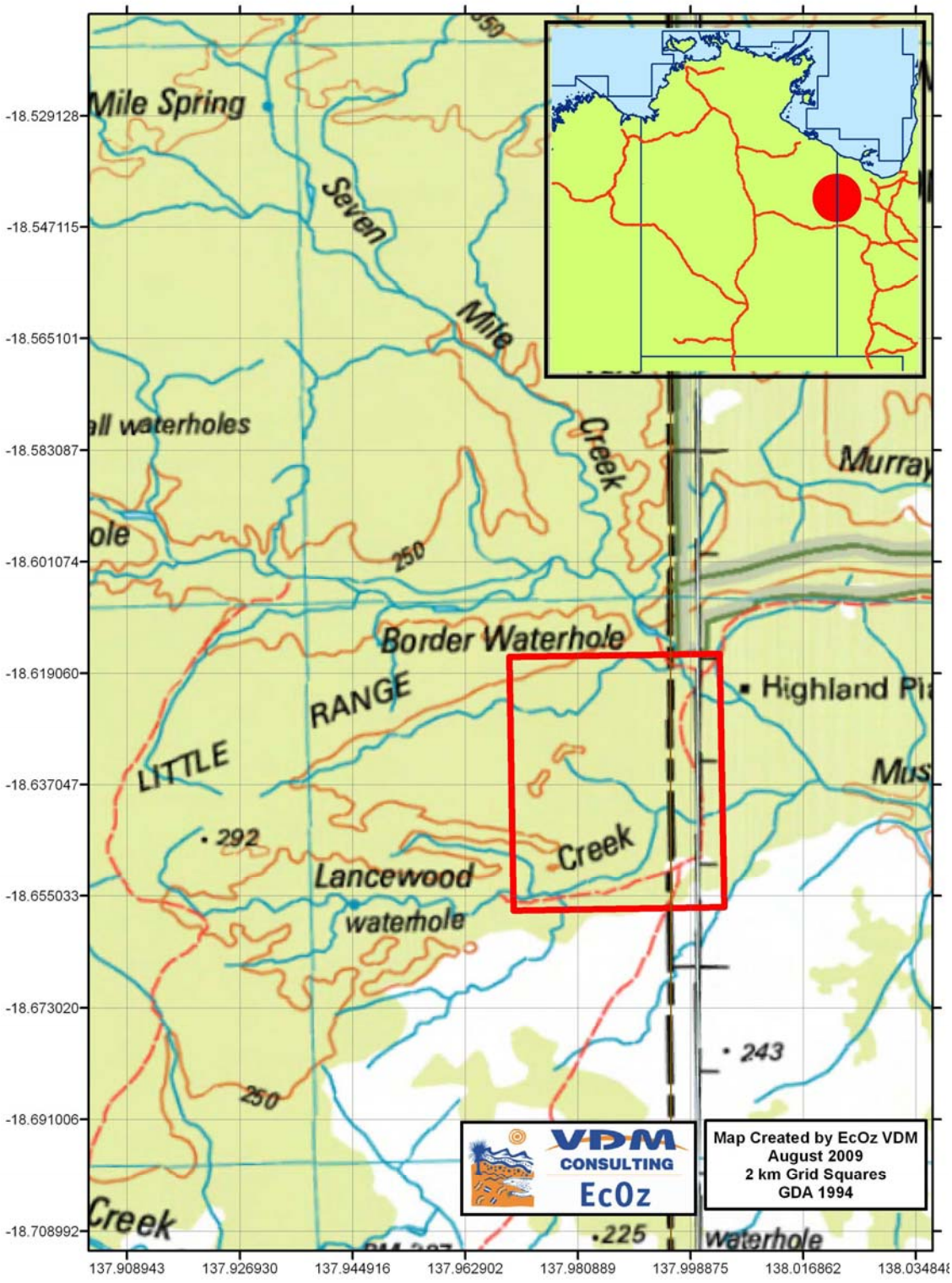
1 INTRODUCTION

The Highland Plains Project consists of one granted tenement, EL25068 which occurs on the NT/QLD border, around 140 km north of where the Barkley Highway crosses the border.

Most of the NT side of the tenement area is within Mount Drummond pastoral property, land which also has a Native Title claim of the same name (Mount Drummond). The QLD side of the tenement area overlaps with the Waanyi Peoples Native Title claim.

Within this tenement area (refer to **Figure 1**), Phosphate Australia plan to explore available phosphate resources. In late July 2009, Phosphate Australia contracted VDM Consulting EcOz to conduct a desktop flora and fauna study over the tenement area, the results of which are presented in this report. The tenement area is hereafter referred to as the Highland Plains Phosphate Project area, or the 'project area'.

Figure 1: Location Map of the project area



2 METHODOLOGY

The main data sources utilised in the desktop study included:

- NT Fauna Atlas records provided by the Parks and Wildlife Service of the Northern Territory (PWSNT) for the region within a 10 km radius of the project boundary;
- Land System information (1:250,000) sourced from the NT government department of Natural Resources, Environment, The Arts and Sport (NRETAS) because Land Unit information is not available for the Highland Plains region;
- EPBC Act Protected Matters Search Tool for the project area;
- Bioregional summaries for the Gulf Fall and Uplands and the Mt Isa Inlier bioregions (http://www.nt.gov.au/nreta/wildlife/nature/bioregional.html accessed 12th August 2009); and
- Scientific papers and reference books.

The results of the desktop review were used to identify fauna and flora species and habitats of conservation significance that occur in or near the project area.

2.1 NT Fauna and Flora Atlas Database

The NT Fauna and Flora Atlas database is maintained by the Parks and Wildlife Service NT (PWSNT). This contains point locations of fauna species identified in miscellaneous surveys and from viable incidental records. Survey effort has been concentrated in certain areas and as a result many areas in the Northern Territory are currently data deficient. The NT Fauna and Flora Atlas database was utilised to identify species likely to occur within 10 km radius from the project area, and to assess whether or not species classified as threatened under Northern Territory or Commonwealth legislation have been previously recorded.

2.2 EPBC Database Search Tool

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) database is maintained by the Department of Environment, Water, Heritage and the Arts (DEWHA) – a Department of the Federal Government. This database is provided to assist members of the public in understanding the EPBC Act and their rights, obligations and requirements under the Act. The database holds mapped locations of World Heritage properties, Ramsar wetlands, threatened species, migratory and marine species, threatened ecological communities and protected areas. It is used to determine whether development is likely to affect a matter of National Environmental Significance and consequently require referral for assessment and approval under the EPBC Act 1999. Whether or not an action will trigger assessment under the EPBC Act 1999 depends on the particular location, scope, timing and other circumstances of the proposed action. The EPBC database and data contained in the other datasets listed in this section were used to identify matters of national environmental significance that may occur within the Highland Plains Phosphate Project area.

2.3 Northern Territory NRM Infonet online database

The NT NRM Infonet website was developed for the Natural Resource Management Board of the NT during collaboration between Tropical Savannas CRC and the NT Department of Natural Resources, Environment and The Arts. It produces custom reports detailing native species, threatened species, weeds, pest animals, fire history and various other outputs of interest in natural resource management within a selected area (i.e. airport).

Data obtained from NT NRM Infonet complements that of the EPBC Database Search Tool and incorporates more detailed local information. These reports provide an indication of what species may be present in the selected area.

3 RESULTS AND DISCUSSION

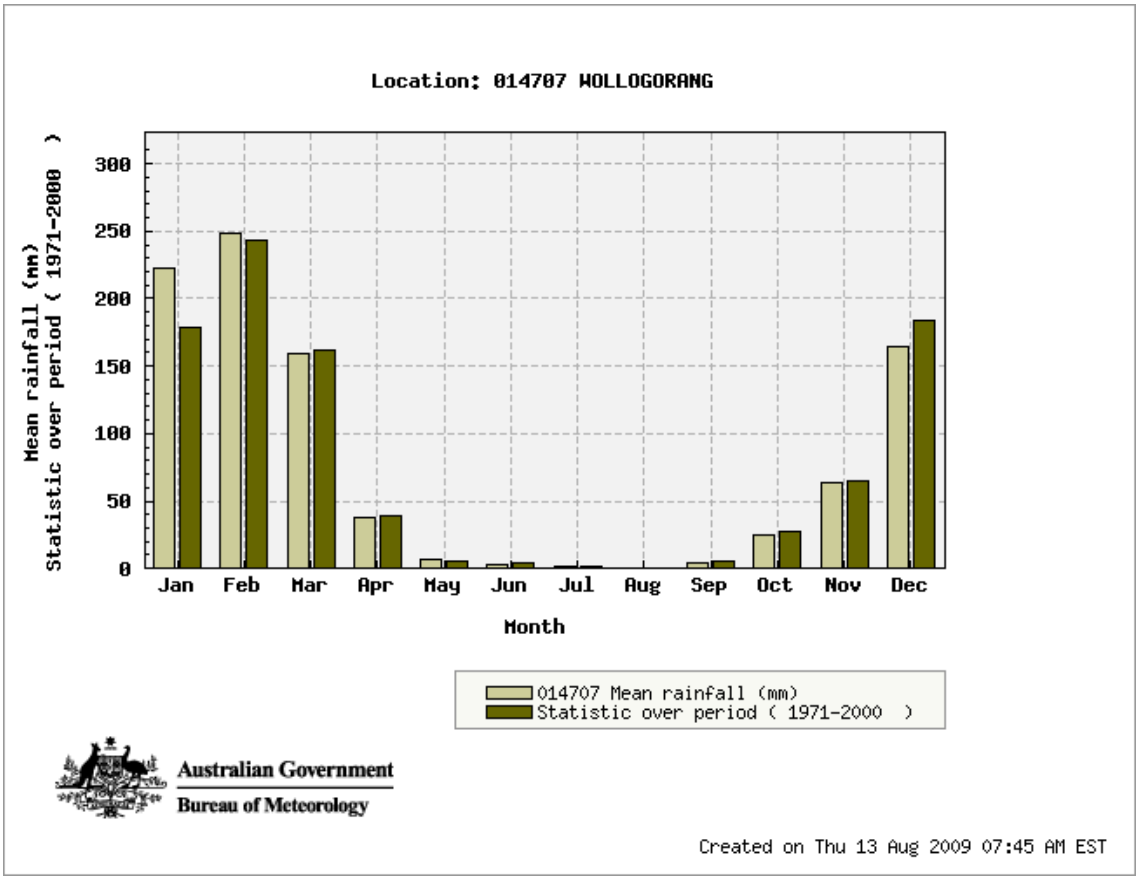
3.1 Climatic Information

The project area is situated between the monsoon tropics of northern Australia, where a large percentage of the region's rainfall falls between November and April with high temperatures and humidity (Purdie *et al.* 2008), and more arid climates (less rainfall and humidity) of central Australia. The Highland Plains area is on the edge of the tropics zone, thus supporting a transition zone between tropical and arid ecosystems (Purdie *et al.* 2008). Climate statistics for Wollogorang Station (approximately 160 km north of the project area) are displayed in **Table 1**, and average rainfall data pictured in **Figure 2**.

Table 1: Climate Statistics for Wollogorang Station (014707) from Bureau Meteorology

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Temperature															
Mean maximum temperature (°C)	34.9	34.4	34.5	33.8	31.4	29.0	29.3	31.0	34.3	36.7	37.6	36.8	33.6	26	1974 2009
Mean minimum temperature (°C)	24.2	24.1	22.7	19.7	16.0	12.1	11.4	12.2	15.8	19.8	22.5	24.2	18.7	26	1974 2009
Rainfall															
Mean rainfall (mm)	222.6	248.5	158.9	38.1	6.9	3.2	1.4	0.7	3.7	25.2	63.6	164.4	957.5	33	1967 2009
Decile 5 (median) rainfall (mm)	175.6	193.7	107.2	19.4	0.2	0.0	0.0	0.0	0.0	8.0	58.7	128.2	941.9	33	1967 2009
Mean number of days of rain ≥ 1 mm	11.1	12.3	7.7	2.7	0.6	0.4	0.1	0.1	0.3	1.9	5.2	8.2	50.6	33	1967 2009
Other daily elements															
Mean number of clear days	1.9	1.4	6.8	9.7	15.4	17.7	21.7	22.0	16.5	13.9	8.0	4.2	139.2	23	1974 2009
Mean number of cloudy days	16.6	17.3	11.4	5.6	3.6	3.1	1.3	1.2	2.0	3.4	6.8	12.1	84.4	23	1974 2009
9 am conditions															
Mean 9am temperature (°C)	29.6	28.9	28.7	27.8	24.7	21.3	20.9	22.8	27.0	30.3	31.5	31.0	27.0	26	1974 2009
Mean 9am relative humidity (%)	72	75	68	55	48	47	44	41	41	45	50	62	54	25	1974 2009
Mean 9am wind speed (km/h)	4.7	4.7	5.1	6.9	8.4	8.2	8.2	9.9	8.7	8.1	6.4	5.3	7.0	27	1974 2009
3 pm conditions															
Mean 3pm temperature (°C)	32.6	32.0	33.0	32.6	30.4	28.3	28.4	30.1	33.2	35.1	35.5	34.3	32.1	22	1974 2009
Mean 3pm relative humidity (%)	60	63	50	41	36	32	28	27	29	34	40	50	41	20	1974 2009
Mean 3pm wind speed (km/h)	5.8	6.2	6.4	6.7	7.1	6.4	6.8	7.9	7.6	7.1	6.0	5.8	6.6	22	1974 2009

Figure 2: Rainfall Summary Graph for Wollogorang from Bureau of Meteorology



The Gulf Falls and Uplands bioregion climate has been described as having a wide range of conditions. In the southeast of this bioregion (where the project area lies, rainfall decreases to 400 mm (http://www.anra.gov.au/topics/rangelands/overview/qld/ibra-gfu.html#climate).

3.2 Bioregion and Land Systems Information

The Highland Plains Phosphate Project area falls within two different bioregions, and spans three land system types.

Most of the project area falls within the **Gulf Fall and Uplands Bioregion**, which comprises undulating terrain with scattered low, steep hills on Proterozoic and Palaeozoic sedimentary rocks, often overlain by lateritised Tertiary material. Soils are mostly skeletal or shallow sands. The most extensive vegetation is woodland dominated by Darwin Stringybark *Eucalyptus tetrodonta* and Variable-barked Bloodwood *C. dichromophloia* with spinifex understorey, and woodland dominated by Northern Box *Eucalyptus tectifica* with tussock grass understorey (http://www.nt.gov.au/nreta/wildlife/nature/gulffalls.html). The Gulf Fall and Uplands bioregion extends from the Arnhem Plateau into Western Queensland (Purdie *et al.* 2008).

The sensitive environments within the Gulf Fall and Uplands bioregion include the limited areas of monsoon rainforest, riparian areas, and wetlands (particularly swamps, springs and soaks). The mammal fauna of this bioregion has had a low to moderate rate of loss. Of 52 species recorded, 2 are regionally extinct, 2 have undergone serious decline, 3 have declined and 45 species are stable (http://www.nt.gov.au/nreta/wildlife/nature/gulffalls.html)

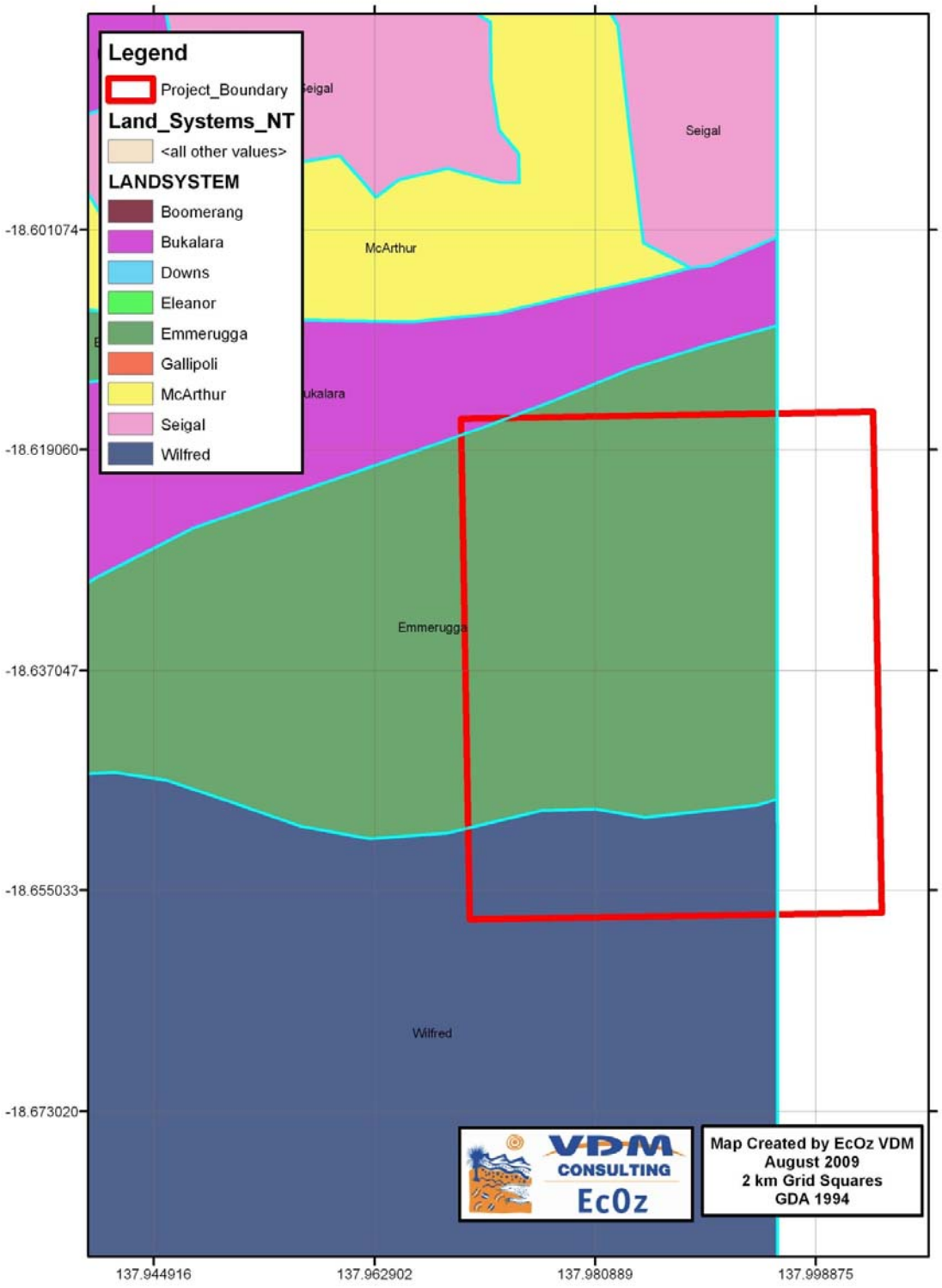
The **Mount Isa Inlier Bioregion** (the same small extent of the project area as the land system labelled Bukalara) is described as rugged hills and mountain ranges separated by undulating valleys, experiencing a semi-arid climate with erratic rainfall (http://www.anra.gov.au/topics/rangelands/overview/nt/ibra-mii.html).

Relevant **land system descriptions** are listed in **Table 2** and mapped over the area in **Figure 3**. Digital land system information was sourced from the Northern Territory Government, thus coverage does not extend into Queensland (**Figure 3**), however, as the Gulf Fall and Uplands bioregion is consistent to the QLD project area boundary (refer to **Appendix 1**), it could be assumed that the land system descriptions will extrapolate into the QLD side.

Table 2: Land System types within the project area

Land System Type	Coverage within Project Area	Basic Description	Detailed Description
Emmerugga	Predominant Land System (approximately 70%) within central portion of the project area	Sandstone plains and rises	Plains and rises mostly on sandstone and siltstone, commonly shallow soils with surface stone and rock outcrop.
Wilfred	Southern (approximately 25%) portion of the project area	Sandstone plains and rises	Plains and rises mostly on sandstone and siltstone; commonly shallow soils with surface stone and rock outcrop
Bukalara	Very small portion (approximately 5%) of the north-western corner of the project area	Rugged quartz sandstone plateaux and hills	Steep rocky plateaux and hills on quartz sandstone and siltstone; shallow sandy soils and rock outcrop

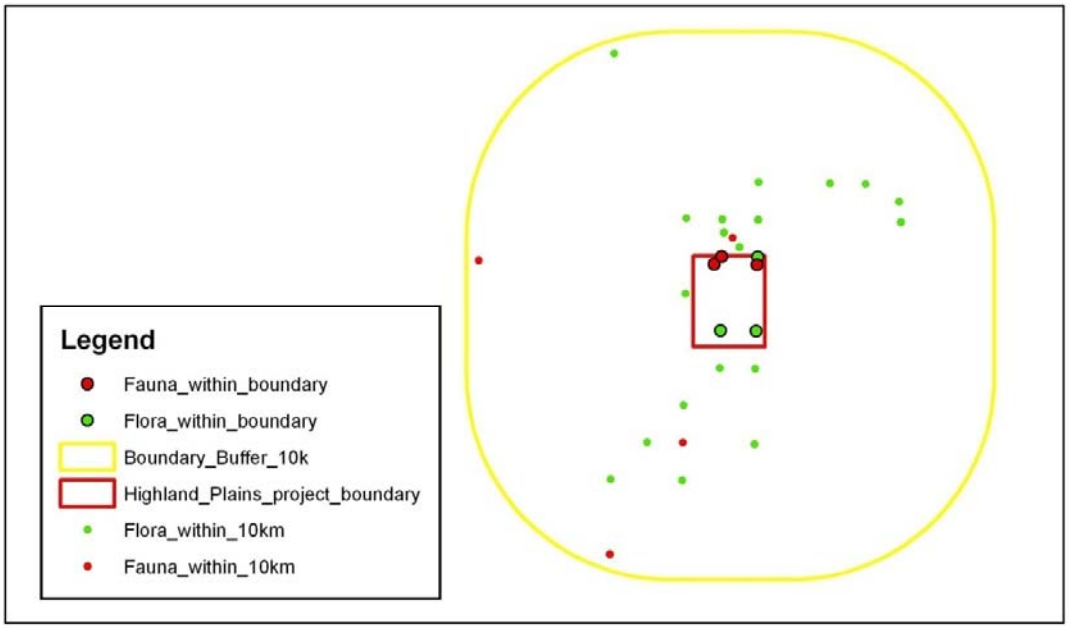
Figure 3: Land System coverage within the Project area



3.3 NT Flora and Fauna Atlas Data

Flora and Fauna Atlas records for the area are sparse, and not evenly spread across the area of interest (refer to **Figure 4)**, thus the presence of species types within the region may be discussed, but not their distributions or comparative species diversity. All species recorded within a 10 km radius of the project area in the NT Flora and Fauna Atlas database can be found in **Appendix 2**.

Figure 4: Distribution of Flora and Fauna Atlas records within the project region



3.4 Habitat and Regions of Conservation Significance

A search of the EPBC database revealed that there are no World Heritage properties, National Heritage places, Wetlands of International Significance, nor Threatened Ecological Communities listed within the project area (refer to **Appendix 2)**.

3.5 Desktop Flora and Vegetation Study

A total of 40 flora species have been recorded within the project area and 158 flora species have been recorded within a 10 kilometre radius (numbers of species reflect survey effort in the region, and should not be used as an indication of floral diversity). Flora species of conservation significance have not been recorded within the project area, or within a 10 km radius. The EPBC database (refer to **Appendix 3**) does not hold any threatened plant species records within the project area. Several plant species recorded within 10 km of the project area are listed as Data Deficient under the *Territory Parks and Wildlife Conservation Act* (*TPWC Act 2000*), of which *Arachne racemosa* has been recorded within the actual project area.

Data Deficient species recorded within 10 km of the project area include:

- *Arachne racemosa;*
- *Enneapogon robustissimus;*
- *Ipomea brassii;*
- *Polycarpa multicaulis;* and
- *Pterocaulon sphaeranthoides.*

Species listed as Data Deficient may or may not be in decline, requiring further study to understand their population dynamics.

Euphorbia petala (a forb), although not identified through this desktop study, is an endemic to the region, and thus carries conservation significance in the sense that it could be wiped out through extensive land clearing throughout its range.

3.5.1 Exotic Plant Species and Potential Weeds

Exotic plant species (weeds or potential weeds) have not been recorded within the project area, however the following exotic plant species have been recorded within a 10 kilometre radius (Purdie *et al.* 2008):

- Kapok Bush ***Aerva javanica*** – not a declared weed, but has spread alarmingly in some areas, especially along highways*;*
- Awnless Barnyard Grass ***Echinochloa colonum*** – can spread rapidly, usually in clay soils in damp areas; and
- Roly Poly ***Salsola tragus*** – an indicator of poor pasture condition, it is usually present in disturbed areas.

The Infonet database search over the project area (refer to **Appendix 4**) revealed several other introduced plant species that may occur:

- Caribbean Stylo *Stylosanthes hamata;*
- Coffee Senna *Senna occidentalis;*
- Khaki Weed *Alternanthera pungens;*
- Native Thornapple *Datura leichhardtii;*
- Noogoora Burr *Xanthium strumarium;*
- Sicklepod *Senna obtusifolia;*
- Spiny Sida *Sida spinosa;* and
- Ulcardo Melon *Cucumis melo subsp. melo*.

Coffee Senna, Khaki Weed, Noogoora Burr and Sicklepod are all weeds classed as B/C within the NT. Land owners with class B/C weeds must control the growth and spread of these species under NT legislation. Native Thornapple is classed as C within the NT, which means that this species must not be introduced.

3.6 Desktop Fauna Study

A total of 34 fauna species have been recorded within the project area and 50 fauna species have been recorded within a 10 km radius (numbers of species reflect survey effort in the region, and should not be used as an indication of faunal diversity). Several fauna species of conservation significance or listed as Data Deficient have been recorded within the project area, or within a 10 km radius. These species are listed in **Table** 3.

Table 3: Fauna species of conservation significance previously recorded within the region

Species Name	Common Name	Where Recorded	Listing
Varanus mertensi	Merten's Water Monitor	Within a 10 km radius of the project area	Vulnerable (TPWC Act)
Rattus villosissimus	Long-haired Rat	Within the project area	Near Threatened (TPWC Act)
Ixobrychus flavicollis	Black Bittern	Within the project area	Data Deficient (TPWC Act)
Ctenotus lateralis	Gravelly Soil Ctenotus	Within a 10 km radius of the project area	Data Deficient (TPWC Act)

Several species of conservation significance have been identified through the EPBC database and Infonet database searches as potentially occurring within the project area, or having preferred habitat within the project area (refer to **Table 4**).

Table 4: Species of conservation significance that may occur within the project area

Species Name	Common Name	Listing	EPBC / Infonet description
Erythrura gouldiae	Gouldian Finch	**Endangered** (EPBC Act 1999 and TPWC Act 2000) and Migratory (EPBC Act 1999)	EPBC - Species or species habitat may occur within area
Rostratula australis	Australian Painted Snipe	Vulnerable (EPBC Act 1999 and TPWC Act 2000)	EPBC - Species or species habitat may occur within area
Elseya lavarackorum	Gulf Snapping Turtle	**Endangered** (EPBC Act 1999)	EPBC - Species or species habitat may occur within area
Pristis microdon	Freshwater Sawfish	Vulnerable (EPBC Act 1999 and TPWC Act 2000)	EPBC - Species or species habitat likely to occur within area
Haliaeetus leucogaster	White-bellied Sea-Eagle	Migratory (EPBC Act 1999)	EPBC - Species or species habitat likely to occur within area
Merops ornatus	Rainbow Bee-eater	Migratory (EPBC Act 1999)	EPBC - Species or species habitat may occur within area
Rhipidura rufifrons	Rufous Fantail	Migratory (EPBC Act 1999)	EPBC - Species or species habitat may occur within area
Ardeotis australis	Australian Bustard	Vulnerable (TPWC Act 2000)	Infonet
Pezoporus occidentalis	Night Parrot	**Critically Endangered** (TPWC Act 2000) and Endangered (EPBC Act 1999)	Infonet

Migratory Wetland and Migratory Marine species are also listed, however as marine habitat is definitely not within the project area, and significant wetland habitat is not recorded within the project area, the presence of these species within the project area is not considered likely:

- Great Egret, White Egret *Ardea alba;*
- Cattle Egret *Ardea ibis;*
- Oriental Plover, Oriental Dotterel *Charadrius veredus;*
- Oriental Pratincole *Glareola maldivarum;*
- Little Curlew, Little Whimbrel *Numenius minutes;*
- Painted Snipe *Rostratula benghalensis s. lat.;* and
- Fork-tailed Swift *Apus pacificus.*

The Infonet database search also indicated several pest or potential pest species likely to occur within the project area (**Table 5**).

Table 5: Pest or Potential Pest species likely to occur within the area (Infonet Database)

Common Name	Scientific Name	NT Status
Cane Toad	*Chaunus marinus*	Prohibited species (all exotic vertebrates except those listed as non-prohibited)
Asian House Gecko	*Hemidactylus frenatus*	Prohibited species
Rock Dove	*Columba livia*	Prohibited species
Red-tailed Black-Cockatoo	*Calyptorhynchus banksii*	Native species with pest potential
Sulphur-Crested Cockatoo	*Cacatua galerita*	Native species with pest potential
Agile Wallaby	*Macropus agilis*	Native species with pest potential
House Mouse	*Mus musculus*	Prohibited species
Black Rat	*Rattus rattus*	Prohibited species
Dingo / Wild dog	*Canis lupus*	Native species with pest potential
Cat	*Felis catus*	Prohibited species
Donkey	*Equus asinus*	Prohibited species
Horse	*Equus caballus*	Prohibited species
Pig	*Sus scrofa*	Prohibited species
Swamp Buffalo	*Bubalus bubalis*	Prohibited species
Cattle	*Bos indicus / Bos taurus*	Prohibited species

Wild horse *Equus caballus* is the only introduced species recorded in the NT Atlas database within a 10 km radius of the project area.

4 DISCUSSION WITH RESPECT TO PHOSPHATE AUSTRALIA'S ENVIRONMENTAL MANAGEMENT PLANNING

4.1 Management of Species of Conservation Significance

Phosphate Australia have committed within their Environmental Management Plan to comply with Commonwealth law (*EPBC Act 1999*), *a person must not take an action that:*

(a) has or will have a significant impact on a listed threatened species included in the Extinct, Critically endangered, Endangered species, Vulnerable species, Critically endangered communities or Endangered communities in the wild category; or

(b) is likely to have a significant impact on a listed threatened species included in the Extinct, Critically endangered, Endangered species, Vulnerable species, Critically endangered communities or Endangered communities in the wild category.

As a large part of the project area falls within the Northern Territory, impacts on species listed under the *TPWC Act 2000* must also be minimised through environmental management practices.

Species identified through this desktop study as potentially occurring in the area must be considered in environmental management of the project area. These species are listed in Table 6, with their habitat requirements.

Table 6: Species and habitat preferences to be considered

Species Name	Common Name	Listing	Habitat and description	Likelihood of Impact
Erythrura gouldiae	Gouldian Finch	Endangered (EPBC Act 1999 and TPWC Act 2000) and Migratory (EPBC Act 1999)	Open tropical woodland that has a grassy understorey, often in hilly areas	Possible
Varanus mertensi	Merten's Water Monitor	Vulnerable (TPWC Act)	Inland waters, however it is also a climber and inhabits rocks and trees near water. Major threat currently facing these Monitors is the Cane Toad	Low – no proposed works near waterways
Rattus villosissimus	Long-haired Rat	Near Threatened (TPWC Act 2000)	Mesic, densely vegetated sites, but can inhabit range of habitats	Possible
Rostratula australis	Australian Painted Snipe	Vulnerable (EPBC Act 1999 and TPWC Act 2000)	Marsh with moderate cover	Unlikely – proposed works are unlikely to impact on wet areas
Elseya lavarackorum	Gulf Snapping Turtle	Endangered (EPBC Act 1999)	Freshwater rivers and creeks of the region, threatened by stock and feral pigs	Low – no proposed works near waterways
Pristis microdon	Freshwater Sawfish	Vulnerable (EPBC Act 1999 and TPWC Act 2000)	Freshwater rivers and creeks of the region	Low – no proposed works near waterways
Haliaeetus leucogaster	White-bellied Sea-Eagle	Migratory (EPBC Act 1999)	Large rivers, and inland waters	Unlikely – possible impact on nesting trees

Species Name	Common Name	Listing	Habitat and description	Likelihood of Impact
Merops ornatus	Rainbow Bee-eater	Migratory (EPBC Act 1999)	Open country, most vegetation types, sand dunes and banks	Possible
Rhipidura rufifrons	Rufous Fantail	Migratory (EPBC Act 1999)	Prefers wetter forest, possibly riparian areas within the project area	Unlikely – due to lack of impact on waterways
Ardeotis australis	Australian Bustard	Vulnerable (TPWC Act 2000)	Tropical open grassland, grassy woodland, pastoral land, crops	Possible
Pezoporus occidentalis	Night Parrot	Critically Endangered (TPWC Act 2000) and Endangered (EPBC Act 1999)	Inland plains, breakaways, samphire about salt lakes – project area is north and outside its known distribution	Unlikely – due to Parrot's more southern distribution

4.2 Control of Weed Species

Under NT legislation, Phosphate Australia must also control the growth and spread of the following species within **Table 7**, should they be present within the project area.

Table 7: Weed species to control

Common Name	Scientific Name	Description
Coffee Senna	*Senna occidentalis*	Annual or short lived perennial shrubs to 2m high, leaves divided into opposite pairs of leaflets. Flowers yellow with 5 petals. Pods slender, sickle shaped, slightly indented around the seeds. Seeds dark brown, flattened. Grows in dense stands in disturbed areas.
Khaki Weed	*Alternanthera pungens*	Khaki weed grows in dense patches and "flat on the ground". It is easily distinguishable by its many white/yellow prickly burrs. When mature, these burrs stick to bare feet, shoes, motor tyres etc. Source: http://www.northwestweeds.nsw.gov.au/khaki_weed.htm
Noogoora Burr	*Xanthium strumarium*	Annual, much-branched woody herb to 60cm tall. Stems and base of each leaf covered with 3-pronged spines. Leaves divided into irregular lobes, green above, paler below. Fruits hard woody burrs, brown, covered with yellowish hairs and numerous hooked spines. Grows in disturbed areas.
Sicklepod	*Senna obtusifolia*	Very similar to *Senna occidentalis*, but does not generally occur in such dense stands.

Source: Smith (2002)

4.3 Conclusion

Phosphate Australia do not plan to work near waterways. Thus, if appropriate sedimentation and pollution control measures are employed in general works, there would be reason to believe that works will not impact upon Merten's Water Monitor, the Freshwater Sawfish, and the Gulf Snapping Turtle. Proposed exploration works will involve minimal land disturbance resulting in impacts to the other listed species (**Table 6**) and their habitat being negligible. Further potential impacts on the environment will be minimised via the prevention of growth and spread of weeds of concern on the site during exploration activities.

Personnel involved in on ground activities will be made aware of these issues and control, management or mitigation measures during the site induction process.

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Appendix 1
Bioregion Map of Australia

N

400 200 0 400 800

Kilometres

Data source:
IBRA version 6.1 (2004) was developed through co-operative efforts of the Australian Government Department of the Environment and Heritageand State/Territory land management agencies.
Topographic Data - Australia - 1:10 million (c) Geoscience Australia, 1989.

Caveats:
Data used are assumed to be correct as received from the data suppliers.

Map produced by ERIN for the National Reserve Systems Section, Australian Government Department of the Environment and Heritage, Canberra, March 2005.

TIW
ARC
DARWIN
DAC
PCK
ARP
CA
DAB
VB
NK
CK
DL
OVP
STU
GFU
GUC
CYP
GUP
EIU
WT
TAN
DMR
GSD
MII
PIL
BRT
MGD
DEU
BBN
GMC
LSD
GD
MAC
CAR
GAS
CR
FIN
CHC
SSD
BBS
SEQ
BRISBANE
MUR
GVD
STP
ML
GS
YAL
NUL
GAW
DRP
NAN
NET
AW
COO
BHC
PERTH
HAM
FLB
CP
NNC
SWA
MAL
EYB
SB
JF
ESP
RIV
NSS
SYDNEY
ADELAIDE
WAR
KAN
MDD
SEH
VCP
VM
SEC
VVP
CP
MELBOURNE
KIN
FLI
TNS
BEL
TWE
TSE
HOBART

Interim Biogeographic Regionalisation for Australia, Version 6.1

This map depicts the Interim Biogeographical Regionalisation for Australia (IBRA) version 6.1. IBRA regions represent a landscape based approach to classifying the land surface, including attributes of climate, geomorphology, landform, lithology, and characteristic flora and fauna. Specialist ecological knowledge combined with appropriate regional and continental scale biophysical data sets were interpreted to describe these regions. 85 IBRA regions exist across Australia.

AA	Australian Alps
ARC	Arnhem Coast
ARP	Arnhem Plateau
AW	Avon Wheatbelt
BBN	Brigalow Belt North
BBS	Brigalow Belt South
BEL	Ben Lomond
BHC	Broken Hill Complex
BRT	Burt Plain
CA	Central Arnhem
CAR	Carnarvon
CHC	Channel Country
CK	Central Kimberley
CMC	Central Mackay Coast
COO	Coolgardie
CP	Cobar Peneplain
CR	Central Ranges
CYP	Cape York Peninsula
DAB	Daly Basin
DAC	Darwin Coastal
DEU	Desert Uplands
DL	Dampierland
DMR	Davenport Murchison Ranges
DRP	Darling Riverine Plains
EIU	Einasleigh Uplands
ESP	Esperance Plains
EYB	Eyre Yorke Block
FIN	Finke
FLB	Flinders Lofty Block
FLI	Flinders
GAS	Gascoyne
GAW	Gawler
GD	Gibson Desert
GFU	Gulf Fall and Uplands
GS	Geraldton Sandplains
GSD	Great Sandy Desert
GUC	Gulf Coastal
GUP	Gulf Plains
GVD	Great Victoria Desert
HAM	Hampton
JF	Jarrah Forest
KAN	Kanmantoo
KIN	King
LSD	Little Sandy Desert
MAC	MacDonnell Ranges
MAL	Mallee
MDD	Murray Darling Depression
MGD	Mitchell Grass Downs
MII	Mount Isa Inlier
ML	Mulga Lands
MUR	Murchison
NAN	Nandewar
NCP	Naracoorte Coastal Plain
NET	New England Tablelands
NK	Northern Kimberley
NNC	NSW North Coast
NSS	NSW South Western Slopes
NUL	Nullarbor
OVP	Ord Victoria Plain
PCK	Pine Creek
PIL	Pilbara
RIV	Riverina
SB	Sydney Basin
SCP	South East Coastal Plain
SEC	South East Corner
SEH	South Eastern Highlands
SEQ	South Eastern Queensland
SSD	Simpson Strzelecki Dunefields
STP	Stony Plains
STU	Sturt Plateau
SWA	Swan Coastal Plain
TAN	Tanami
TCH	Tasmanian Central Highlands
TIW	Tiwi Cobourg
TNM	Tasmanian Northern Midlands
TNS	Tasmanian Northern Slopes
TSE	Tasmanian South East
TSR	Tasmanian Southern Ranges
TWE	Tasmanian West
VB	Victoria Bonaparte
VM	Victorian Midlands
VVP	Victorian Volcanic Plain
WAR	Warren
WT	Wet Tropics
YAL	Yalgoo

Appendix 2
NT Flora and Fauna Atlas Database Results

Flora Species recorded within project area: Taken from NT ATLAS

Latitude	Longitude	Family	Scientific Name	NT Status
-18.61667	137.98333	AMARANTHACEAE	Amaranthus cochleitepalus	lc
-18.6167	137.9833	AMARANTHACEAE	Gomphrena canescens subsp. indeterminate	
-18.6167	137.9833	ASTERACEAE	Pterocaulon serrulatum var. serrulatum	lc
-18.61667	137.98333	CAESALPINIACEAE	Chamaecrista absus var. absus	lc
-18.61667	137.98333	CAPPARACEAE	Cleome viscosa	lc
-18.61667	137.98333	COMBRETACEAE	Terminalia bursarina	lc
-18.65	137.98333	CYPERACEAE	Cyperus dactylotes	lc
-18.61667	137.98333	EUPHORBIACEAE	Euphorbia petala	lc
-18.6167	137.9833	EUPHORBIACEAE	Flueggea virosa subsp. melanthesoides	lc
-18.6167	137.9833	EUPHORBIACEAE	Sebastiania chamaelea	lc
-18.61667	137.98333	FABACEAE	Crotalaria montana var. angustifolia	lc
-18.6167	137.9833	FABACEAE	Crotalaria novae-hollandiae subsp. lasiophylla	lc
-18.61667	137.98333	FABACEAE	Crotalaria retusa	lc
-18.6167	137.9833	FABACEAE	Indigofera colutea	lc
-18.6167	137.9833	FABACEAE	Indigofera linnaei	lc
-18.6167	137.9833	FABACEAE	Zornia prostrata var. indeterminate	
-18.6167	137.9833	LORANTHACEAE	Amyema bifurcata	
-18.61667	137.98333	MIMOSACEAE	Acacia alleniana	lc
-18.65	138	MIMOSACEAE	Acacia holosericea	lc
-18.61667	138	MIMOSACEAE	Acacia phlebocarpa	lc
-18.6167	137.9833	MIMOSACEAE	Acacia retivenea subsp. retivenea	lc
-18.61667	138	MIMOSACEAE	Acacia shirleyi	lc
-18.61667	138	MIMOSACEAE	Acacia wickhamii subsp. parviphyllodinea	lc
-18.61667	137.98333	MYRTACEAE	Corymbia flavescens	lc
-18.61667	138	PANDANACEAE	Pandanus aquaticus	lc
-18.61667	137.98333	POACEAE	Acrachne racemosa	dd
-18.61667	137.98333	POACEAE	Bothriochloa bladhii subsp. bladhii	lc
-18.61667	137.98333	POACEAE	Eragrostis confertiflora	lc
-18.61667	137.98333	POACEAE	Eragrostis cumingii	lc
-18.65	137.98333	POACEAE	Eragrostis elongata	lc
-18.61667	137.98333	POACEAE	Eragrostis fallax	lc
-18.61667	137.98333	POACEAE	Eriachne ciliata	lc
-18.61667	137.98333	POACEAE	Ischaemum australe var. australe	lc

Latitude	Longitude	Family	Scientific Name	NT Status
-18.61667	137.98333	POACEAE	Panicum decompositum var. indeterminate	
-18.61667	137.98333	POACEAE	Panicum mindanaense	lc
-18.65	137.98333	POACEAE	Panicum sp.	
-18.61667	137.98333	POACEAE	Sehima nervosum	lc
-18.61667	137.98333	POACEAE	Urochloa praetervisa	lc
-18.61667	138	PROTEACEAE	Grevillea dryandri subsp. indeterminate	
-18.6167	137.9833	TILIACEAE	Corchorus sericeus subsp. indeterminate	

Flora Species recorded within 10km of project area: Taken from NT ALTAS

Latitude	Longitude	Family	Scientific Name	Exotic	Endemic	NT Status
-18.6	137.9833	ACANTHACEAE	Hygrophila angustifolia			lc
-18.6	138.06667	AMARANTHACEAE	Aerva javanica	N		
-18.6	137.9833	AMARANTHACEAE	Alternanthera nana			lc
-18.61667	137.98333	AMARANTHACEAE	Amaranthus cochleitepalus			lc
-18.6333	137.9667	AMARANTHACEAE	Gomphrena lanata			lc
-18.6167	137.9833	AMARANTHACEAE	Gomphrena canescens subsp. indeterminate			
-18.60582	137.98418	APOCYNACEAE	Carissa lanceolata			lc
-18.52723	137.93168	ARECACEAE	Livistona rigida			lc
-18.58333	138.05	ASTERACEAE	Pluchea ferdinandi-muelleri			lc
-18.6167	137.9833	ASTERACEAE	Pterocaulon serrulatum var. serrulatum			lc
-18.58333	138.05	ASTERACEAE	Pterocaulon sphaeranthoides			dd
-18.6	137.9833	ASTERACEAE	Sphaeromorphaea australis			lc
-18.6	138	CAESALPINIACEAE	Bauhinia cunninghamii			lc
-18.61667	137.98333	CAESALPINIACEAE	Chamaecrista absus var. absus			lc
-18.7	137.95	CAESALPINIACEAE	Senna notabilis			lc
-18.7	137.95	CAESALPINIACEAE	Senna oligoclada			lc
-18.6	138	CAESALPINIACEAE	Senna planitiicola			lc
-18.6	138	CAESALPINIACEAE	Senna venusta			lc
-18.6	137.9833	CAESALPINIACEAE	Senna planitiicola			lc
-18.6	138	CAPPARACEAE	Capparis lasiantha			lc
-18.61667	137.98333	CAPPARACEAE	Cleome viscosa			lc
-18.66667	138	CARYOPHYLLACEAE	Polycarpaea multicaulis			dd
-18.6	138	CHENOPODIACEAE	Salsola tragus subsp. indeterminate	x		
-18.61667	137.98333	COMBRETACEAE	Terminalia bursarina			lc
-18.60582	137.98418	COMBRETACEAE	Terminalia canescens			lc
-18.63333	137.96667	CONVOLVULACEAE	Bonamia media var. media			lc
-18.6	138	CONVOLVULACEAE	Bonamia pannosa			lc
-18.6	137.9833	CONVOLVULACEAE	Evolvulus alsinoides var. indeterminate			
-18.6	138	CONVOLVULACEAE	Ipomoea eriocarpa			lc
-18.6	137.9833	CONVOLVULACEAE	Ipomoea brassii			dd
-18.6	137.9833	CONVOLVULACEAE	Ipomoea plebeia			lc
-18.52723	137.93168	CONVOLVULACEAE	Jacquemontia paniculata			lc
-18.6	137.9833	CONVOLVULACEAE	Polymeria ambigua			lc
-18.6	137.9833	CONVOLVULACEAE	Xenostegia tridentata			lc
-18.65	137.98333	CYPERACEAE	Cyperus dactylotes			lc
-18.6122	137.9914	CYPERACEAE	Cyperus holoschoenus			lc
-18.6	138	CYPERACEAE	Cyperus sexflorus			lc

Latitude	Longitude	Family	Scientific Name	Exotic	Endemic	NT Status
-18.52723	137.93168	CYPERACEAE	Cyperus haspan subsp. indeterminate			
-18.6122	137.9914	CYPERACEAE	Fimbristylis littoralis var. littoralis			lc
-18.5911	138.0656	CYPERACEAE	Fimbristylis tetragona			lc
-18.6	137.96667	CYPERACEAE	Scleria brownii			lc
-18.58333	138.05	ERIOCAULACEAE	Eriocaulon pygmaeum			lc
-18.6	137.9833	EUPHORBIACEAE	Breynia cernua			lc
-18.52723	137.93168	EUPHORBIACEAE	Breynia cernua			lc
-18.61667	137.98333	EUPHORBIACEAE	Euphorbia petala		1	lc
-18.6167	137.9833	EUPHORBIACEAE	Flueggea virosa subsp. melanthesoides			lc
-18.6	138	EUPHORBIACEAE	Petalostigma quadriloculare			lc
-18.58333	138.03333	EUPHORBIACEAE	Petalostigma banksii			lc
-18.6	137.9833	EUPHORBIACEAE	Phyllanthus maderaspatensis var. angustifolius			lc
-18.5833	138.0333	EUPHORBIACEAE	Phyllanthus carpentariae			lc
-18.6167	137.9833	EUPHORBIACEAE	Sebastiania chamaelea			lc
-18.63333	137.96667	FABACEAE	Crotalaria medicaginea var. indeterminate			
-18.63333	137.96667	FABACEAE	Crotalaria ramosissima			lc
-18.6167	137.9833	FABACEAE	Crotalaria novae-hollandiae subsp. lasiophylla			lc
-18.61667	137.98333	FABACEAE	Crotalaria montana var. angustifolia			lc
-18.61667	137.98333	FABACEAE	Crotalaria retusa			lc
-18.6	138	FABACEAE	Crotalaria ramosissima			lc
-18.6	137.9833	FABACEAE	Crotalaria crispata			lc
-18.58333	138.05	FABACEAE	Crotalaria novae-hollandiae subsp. indeterminate			
-18.58333	138.05	FABACEAE	Crotalaria verrucosa			lc
-18.71667	137.93333	FABACEAE	Cullen plumosum			lc
-18.6167	137.9833	FABACEAE	Indigofera colutea			lc
-18.6167	137.9833	FABACEAE	Indigofera linnaei			lc
-18.61667	137.98333	FABACEAE	Indigofera colutea			lc
-18.6	137.9833	FABACEAE	Templetonia hookeri			lc
-18.63333	137.96667	FABACEAE	Zornia albiflora			lc
-18.6167	137.9833	FABACEAE	Zornia prostrata var. indeterminate			
-18.6	138	GOODENIACEAE	Goodenia odonnellii			lc
-18.52723	137.93168	LAURACEAE	Cassytha filiformis			lc
-18.6167	137.9833	LORANTHACEAE	Amyema bifurcata			
-18.6	138	LORANTHACEAE	Lysiana spathulata subsp. spathulata			lc
-18.6	138	LORANTHACEAE	Lysiana subfalcata			lc
-18.52723	137.93168	MELASTOMATACEAE	Melastoma malabathricum subsp. malabathricum			lc
-18.68333	137.96667	MIMOSACEAE	Acacia lysiphloia			lc
-18.65	138	MIMOSACEAE	Acacia holosericea			lc

Latitude	Longitude	Family	Scientific Name	Exotic	Endemic	NT Status
-18.63333	137.96667	MIMOSACEAE	Acacia hemsleyi			lc
-18.63333	137.96667	MIMOSACEAE	Acacia lysiphloia			lc
-18.61667	138	MIMOSACEAE	Acacia phlebocarpa			lc
-18.61667	138	MIMOSACEAE	Acacia shirleyi			lc
-18.61667	138	MIMOSACEAE	Acacia wickhamii subsp. parviphyllodinea			lc
-18.6167	137.9833	MIMOSACEAE	Acacia retivenea subsp. retivenea			lc
-18.61667	137.98333	MIMOSACEAE	Acacia alleniana			lc
-18.60582	137.98418	MIMOSACEAE	Acacia plectocarpa subsp. indeterminate			
-18.6	138	MIMOSACEAE	Acacia monticola			lc
-18.6	138	MIMOSACEAE	Acacia retivenea subsp. retivenea			lc
-18.6	137.9833	MIMOSACEAE	Acacia platycarpa			lc
-18.5833	138.0333	MORACEAE	Ficus aculeata var. aculeata			lc
-18.52723	137.93168	MORACEAE	Ficus aculeata var. indeterminate			
-18.63333	137.96667	MYRTACEAE	Calytrix brownii			lc
-18.63333	137.96667	MYRTACEAE	Corymbia aspera			lc
-18.61667	137.98333	MYRTACEAE	Corymbia flavescens			lc
-18.6	138	MYRTACEAE	Corymbia aspera			lc
-18.6	138	MYRTACEAE	Corymbia terminalis			lc
-18.58333	138.05	MYRTACEAE	Corymbia ptychocarpa subsp. ptychocarpa			lc
-18.58333	138	MYRTACEAE	Corymbia polycarpa			lc
-18.71667	137.96667	MYRTACEAE	Eucalyptus leucophloia subsp. euroa			lc
-18.63333	137.96667	MYRTACEAE	Eucalyptus pruinosa subsp. pruinosa			lc
-18.60582	137.98418	MYRTACEAE	Eucalyptus leucophloia subsp. euroa			lc
-18.6	138	MYRTACEAE	Eucalyptus camaldulensis var. obtusa			lc
-18.6	138	MYRTACEAE	Eucalyptus chlorophylla subsp. chlorophylla			lc
-18.6	138	MYRTACEAE	Eucalyptus leucophloia subsp. euroa			lc
-18.6	138	MYRTACEAE	Eucalyptus pruinosa subsp. pruinosa			lc
-18.6	137.9833	MYRTACEAE	Eucalyptus camaldulensis subsp. indeterminate			
-18.58333	138.05	MYRTACEAE	Eucalyptus chlorophylla subsp. chlorophylla			lc
-18.6	138	MYRTACEAE	Melaleuca dealbata			lc
-18.6	138	MYRTACEAE	Melaleuca viridiflora			lc
-18.52723	137.93168	MYRTACEAE	Melaleuca leucadendra			lc
-18.61667	138	PANDANACEAE	Pandanus aquaticus			lc
-18.61667	137.98333	POACEAE	Acrachne racemosa			dd
-18.63333	137.96667	POACEAE	Aristida exserta			lc
-18.63333	137.96667	POACEAE	Aristida ingrata			lc
-18.6	138	POACEAE	Aristida pruinosa			lc
-18.6	137.96667	POACEAE	Aristida calycina var. calycina			lc

Latitude	Longitude	Family	Scientific Name	Exotic	Endemic	NT Status
-18.61667	137.98333	POACEAE	Bothriochloa bladhii subsp. bladhii			lc
-18.60582	137.98418	POACEAE	Cymbopogon bombycinus			lc
-18.6	137.96667	POACEAE	Digitaria breviglumis			lc
-18.6	137.9833	POACEAE	Echinochloa colonum	N		
-18.58333	138.05	POACEAE	Ectrosia leporina			lc
-18.63333	137.96667	POACEAE	Enneapogon robustissimus			dd
-18.6	137.96667	POACEAE	Enneapogon oblongus			lc
-18.65	137.98333	POACEAE	Eragrostis elongata			lc
-18.61667	137.98333	POACEAE	Eragrostis confertiflora			lc
-18.61667	137.98333	POACEAE	Eragrostis cumingii			lc
-18.61667	137.98333	POACEAE	Eragrostis fallax			lc
-18.58333	138.05	POACEAE	Eragrostis schultzii			lc
-18.58333	138.05	POACEAE	Eragrostis speciosa			lc
-18.61667	137.98333	POACEAE	Eriachne ciliata			lc
-18.6	137.9833	POACEAE	Eriachne mucronata			lc
-18.6	138	POACEAE	Eulalia aurea			lc
-18.61667	137.98333	POACEAE	Ischaemum australe var. australe			lc
-18.65	137.98333	POACEAE	Panicum sp.			
-18.61667	137.98333	POACEAE	Panicum decompositum var. indeterminate			
-18.61667	137.98333	POACEAE	Panicum mindanaense			lc
-18.61667	137.98333	POACEAE	Sehima nervosum			lc
-18.66667	137.98333	POACEAE	Triodia pungens			lc
-18.60582	137.98418	POACEAE	Triodia sp.			
-18.63333	137.96667	POACEAE	Urochloa piligera			lc
-18.61667	137.98333	POACEAE	Urochloa praetervisa			lc
-18.7	138	PROTEACEAE	Grevillea heliosperma			lc
-18.63333	137.96667	PROTEACEAE	Grevillea pteridifolia			lc
-18.61667	138	PROTEACEAE	Grevillea dryandri subsp. indeterminate			
-18.6	138	PROTEACEAE	Grevillea heliosperma			lc
-18.58333	138.05	PROTEACEAE	Grevillea parallela			lc
-18.5833	138.05	PROTEACEAE	Persoonia falcata			lc
-18.6	138	RHAMNACEAE	Alphitonia excelsa			lc
-18.63333	137.96667	RHAMNACEAE	Ventilago viminalis			lc
-18.6	138	RUBIACEAE	Gardenia pyriformis subsp. orientalis			lc
-18.6	137.9833	SANTALACEAE	Santalum lanceolatum			lc
-18.6	138	SAPINDACEAE	Atalaya hemiglauca			lc
-18.60582	137.98418	SAPINDACEAE	Distichostemon hispidulus var. indeterminate			
-18.6	138	STERCULIACEAE	Waltheria indica			lc

Latitude	Longitude	Family	Scientific Name	Exotic	Endemic	NT Status
-18.7	137.95	TILIACEAE	Corchorus sidoides subsp. vermicularis			lc
-18.6167	137.9833	TILIACEAE	Corchorus sericeus subsp. indeterminate			
-18.6	138	TILIACEAE	Corchorus pumilio			lc
-18.6	138	ULMACEAE	Celtis philippensis			lc
-18.52723	137.93168	VERBENACEAE	Clerodendrum floribundum var. indeterminate			
-18.6	138	VIOLACEAE	Hybanthus enneaspermus subsp. enneaspermus			lc
-18.5833	138.05	XYRIDACEAE	Xyris complanata			lc

Fauna Species recorded within project area: Taken from NT ATLAS

Family	Scientific Name	Common Name	Year	Latitude	Longitude	TPWCA
REPTILES						
Agamidae	Lophognathus gilberti	Gilbert's Dragon	1967	-18.62	137.98	LC
BIRDS						
Accipitridae	Accipiter fasciatus	Brown Goshawk	1967	-18.62	137.98	LC
Psittacidae	Aprosmictus erythropterus	Red-winged Parrot	1967	-18.62	137.98	LC
Artamidae	Artamus leucorynchus	White-breasted Woodswallow	1967	-18.62	137.98	LC
Artamidae	Artamus minor	Little Woodswallow	1967	-18.62	137.98	LC
Cacatuidae	Cacatua galerita	Sulphur-crested Cockatoo	1967	-18.62	137.98	LC
Vespertilionidae	Chalinolobus gouldii	Gould's Wattled Bat	1967	-18.6167	137.9833	LC
Ptilonorhynchidae	Chlamydera nuchalis	Great Bowerbird	1967	-18.62	137.98	LC
Pachycephalidae	Colluricincla woodwardi	Sandstone Shrike-thrush	1967	-18.62	137.98	LC
Meliphagidae	Conopophila rufogularis	Rufous-throated Honeyeater	1967	-18.62	137.98	LC
Campephagidae	Coracina papuensis	White-bellied Cuckoo-shrike	1967	-18.62	137.98	LC
Corvidae	Corvus orru	Torresian Crow	1967	-18.62	137.98	LC
Phasianidae	Coturnix ypsilophora	Brown Quail	1967	-18.62	137.98	LC
Falconidae	Falco berigora	Brown Falcon	1967	-18.62	138	LC
Columbidae	Geopelia cuneata	Diamond Dove	1967	-18.62	137.98	LC
Columbidae	Geophaps plumifera	Spinifex Pigeon	1967	-18.62	137.98	LC
Dicruridae	Grallina cyanoleuca	Magpie-lark	1967	-18.62	137.98	LC
Ardeidae	Ixobrychus flavicollis	Black Bittern	1967	-18.62	137.98	DD
Meliphagidae	Lichmera indistincta	Brown Honeyeater	1967	-18.62	137.98	LC
Maluridae	Malurus melanocephalus	Red-backed Fairy-wren	1967	-18.62	137.98	LC
Psittacidae	Melopsittacus undulatus	Budgerigar	1967	-18.62	137.98	LC
Columbidae	Ocyphaps lophotes	Crested Pigeon	1967	-18.62	137.98	LC
Pachycephalidae	Pachycephala rufiventris	Rufous Whistler	1967	-18.62	137.98	LC
Columbidae	Phaps chalcoptera	Common Bronzewing	1967	-18.62	137.98	LC

Family	Scientific Name	Common Name	Year	Latitude	Longitude	TPWCA
Meliphagidae	Philemon argenticeps	Silver-crowned Friarbird	1967	-18.62	137.98	LC
Passeridae	Poephila acuticauda	Long-tailed Finch	1967	-18.62	137.98	LC
Pomatostomidae	Pomatostomus temporalis	Grey-crowned Babbler	1967	-18.62	137.98	LC
Psittacidae	Psitteuteles versicolor	Varied Lorikeet	1967	-18.62	137.98	LC
Dicruridae	Rhipidura leucophrys	Willie Wagtail	1967	-18.62	137.98	LC
Passeridae	Taeniopygia bichenovii	Double-barred Finch	1967	-18.62	137.98	LC
MAMMALS						
Muridae	Pseudomys delicatulus	Delicate Mouse	1967	-18.62	137.98	LC
Muridae	Rattus villosissimus	Long-haired Rat	1967	-18.62	137.98	NT
Vespertilionidae	Scotorepens balstoni	Inland Broad-nosed Bat	1967	-18.6167	137.9833	LC
Muridae	Zyzomys argurus	Common Rock-rat	1967	-18.62	137.98	LC

Fauna Species recorded within 10km of project area: Taken from NT ATLAS

Family	Scientific Name	Common Name	Year	Latitude	Longitude	TPWCA
REPTILES						
Scincidae	Carlia triacantha	Three-Spined Rainbow Skink	1995	-18.6083	137.9883	LC
Scincidae	Cryptoblepharus plagiocephalus	Aboreal Snake-Eyed Skink	1995	-18.6083	137.9883	LC
Scincidae	Ctenotus lateralis	Gravelly-soil Ctenotus	1995	-18.6083	137.9883	DD
Scincidae	Ctenotus pulchellus	Pretty Ctenotus	1995	-18.6083	137.9883	LC
Scincidae	Ctenotus saxatilis	Rock Ctenotus	1995	-18.6083	137.9883	LC
Scincidae	Ctenotus spaldingi	Spalding's Ctenotus	1995	-18.6083	137.9883	LC
Scincidae	Ctenotus striaticeps	Carpentarian Ctenotus	1995	-18.6083	137.9883	LC
Gekkonidae	Diplodactylus conspicillatus	Fat-tailed Gecko	1995	-18.6083	137.9883	LC
Agamidae	Diporiphora lalliae		1995	-18.6083	137.9883	LC
Gekkonidae	Heteronotia binoei	Bynoe's Gecko	1995	-18.6083	137.9883	LC
Ardeidae	Ixobrychus flavicollis	Black Bittern	1967	-18.62	137.98	DD
Agamidae	Lophognathus gilberti	Gilbert's Dragon	1988	-18.75	137.93333	LC
Elapidae	Suta punctata	Little Spotted Snake	1995	-18.6083	137.9883	LC
Varanidae	Varanus acanthurus	Ridge-tailed Monitor	1995	-18.6083	137.9883	LC
Varanidae	Varanus mertensi	Merten's Water Monitor	1995	-18.6083	137.9883	VU
BIRDS						
Accipitridae	Accipiter fasciatus	Brown Goshawk	1967	-18.62	137.98	LC
Psittacidae	Aprosmictus erythropterus	Red-winged Parrot	1967	-18.62	137.98	LC
Artamidae	Artamus leucorynchus	White-breasted Woodswallow	1967	-18.62	137.98	LC
Artamidae	Artamus minor	Little Woodswallow	1967	-18.62	137.98	LC
Cacatuidae	Cacatua galerita	Sulphur-crested Cockatoo	1967	-18.62	137.98	LC
Ptilonorhynchidae	Chlamydera nuchalis	Great Bowerbird	1967	-18.62	137.98	LC
Climacteridae	Climacteris melanura	Black-tailed Treecreeper	1967	-18.62	137.87	LC
Pachycephalidae	Colluricincla woodwardi	Sandstone Shrike-thrush	1967	-18.62	137.98	LC
Meliphagidae	Conopophila rufogularis	Rufous-throated Honeyeater	1967	-18.62	137.98	LC
Campephagidae	Coracina papuensis	White-bellied Cuckoo-shrike	1967	-18.62	137.98	LC
Corvidae	Corvus orru	Torresian Crow	1967	-18.62	137.98	LC
Phasianidae	Coturnix ypsilophora	Brown Quail	1967	-18.62	137.98	LC
Falconidae	Falco berigora	Brown Falcon	1967	-18.62	138	LC
Columbidae	Geopelia cuneata	Diamond Dove	1967	-18.62	137.98	LC
Columbidae	Geophaps plumifera	Spinifex Pigeon	1967	-18.62	137.98	LC
Dicruridae	Grallina cyanoleuca	Magpie-lark	1967	-18.62	137.98	LC
Meliphagidae	Lichmera indistincta	Brown Honeyeater	1967	-18.62	137.98	LC
Maluridae	Malurus melanocephalus	Red-backed Fairy-wren	1967	-18.62	137.98	LC
Psittacidae	Melopsittacus undulatus	Budgerigar	1967	-18.62	137.98	LC
Columbidae	Ocyphaps lophotes	Crested Pigeon	1967	-18.62	137.98	LC

Family	Scientific Name	Common Name	Year	Latitude	Longitude	TPWCA
Pachycephalidae	Pachycephala rufiventris	Rufous Whistler	1967	-18.62	137.98	LC
Columbidae	Phaps chalcoptera	Common Bronzewing	1967	-18.62	137.98	LC
Meliphagidae	Philemon argenticeps	Silver-crowned Friarbird	1967	-18.62	137.98	LC
Meliphagidae	Philemon citreogularis	Little Friarbird	1988	-18.7	137.96667	LC
Passeridae	Poephila acuticauda	Long-tailed Finch	1967	-18.62	137.98	LC
Pomatostomidae	Pomatostomus temporalis	Grey-crowned Babbler	1967	-18.62	137.98	LC
Psittacidae	Psitteuteles versicolor	Varied Lorikeet	1967	-18.62	137.98	LC
Dicruridae	Rhipidura leucophrys	Willie Wagtail	1967	-18.62	137.98	LC
Passeridae	Taeniopygia bichenovii	Double-barred Finch	1967	-18.62	137.98	LC
MAMMALS						
Vespertilionidae	Chalinolobus gouldii	Gould's Wattled Bat	1967	-18.6167	137.9833	LC
Equidae	Equus caballus	Horse	1988	-18.7	137.96667	(Int)
Muridae	Pseudomys delicatulus	Delicate Mouse	1967	-18.62	137.98	LC
Muridae	Rattus villosissimus	Long-haired Rat	1967	-18.62	137.98	NT
Vespertilionidae	Scotorepens balstoni	Inland Broad-nosed Bat	1967	-18.6167	137.9833	LC
Muridae	Zyzomys argurus	Common Rock-rat	1967	-18.62	137.98	LC

Land Systems: Taken from NT ATLAS

AREA	Perimeter	NT North	Land System	Map Unit	Landscape	Geomor	Soil	Erosion	Drainage	ASS Occurrence	Survey	Biogeo	Scale
0.06548	6.09425	14455	Bukalara	Asb	Gulf Fall and Uplands, rugged quartz sandstone plateau and hills, steep rocky plateau and hills on quartz sandstone and sandstone; shallow sandy soils and rock outcrop	QZ	RU	H(r)		No occurrence of acid sulphate soils	Gulf	G	1:250,000
0.00383	0.761509	14524	Seigal	Als	Gulf Fall and Uplands, rugged quartz sandstone plateau and hills, steep rocky plateau and hills on quartz sandstone and sandstone; shallow sandy soils and rock outcrop, sandstone plains and rises, plains and rises mostly on sandstone and siltstone; commonly shallow soils with surface stone and rock outcrop	SS	RU	M(r)		No occurrence of acid sulphate soils	Gulf	G	1:250,000
0.00029	0.078826	14526	Emmerugga	Rle	Gulf Fall and Uplands, rugged quartz sandstone plateau and hills, steep rocky plateau and hills on quartz sandstone and sandstone; shallow sandy soils and rock outcrop, sandstone plains and rises, plains and rises mostly on sandstone and siltstone; commonly shallow soils with surface stone and rock outcrop	SS	RU	H(r)		No occurrence of acid sulphate soils	Gulf	G	1:250,000
0.00164	0.444512	14528	McArthur	Tam	Gulf Fall and Uplands, alluvial floodplains, alluvial floodplains, swamps and drainage depressions; seasonally inundated; sandy, silty and clay soils on Quaternary alluvium	AF	VE	H(f)	poor	No occurrence of acid sulphate soils	Gulf	G	1:250,000
0.0019	0.370965	14529	Bukalara	Asb	Gulf Fall and Uplands, rugged quartz sandstone plateau and hills, steep rocky plateau and hills on quartz sandstone and sandstone; shallow sandy soils and rock outcrop	QZ	RU	H(r)		No occurrence of acid sulphate soils	Gulf	G	1:250,000
0.00121	0.235346	14533	Seigal	Als	Gulf Fall and Uplands, sandstone plains and rises, plains and rises mostly on sandstone and siltstone; commonly shallow soils with surface stone and rock	SS	RU	M(r)		No occurrence of acid sulphate soils	Gulf	G	1:250,000

AREA	Perimeter	NT North	Land System	Map Unit	Landscape	Geomor	Soil	Erosion	Drainage	ASS Occurrence	Survey	Biogeo	Scale
					outcrop								
0.00018	0.057529	14536	Eleanor	Ale	Gulf Fall and Uplands, sandstone plains and rises, plains and rises mostly on sandstone and siltstone; commonly shallow soils with surface stone and rock outcrop	SS	RU	M(r)		No occurrence of acid sulphate soils	Gulf	G	1:250,000
0.00023	0.082141	14537	McArthur	Tam	Gulf Fall and Uplands, alluvial floodplains, alluvial floodplains, swamps and drainage depressions; seasonally inundated; sandy, silty and clay soils on Quaternary alluvium	AF	VE	H(f)	poor	No occurrence of acid sulphate soils	Gulf	G	1:250,000
0.00181	0.245924	14540	Emmerugga	Rle	Gulf Fall and Uplands, sandstone plains and rises, plains and rises mostly on sandstone and siltstone; commonly shallow soils with surface stone and rock outcrop	SS	RU	H(r)		No occurrence of acid sulphate soils	Gulf	G	1:250,000
0.00373	0.376667	14541	Bukalara	Asb	Gulf Fall and Uplands, rugged quartz sandstone plateau and hills, steep rocky plateau and hills on quartz sandstone and sandstone; shallow sandy soils and rock outcrop	QZ	RU	H(r)		No occurrence of acid sulphate soils	Gulf	G	1:250,000
0.0012	0.236876	14544	Bukalara	Asb	Gulf Fall and Uplands, rugged quartz sandstone plateau and hills, steep rocky plateau and hills on quartz sandstone and sandstone; shallow sandy soils and rock outcrop	QZ	RU	H(r)		No occurrence of acid sulphate soils	Gulf	G	1:250,000
0.00023	0.090974	14546	Emmerugga	Rle	Gulf Fall and Uplands, sandstone plains and rises, plains and rises mostly on sandstone and siltstone; commonly shallow soils with surface stone and rock outcrop	SS	RU	H(r)		No occurrence of acid sulphate soils	Gulf	G	1:250,000
0.00202	0.229698	14547	Emmerugga	Rle	Mount Isa Inlier, sandstone plains and rises, plains and rises mostly on sandstone and siltstone; commonly shallow soils with surface stone and rock outcrop	SS	RU	H(r)		No occurrence of acid sulphate soils	Gulf	MII	1:250,000
0.00197	0.212862	14550	Downs	Ald	Gulf Fall and Uplands, sandstone plains and rises, plains and rises mostly on sandstone and siltstone; commonly shallow	SS	KA	M(r)		No occurrence of acid sulphate	Gulf	G	1:250,000

AREA	Perimeter	NT North	Land System	Map Unit	Landscape	Geomor	Soil	Erosion	Drainage	ASS Occurrence	Survey	Biogeo	Scale
					soils with surface stone and rock outcrop					soils			
0.01738	1.25279	14552	Wilfred	Rlw	Mount Isa Inlier, sandstone plains and rises, plains and rises mostly on sandstone and siltstone; commonly shallow soils with surface stone and rock outcrop	SS	RU	M(r)		No occurrence of acid sulphate soils	Gulf	MII	1:250,000
0.00282	0.231599	14554	Boomerang	Tcb	Gulf Fall and Uplands, lateritic plains, plains and rises associated with deeply weathered profiles (laterite) including sand sheets and other depositional products; sandy and earth soils	LS	KA	L		No occurrence of acid sulphate soils	Gulf	G	1:250,000
0.00134	0.310123	14556	McArthur	Tam	Gulf Fall and Uplands, alluvial floodplains, alluvial floodplains, swamps and drainage depressions; seasonally inundated; sandy, silty and clay soils on Quaternary alluvium	AF	VE	H(f)	poor	No occurrence of acid sulphate soils	Gulf	G	1:250,000
0.00669	0.524407	14558	Boomerang	Tcb	Gulf Fall and Uplands, lateritic plains, plains and rises associated with deeply weathered profiles (laterite) including sand sheets and other depositional products; sandy and earth soils	LS	KA	L		No occurrence of acid sulphate soils	Gulf	G	1:250,000
0.00466	0.435083	14565	Boomerang	Tcb	Mount Isa Inlier, lateritic plains, plains and rises associated with deeply weathered profiles (laterite) including sand sheets and other depositional products; sandy and earth soils	LS	KA	L		No occurrence of acid sulphate soils	Gulf	MII	1:250,000
0.0059	0.519254	14566	Gallipoli	Rlg	Mitchell Grass Downs, clay plains, level plains to gently undulating clay plains; cracking clay soils	BC	VE	L		No occurrence of acid sulphate soils	Gulf	BT	1:250,000

Appendix 3
EPBC Database Search Results

Australian Government
Department of the Environment, Water, Heritage and the Arts

Protected Matters Search Tool

You are here: Environment Home > EPBC Act > Search

11 August 2009 17:00

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

You may wish to print this report for reference before moving to other pages or websites.

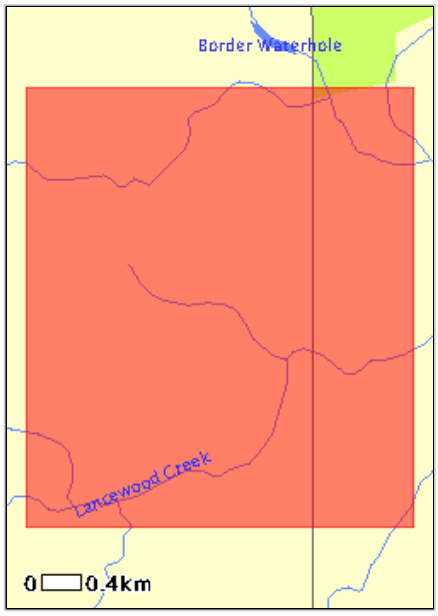
The Australian Natural Resources Atlas at http://www.environment.gov.au/atlas may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.environment.gov.au/epbc/assessmentsapprovals/index.html

Search Type: Area

Buffer: 0 km

Coordinates: -18.61678,137.96948, -18.65725,137.96948, -18.65725,138.00508, -18.61678,138.00508

Report Contents:



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None

Threatened Species:	4
Migratory Species:	13

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.au/epbc/permits/index.html.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Other Commonwealth Reserves:	None
Regional Forest Agreements:	None

Details

Matters of National Environmental Significance

Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
Erythrura gouldiae Gouldian Finch	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area
Reptiles		
Elseya lavarackorum Gulf Snapping Turtle	Endangered	Species or species habitat may occur within area
Sharks		
Pristis microdon	Vulnerable	Species or species habitat likely to occur

Freshwater Sawfish		within area
Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
Erythrura gouldiae Gouldian Finch	Migratory	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater	Migratory	Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail	Migratory	Species or species habitat may occur within area
Migratory Wetland Species		
Birds		
Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Migratory	Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel	Migratory	Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole	Migratory	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel	Migratory	Species or species habitat may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Migratory	Species or species habitat may occur within area
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift	Migratory	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Migratory	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Dataset Information]	Status	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift	Listed - overfly marine area	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Listed - overfly marine area	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Listed - overfly marine area	Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel	Listed - overfly marine area	Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole	Listed - overfly marine area	Species or species habitat may occur within area

Haliaeetus leucogaster White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel	Listed - overfly marine area	Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail	Listed - overfly marine area	Species or species habitat may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Reptiles		
Crocodylus johnstoni Freshwater Crocodile	Listed	Species or species habitat may occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the *Environment Protection and Biodiversity Conservation Act 1999*. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under "type of presence". For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the migratory and marine provisions of the Act have been mapped.

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgments

This database has been compiled from a range of data sources. The Department acknowledges the following custodians who have contributed valuable data and advice:

- New South Wales National Parks and Wildlife Service
- Department of Sustainability and Environment, Victoria
- Department of Primary Industries, Water and Environment, Tasmania
- Department of Environment and Heritage, South Australia Planning SA
- Parks and Wildlife Commission of the Northern Territory
- Environmental Protection Agency, Queensland
- Birds Australia
- Australian Bird and Bat Banding Scheme
- Australian National Wildlife Collection
- Natural history museums of Australia
- Queensland Herbarium
- National Herbarium of NSW
- Royal Botanic Gardens and National Herbarium of Victoria
- Tasmanian Herbarium
- State Herbarium of South Australia
- Northern Territory Herbarium
- Western Australian Herbarium
- Australian National Herbarium, Atherton and Canberra
- University of New England
- Other groups and individuals

ANUCliM Version 1.8, Centre for Resource and Environmental Studies, Australian National University was used extensively for the production of draft maps of species distribution. Environment Australia is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

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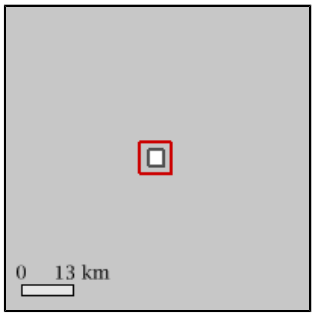
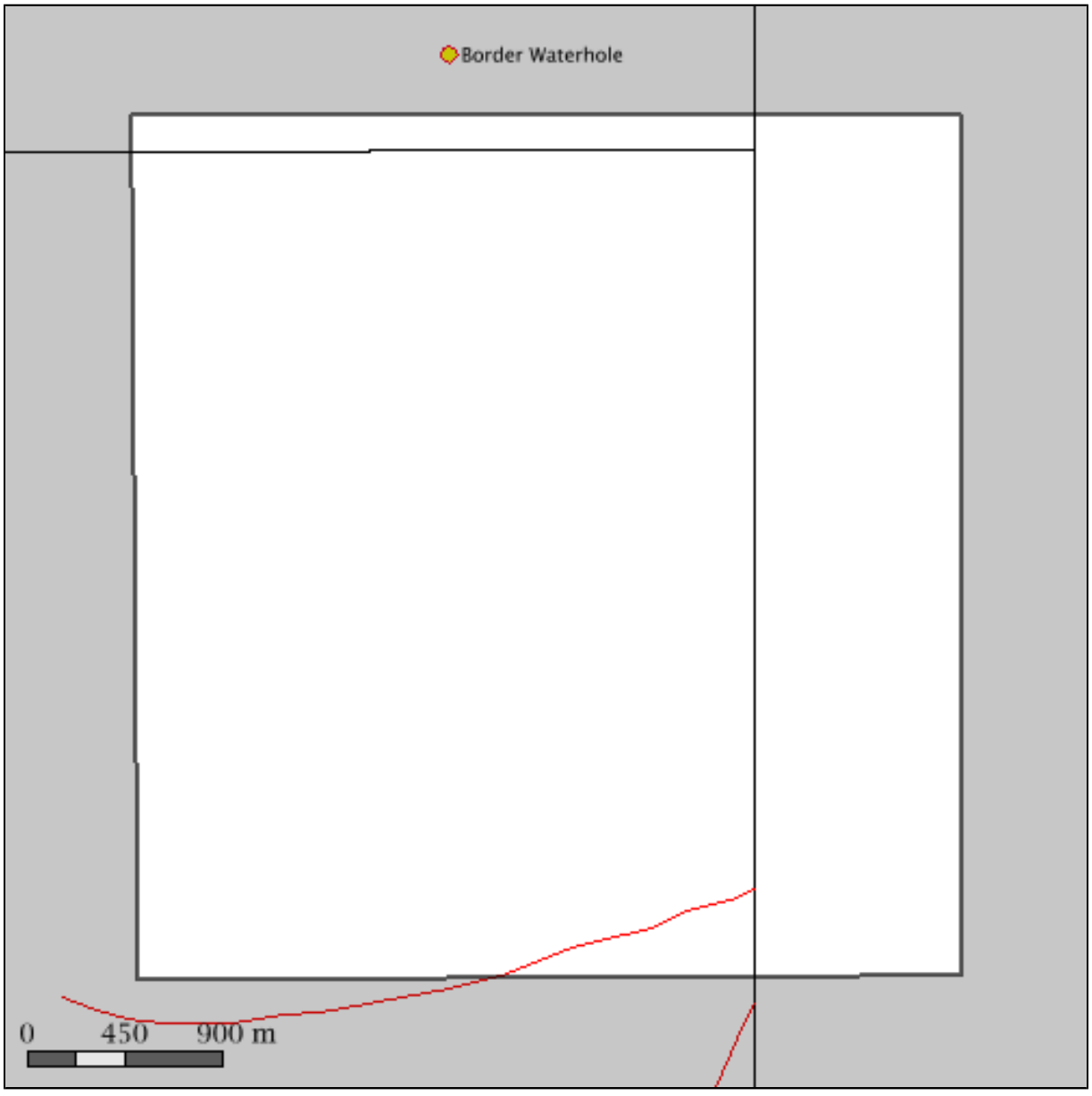
Appendix 4
Infonet Database Search Results

undefined

undefined encompasses an area of 13.96 sq km extending from 18 deg 37.0 min to 18 deg 39.0 min S and 137 deg 58.0 min to 138 deg 0.0 min E.
undefined is located in the Mount Isa Inlier, bioregion(s)



Location of undefined

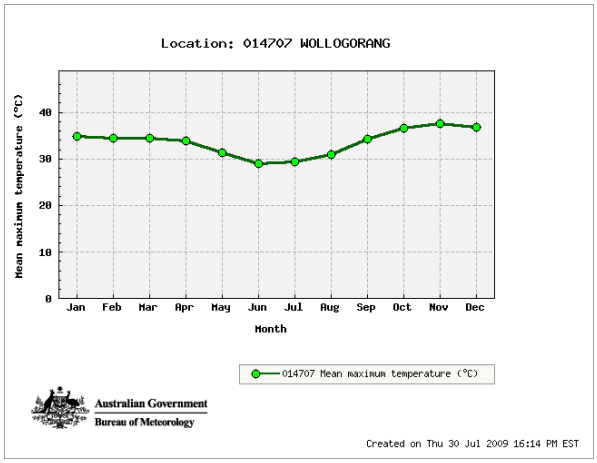


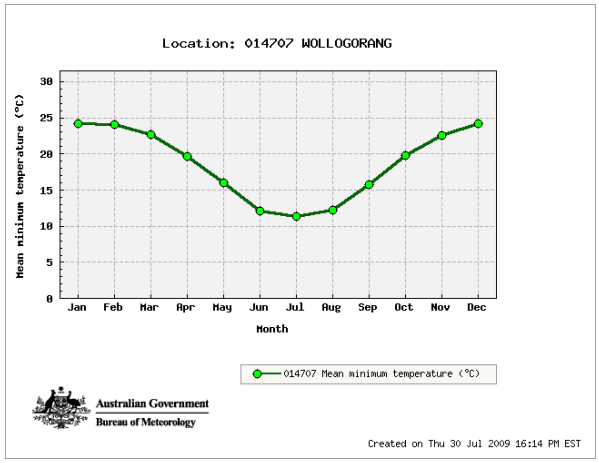
undefined Climate

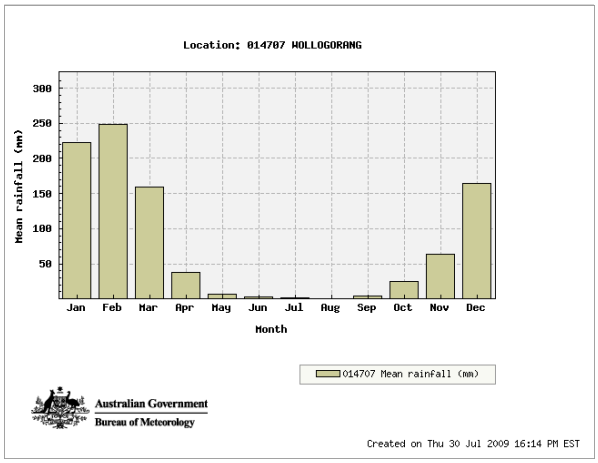
The closest long-term weather station is WOLLOGORANG (17 deg 12.0 min S, 137.9462E) 157 km N of the center of selected area

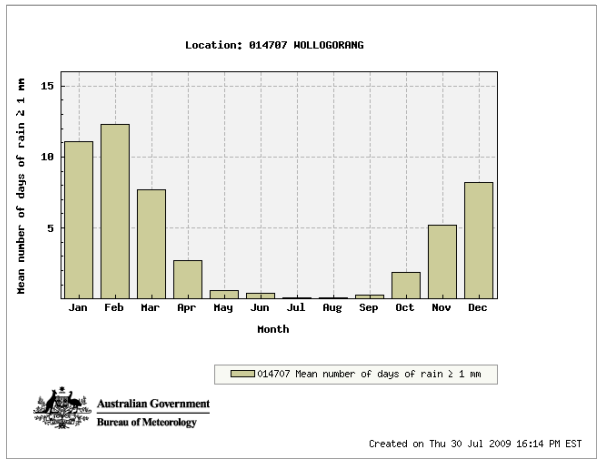
Statistics	Annual Values	Years of record
Mean max temp (deg C)	33.6	26
Mean min temp (deg C)	18.7	26
Average rainfall (mm)	960.0	33
Average days of rain	50.6	33

Climate summaries from Bureau of Meteorology (www.bom.gov.au)









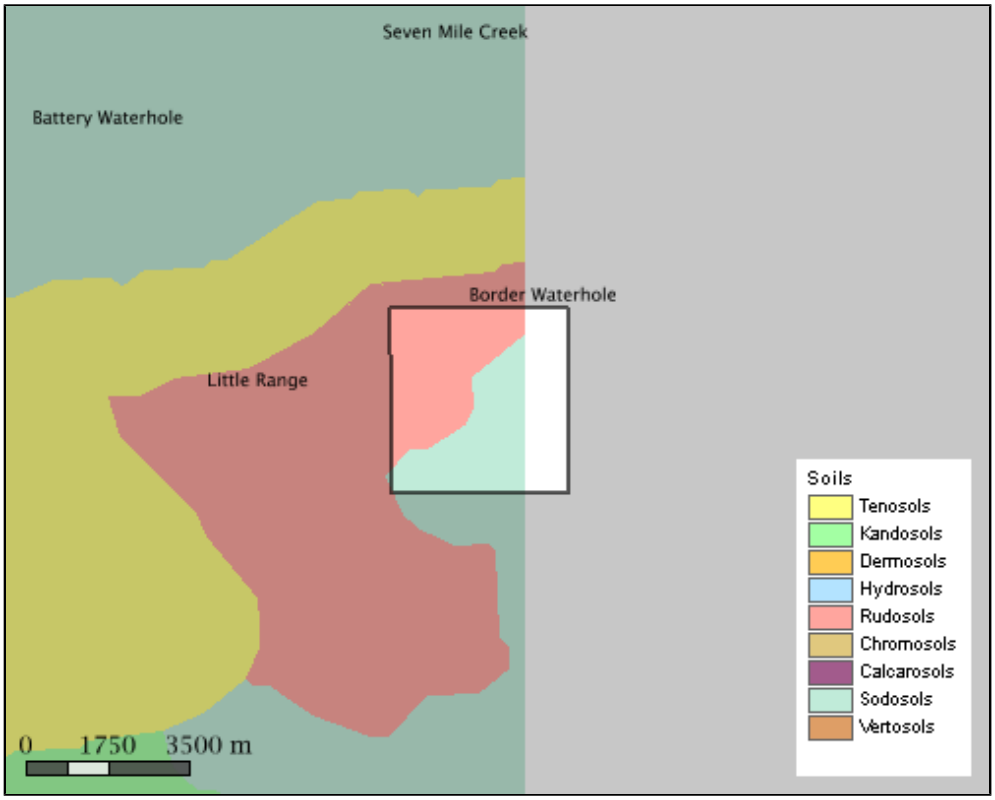
undefined Soils

Soil types

Area of soil types (Northcote Factual Key)

Selected area is too small to produce reliable statistics

Soil Types



Soils 1:2M Layer is a copy of the NT portion (1:2,000,000 scale dataset) of the CSIRO Atlas of Australian Soils - K.H. Northcote et al. Data scale: 1:2,000,000 ANZLIC Identifier: 2DBCB771205D06B6E040CD9B0F274EFE
More details: Go to www.nt.gov.au/nreta/nretamaps/ and enter the ANZLIC identifier in the Spatial Data Search

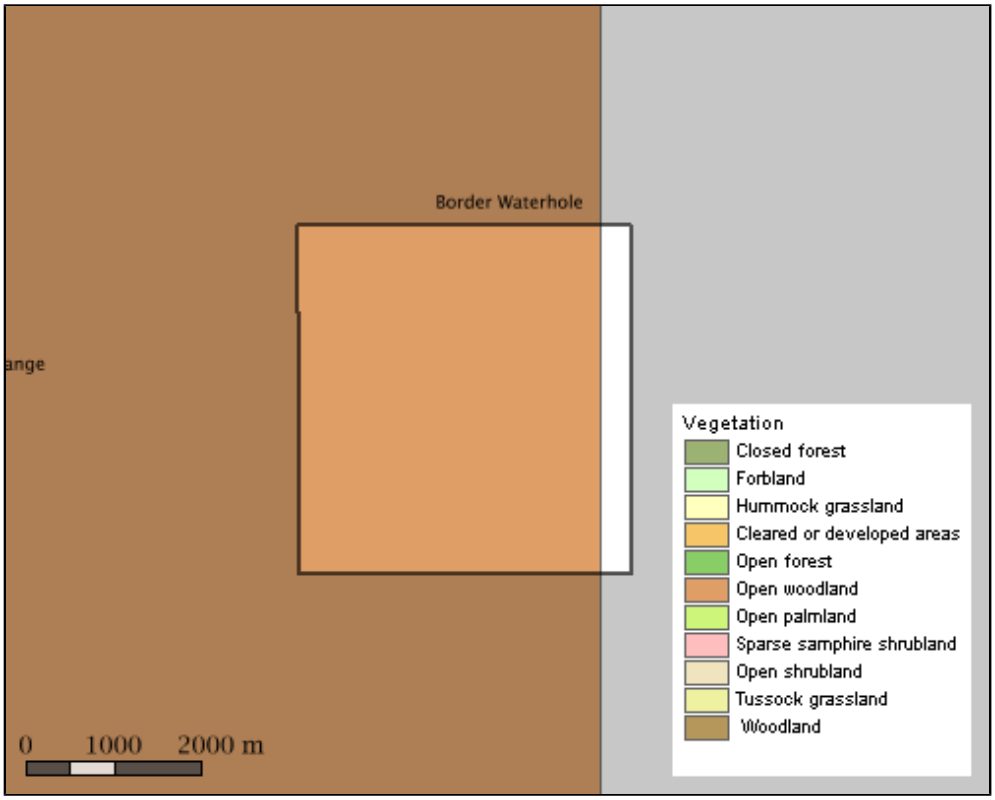
undefined Vegetation

Vegetation types

Selected area is too small to produce reliable statistics

Area of vegetation communities

Vegetation Communities



The NVIS 2005 Layer is compiled from a number of vegetation and land unit survey maps that were recoded and re-attributed for the National Vegetation Information System (NVIS)
Data scale variable depending on location. ANZLIC Identifier:2DBCB771207006B6E040CD9B0F274EFE
More details:Go to www.nt.gov.au/nreta/nretamaps/ and enter the ANZLIC identifier in the Spatial Data Search

undefined Threatened Species

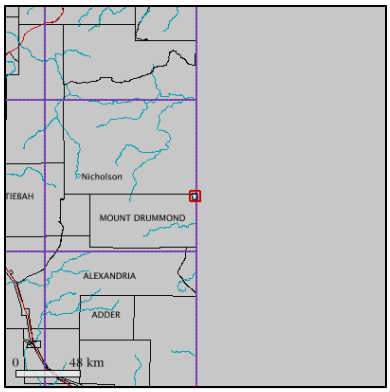
Threatened species recorded in the grid cell(s) in which undefined occurs

Group	Common Name	Scientific Name	NT Status	National Status	ID
Reptiles	Mertens` Water Monitor	*Varanus mertensi*	VU	.	347295
Birds	Emu	*Dromaius novaehollandiae*	VU	.	176363
Birds	Australian Bustard	*Ardeotis australis*	VU	.	176354
Birds	Night Parrot	*Pezoporus occidentalis*	CR	EN	247103

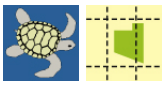
EX = Extinct EW = Extinct in the Wild ER= Extinct in the NT EN = Endangered
EN/VU = One Endangered subspecies/One Vulnerable subspecies
VU=Vulnerable
VU/- = One or more subspecies vulnerable EN/- = One or more subspecies endangered

More species info: Go to www.landmanager.org.au/view/index.aspx?id=####
where #### is the ID number from the tables above for the species of interest.

Species listed in the table above were recorded from all the grid cells shown below (red/blue line) that overlap undefined



undefined Native Animals



Native species that have been recorded in the grid cell(s) in which undefined occurs

Group	Common Name	Scientific Name	NT Status	National Status	ID
Ferns	Climbing Maidenhair Fern	*Lygodium microphyllum*	.	.	.
Ferns	Northern Rock-fern	*Cheilanthes brownii*	.	.	.
Ferns	Fern	*Cheilanthes pumilio*	.	.	.
Flowering Plants	Giant Waterlily	*Nymphaea gigantea*	.	.	.
Flowering Plants	Waterlily	*Nymphaea macrosperma*	.	.	.
Flowering Plants	Blue Waterlily	*Nymphaea violacea*	.	.	.
Flowering Plants	Hairy Dodder-laurel	*Cassytha filiformis*	.	.	.
Flowering Plants	Caldesia	*Caldesia oligococca var. oligococca*	.	.	.
Flowering Plants	Blyxia	*Blyxa aubertii var. aubertii*	.	.	.
Flowering Plants	Floating Pondweed	*Potamogeton tricarinatus*	.	.	.
Flowering Plants	Iphigenia	*Iphigenia indica*	.	.	.
Flowering Plants	River Pandanus	*Pandanus aquaticus*	.	.	.
Flowering Plants	Mataranka Fan Palm	*Livistona mariae subsp. rigida*	.	.	.
Flowering Plants	Arda	*Cartonema parviflorum*	.	.	.
Flowering Plants	Commelina	*Commelina agrostophylla*	.	.	.
Flowering Plants	Wandering Jew	*Commelina ensifolia*	.	.	.
Flowering Plants	Monochoria	*Monochoria cyanea*	.	.	.
Flowering Plants	Centrolepis	*Centrolepis exserta*	.	.	.
Flowering Plants	Short-leaved Rush	*Bulbostylis barbata*	.	.	.
Flowering Plants	Downs Nutgrass	*Cyperus bifax*	.	.	.
Flowering Plants	Bunchy Sedge	*Cyperus polystachyos*	.	.	.
Flowering Plants	Button Rush	*Lipocarpha microcephala*	.	.	.
Flowering Plants	Soft Twig-rush	*Baumea rubiginosa*	.	.	.
Flowering Plants	Cone Umbrella Rush	*Cyperus conicus*	.	.	.
Flowering Plants	Sedge	*Cyperus crispulus*	.	.	.
Flowering Plants	Sedge	*Cyperus dactylotes*	.	.	.
Flowering Plants	Dirty Dora	*Cyperus difformis*	.	.	.
Flowering Plants	Small Umbrella Rush	*Cyperus haspan*	.	.	.
Flowering Plants	Umbrella Rush	*Cyperus holoschoenus*	.	.	.
Flowering Plants	Rice Flat Sedge	*Cyperus iria*	.	.	.
Flowering Plants	Dwarf Sedge	*Cyperus pygmaeus*	.	.	.
Flowering Plants	Sedge	*Cyperus sexflorus*	.	.	.
Flowering Plants	Pale Spike-Rush	*Eleocharis pallens*	.	.	.
Flowering Plants	Fringe-Rush	*Fimbristylis ammobia*	.	.	.
Flowering Plants	Fringe-Rush	*Fimbristylis depauperata*	.	.	.
Flowering Plants	Fringe-Rush	*Fimbristylis littoralis var. littoralis*	.	.	.
Flowering Plants	Fringe-Rush	*Fimbristylis microcarya*	.	.	.
Flowering Plants	Iukarrara	*Fimbristylis oxystachya*	.	.	.
Flowering Plants	Fringe-Rush	*Fimbristylis tetragona*	.	.	.
Flowering Plants	Fringe-Rush	*Fimbristylis tristachya*	.	.	.
Flowering Plants	Small Club Rush	*Fuirena ciliaris*	.	.	.
Flowering Plants	Star Sedge	*Rhynchospora pterochaeta*	.	.	.
Flowering Plants	Inland Club-Rush	*Schoenoplectus dissachanthus*	.	.	.
Flowering Plants	Sedge	*Scleria brownii*	.	.	.
Flowering Plants	Mildrop Sedge	*Scleria rugosa*	.	.	.
Flowering Plants	Hatpins	*Eriocaulon cinereum*	.	.	.
Flowering Plants	Hatpins	*Eriocaulon pygmaeum*	.	.	.
Flowering Plants	Cockatoo Grass	*Alloteropsis semialata*	.	.	451013
Flowering Plants	Feathertop Wiregrass	*Aristida latifolia*	.	.	.
Flowering Plants	Gulf Feathertop Wiregrass	*Aristida pruinosa*	.	.	.
Flowering Plants	Barley Mitchell Grass	*Astrebla pectinata*	.	.	.
Flowering Plants	Bull Mitchell Grass	*Astrebla squarrosa*	.	.	.
Flowering Plants	River Grass	*Chionachne cyathopoda*	.	.	.
Flowering Plants	Curly Bluegrass	*Dichanthium fecundum*	.	.	.
Flowering Plants	Comb Finger Grass	*Digitaria ctenantha*	.	.	.
Flowering Plants	Spike Lovegrass	*Eragrostis confertiflora*	.	.	.
Flowering Plants	Clustered Lovegrass	*Eragrostis elongata*	.	.	.
Flowering Plants	Delicate Lovegrass	*Eragrostis tenellula*	.	.	.
Flowering Plants	Silky Browntop	*Eulalia aurea*	.	.	.
Flowering Plants	Red Flinders Grass	*Iseilema vaginiflorum*	.	.	.
Flowering Plants	Comet Grass	*Perotis rara*	.	.	.

Group	Common Name	Scientific Name	NT Status	National Status	ID
Flowering Plants	Pigeon Grass	*Setaria apiculata*	.	.	.
Flowering Plants	Plume Sorghum	*Sorghum plumosum*	.	.	.
Flowering Plants	Fairy Grass	*Sporobolus caroli*	.	.	.
Flowering Plants	Kangaroo Grass	*Themeda triandra*	.	.	.
Flowering Plants	Goose Grass	*Acrachne racemosa*	DD	.	.
Flowering Plants	Dark Wiregrass	*Aristida calycina var. calycina*	.	.	.
Flowering Plants	Bunched Kerosene Grass	*Aristida contorta*	.	.	.
Flowering Plants	Wire Grass	*Aristida exserta*	.	.	.
Flowering Plants	Northern Kerosene Grass	*Aristida hygrometrica*	.	.	.
Flowering Plants	Unequal Threeawn	*Aristida inaequiglumis*	.	.	.
Flowering Plants	Wire Grass	*Aristida ingrata*	.	.	.
Flowering Plants	Reed Grass	*Arundinella setosa*	.	.	.
Flowering Plants	Forest Bluegrass	*Bothriochloa bladhii subsp. bladhii*	.	.	.
Flowering Plants	Native Couch	*Brachyachne ambigua*	.	.	.
Flowering Plants	Spider Grass	*Brachyachne convergens*	.	.	.
Flowering Plants	Hairy Ribbon Grass	*Chionachne hubbardiana*	.	.	.
Flowering Plants	Golden-beard Grass	*Chrysopogon fallax*	.	.	.
Flowering Plants	Silky Oilgrass	*Cymbopogon bombycinus*	.	.	.
Flowering Plants	Silkyheads	*Cymbopogon obtectus*	.	.	.
Flowering Plants	Queensland Bluegrass	*Dichanthium sericeum*	.	.	.
Flowering Plants	Tassel Bluegrass	*Dichanthium sericeum subsp. polystachyum*	.	.	.
Flowering Plants	Silky Bluegrass	*Dichanthium sericeum subsp. sericeum*	.	.	.
Flowering Plants	Crab Grass	*Digitaria breviglumis*	.	.	.
Flowering Plants	Northern Channel Millet	*Echinochloa turneriana*	.	.	.
Flowering Plants	Haresfoot Grass	*Ectrosia leporina*	.	.	.
Flowering Plants	Spike-grass	*Elytrophorus spicatus*	.	.	.
Flowering Plants	Nine-awn Grass	*Enneapogon eremophilus*	.	.	.
Flowering Plants	Wiry Nine-awn	*Enneapogon lindleyanus*	.	.	.
Flowering Plants	Rock Nine-awn	*Enneapogon oblongus*	.	.	.
Flowering Plants	Leafy Nine-awn	*Enneapogon polyphyllus*	.	.	.
Flowering Plants	Purple Nineawn	*Enneapogon purpurascens*	.	.	.
Flowering Plants	Nine-awn Grass	*Enneapogon robustissimus*	DD	.	.
Flowering Plants	Curly Windmill Grass	*Enteropogon acicularis*	.	.	.
Flowering Plants	Cuming`s Lovegrass	*Eragrostis cumingii*	.	.	.
Flowering Plants	Spreading Love-Grass	*Eragrostis desertorum*	.	.	.
Flowering Plants	Lovegrass	*Eragrostis fallax*	.	.	.
Flowering Plants	Neverfail Grass	*Eragrostis setifolia*	.	.	.
Flowering Plants	Slender Wanderrie	*Eriachne ciliata*	.	.	.
Flowering Plants	Mountain Wanderrie	*Eriachne mucronata*	.	.	.
Flowering Plants	Plains Wanderrie	*Eriachne nervosa*	.	.	.
Flowering Plants	Northern Wanderrie	*Eriachne obtusa*	.	.	.
Flowering Plants	Silky Browntop	*Eulalia mackinlayi*	.	.	.
Flowering Plants	Black Speargrass	*Heteropogon contortus*	.	.	.
Flowering Plants	Ischaemum	*Ischaemum australe var. australe*	.	.	.
Flowering Plants	Flinders Grass	*Iseilema fragile*	.	.	.
Flowering Plants	Scented Flinders Grass	*Iseilema windersii*	.	.	.
Flowering Plants	Australian Millet	*Panicum decompositum*	.	.	.
Flowering Plants	Pepper Grass	*Panicum laevinode*	.	.	.
Flowering Plants	Native Panic	*Panicum mindanaense*	.	.	.
Flowering Plants	Bunch Paspalidium	*Paspalidium rarum*	.	.	.
Flowering Plants	Spiny Mudgrass	*Pseudoraphis spinescens*	.	.	.
Flowering Plants	Fire Grass	*Schizachyrium fragile*	.	.	.
Flowering Plants	White Grass	*Sehima nervosum*	.	.	.
Flowering Plants	Queensland Pigeon Grass	*Setaria queenslandica*	.	.	.
Flowering Plants	Brown`s Pigeon Grass	*Setaria surgens*	.	.	.
Flowering Plants	Thaumastochloa	*Thaumastochloa pubescens*	.	.	.
Flowering Plants	Curly Spinifex	*Triodia bitextura*	.	.	.
Flowering Plants	Soft Spinifex	*Triodia pungens*	.	.	.
Flowering Plants	Five-minute Grass	*Tripogon loliiformis*	.	.	.
Flowering Plants	Hairy-edged Armgrass	*Urochloa gilesii subsp. gilesii*	.	.	.
Flowering Plants	Hairy Armgrass	*Urochloa piligera*	.	.	.
Flowering Plants	Large Armgrass	*Urochloa praetervisa*	.	.	.
Flowering Plants	Desert Flinders Grass	*Yakirra australiensis var. australiensis*	.	.	.
Flowering Plants	Yakirra	*Yakirra majuscula*	.	.	.
Flowering Plants	Cumbungi	*Typha domingensis*	.	.	.
Flowering Plants	Hatpins	*Xyris complanata*	.	.	.

Group	Common Name	Scientific Name	NT Status	National Status	ID
Flowering Plants	Rock Grevillea	*Grevillea heliosperma*	.	.	.
Flowering Plants	Dryander`s Grevillea	*Grevillea dryandri*	.	.	.
Flowering Plants	Silver Grevillea	*Grevillea parallela*	.	.	.
Flowering Plants	Fern-leaved Grevillea	*Grevillea pteridifolia*	.	.	.
Flowering Plants	Silver-leaved Grevillea	*Grevillea refracta*	.	.	.
Flowering Plants	Silver-leaved Grevillea	*Grevillea refracta subsp. refracta*	.	.	.
Flowering Plants	Western Beefwood	*Grevillea striata*	.	.	.
Flowering Plants	Holly Grevillea	*Grevillea wickhamii*	.	.	.
Flowering Plants	Holly Grevillea	*Grevillea wickhamii subsp. aprica*	.	.	.
Flowering Plants	Yellow Hakea	*Hakea arborescens*	.	.	.
Flowering Plants	Milky Plum	*Persoonia falcata*	.	.	.
Flowering Plants	Snake Vine	*Tinospora smilacina*	.	.	.
Flowering Plants	Red Spinach	*Trianthema triquetra*	.	.	.
Flowering Plants	Climbing Saltbush	*Einadia nutans*	.	.	.
Flowering Plants	Rolypoly	*Salsola tragus*	.	.	.
Flowering Plants	Native Amaranth	*Amaranthus interruptus*	.	.	.
Flowering Plants	Prickly Chaff Flower	*Achyranthes aspera*	.	.	.
Flowering Plants	Hairy Joyweed	*Alternanthera nana*	.	.	.
Flowering Plants	Amaranth	*Amaranthus cochleitepalus*	.	.	.
Flowering Plants	Gomphrena	*Gomphrena breviflora*	.	.	.
Flowering Plants	Batchelor`s Buttons	*Gomphrena canescens*	.	.	.
Flowering Plants	Batchelor`s Buttons	*Gomphrena canescens subsp. canescens*	.	.	.
Flowering Plants	Gomphrena Weed	*Gomphrena diffusa subsp. arenicola*	.	.	.
Flowering Plants	Gomphrena Weed	*Gomphrena flaccida*	.	.	.
Flowering Plants	Gomphrena	*Gomphrena lanata*	.	.	.
Flowering Plants	Tassel Top	*Ptilotus clementii*	.	.	.
Flowering Plants	Mulla Mulla	*Ptilotus corymbosus*	.	.	.
Flowering Plants	Pink Mulla Mulla	*Ptilotus exaltatus*	.	.	.
Flowering Plants	Skeleton plant	*Ptilotus fusiformis var. fusiformis*	.	.	.
Flowering Plants	Skeleton plant	*Ptilotus fusiformis var. gracilis*	.	.	.
Flowering Plants	Large Green Pussy-tail	*Ptilotus macrocephalus*	.	.	.
Flowering Plants	Mulla Mulla	*Ptilotus spicatus subsp. leianthus*	.	.	.
Flowering Plants	Copper Plant	*Polycarpaea spirostylis*	.	.	.
Flowering Plants	Polycarpaea	*Polycarpaea corymbosa*	.	.	.
Flowering Plants	Polycarpaea	*Polycarpaea multicaulis*	DD	.	.
Flowering Plants	Narrow-leaved Sundew	*Drosera indica*	.	.	.
Flowering Plants	Hairy Carpet-weed	*Glinus lotoides*	.	.	.
Flowering Plants	Black-soil Tar Vine	*Boerhavia paludosa*	.	.	.
Flowering Plants	Tangled Lignum	*Muehlenbeckia florulenta*	.	.	.
Flowering Plants	Heart Plant	*Portulaca bicolor*	.	.	.
Flowering Plants	Pigweed	*Portulaca decipiens*	.	.	.
Flowering Plants	Pigweed	*Portulaca digyna*	.	.	.
Flowering Plants	Slender Pigweed	*Portulaca filifolia*	.	.	.
Flowering Plants	Munyeroo	*Portulaca oleracea var. Undoolya (R.A.Perry 3267)*	.	.	.
Flowering Plants	Twin-fork Mistletoe	*Amyema bifurcata*	.	.	.
Flowering Plants	Box Mistletoe	*Amyema miquelii*	.	.	.
Flowering Plants	Mistletoe	*Amyema villiflora*	.	.	.
Flowering Plants	Royal Mistletoe	*Diplatia grandibractea*	.	.	.
Flowering Plants	Flat-leaved Mistletoe	*Lysiana spathulata subsp. spathulata*	.	.	.
Flowering Plants	Northern Mistletoe	*Lysiana subfalcata*	.	.	.
Flowering Plants	Plumbush	*Santalum lanceolatum*	.	.	.
Flowering Plants	Bendee	*Terminalia bursarina*	.	.	.
Flowering Plants	Wild Peach	*Terminalia carpentariae*	.	.	.
Flowering Plants	Arid Peach	*Terminalia aridicola*	.	.	.
Flowering Plants	Arid Peach	*Terminalia aridicola subsp. aridicola*	.	.	.
Flowering Plants	Winged Nut Tree	*Terminalia canescens*	.	.	.
Flowering Plants	Jerry-Jerry	*Ammannia multiflora*	.	.	.
Flowering Plants	Rotala	*Rotala mexicana*	.	.	.
Flowering Plants	Native Lasiandra	*Melastoma malabathricum subsp. malabathricum*	.	.	.
Flowering Plants	Liniment Tree	*Asteromyrtus symphyocarpa*	.	.	.
Flowering Plants	Turkey Bush	*Calytrix exstipulata*	.	.	.
Flowering Plants	River Red Gum	*Eucalyptus camaldulensis*	.	.	.

Group	Common Name	Scientific Name	NT Status	National Status	ID
Flowering Plants	Darwin Woollybutt	*Eucalyptus miniata*	.	.	.
Flowering Plants	Northern Swamp Box	*Lophostemon grandiflorus*	.	.	.
Flowering Plants	Coastal Paperbark	*Melaleuca acacioides*	.	.	.
Flowering Plants	Yellow-barked Paperbark	*Melaleuca nervosa*	.	.	.
Flowering Plants	Kerosene Bush	*Calytrix brownii*	.	.	.
Flowering Plants	Rough-leaved Range Gum	*Corymbia aspera*	.	.	.
Flowering Plants	Variable-barked Bloodwood	*Corymbia dichromophloia*	.	.	.
Flowering Plants	Bloodwood	*Corymbia drysdalensis*	.	.	.
Flowering Plants	Rusty Bloodwood	*Corymbia ferruginea*	.	.	.
Flowering Plants	Cabbage Gum	*Corymbia flavescens*	.	.	.
Flowering Plants	Large-leaved Cabbage Gum	*Corymbia grandifolia*	.	.	.
Flowering Plants	Bloodwood	*Corymbia opaca*	.	.	.
Flowering Plants	Long-fruited Bloodwood	*Corymbia polycarpa*	.	.	.
Flowering Plants	Swamp Bloodwood	*Corymbia ptychocarpa*	.	.	.
Flowering Plants	Swamp Bloodwood	*Corymbia ptychocarpa subsp. ptychocarpa*	.	.	.
Flowering Plants	Northern Bloodwood	*Corymbia terminalis*	.	.	.
Flowering Plants	Barkly Coolabah	*Eucalyptus barklyensis*	.	.	.
Flowering Plants	Northern River Red Gum	*Eucalyptus camaldulensis var. obtusa*	.	.	.
Flowering Plants	Greenleaf Box	*Eucalyptus chlorophylla subsp. chlorophylla*	.	.	.
Flowering Plants	Snappy Gum	*Eucalyptus leucophloia subsp. euroa*	.	.	.
Flowering Plants	Western Coolibah	*Eucalyptus microtheca*	.	.	.
Flowering Plants	Silver-leaf Box	*Eucalyptus pruinosa*	.	.	.
Flowering Plants	Silver-leaf Box	*Eucalyptus pruinosa subsp. pruinosa*	.	.	.
Flowering Plants	McArthur River Box	*Eucalyptus tectifica*	.	.	.
Flowering Plants	Silver-leaved Paperbark	*Melaleuca argentea*	.	.	.
Flowering Plants	Blue-leaved Paperbark	*Melaleuca dealbata*	.	.	.
Flowering Plants	Weeping Paperbark	*Melaleuca leucadendra*	.	.	.
Flowering Plants	Broad-leaved Paperbark	*Melaleuca viridiflora*	.	.	.
Flowering Plants	Ludwigia	*Ludwigia perennis*	.	.	.
Flowering Plants	Tribulopis	*Tribulopis angustifolia*	.	.	.
Flowering Plants	Yellowberry Bush	*Maytenus cunninghamii*	.	.	.
Flowering Plants	Ulcardo Melon	*Cucumis melo subsp. agrestis*	.	.	.
Flowering Plants	Head-ache Vine	*Mukia maderaspatana*	.	.	.
Flowering Plants	Swamp Wattle	*Acacia dimidiata*	.	.	.
Flowering Plants	Ghost Wattle	*Acacia platycarpa*	.	.	.
Flowering Plants	Lancewood	*Acacia shirleyi*	.	.	.
Flowering Plants	Sensitive Plant	*Neptunia dimorphantha*	.	.	.
Flowering Plants	Needle-leaved Wattle	*Acacia alleniana*	.	.	.
Flowering Plants	Wattle	*Acacia asperulacea*	.	.	.
Flowering Plants	Halls Creek Wattle	*Acacia cowleana*	.	.	.
Flowering Plants	River Wattle	*Acacia difficilis*	.	.	.
Flowering Plants	Wattle	*Acacia elachantha*	.	.	.
Flowering Plants	Wattle	*Acacia hemsleyi*	.	.	.
Flowering Plants	Candelabra Wattle	*Acacia holosericea*	.	.	.
Flowering Plants	Wattle	*Acacia jasperensis*	.	.	.
Flowering Plants	Flat Wattle	*Acacia latifolia*	.	.	.
Flowering Plants	Turpentine Bush	*Acacia lysiphloia*	.	.	.
Flowering Plants	Hill Turpentine	*Acacia monticola*	.	.	.
Flowering Plants	Wattle	*Acacia neurocarpa*	.	.	.
Flowering Plants	Wattle	*Acacia nuperrima*	.	.	.
Flowering Plants	Tabletop Wattle	*Acacia phlebocarpa*	.	.	.
Flowering Plants	Wattle	*Acacia plectocarpa*	.	.	.
Flowering Plants	Wattle	*Acacia retivenea subsp. retivenea*	.	.	.
Flowering Plants	Wattle	*Acacia subternata*	.	.	.
Flowering Plants	Broom Wattle	*Acacia tenuissima*	.	.	.
Flowering Plants	Victoria Wattle	*Acacia victoriae*	.	.	.
Flowering Plants	Wattle	*Acacia wickhamii subsp. parviphyllodinea*	.	.	.
Flowering Plants	Native Sensitive Plant	*Neptunia gracilis*	.	.	.
Flowering Plants	Sensitive Plant	*Neptunia gracilis f. gracilis*	.	.	.
Flowering Plants	One-seeded Sensitive Plant	*Neptunia monosperma*	.	.	.
Flowering Plants	Barklys Wattle	*Vachellia sutherlandii*	.	.	.
Flowering Plants	Butterfly Tree	*Bauhinia cunninghamii*	.	.	.
Flowering Plants	Nicker Bean	*Caesalpinia bonduc*	.	.	.
Flowering Plants	Hairy Cassia	*Chamaecrista absus*	.	.	289214
Flowering Plants	Dwarf Cassia	*Chamaecrista symonii*	.	.	.

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Flowering Plants	Northern Ironwood	*Erythrophleum chlorostachys*	.	.	.
Flowering Plants	Cockroach Bush	*Senna notabilis*	.	.	.
Flowering Plants	Cassia	*Senna oligoclada*	.	.	.
Flowering Plants	Pepper-leaf Senna	*Senna planitiicola*	.	.	.
Flowering Plants	Graceful Cassia	*Senna venusta*	.	.	.
Flowering Plants	Kimberley Horse Poison	*Crotalaria crispata*	.	.	.
Flowering Plants	Trefoil Rattlepod	*Crotalaria medicaginea*	.	.	.
Flowering Plants	Mulga Trefoil	*Tephrosia sphaerospora*	.	.	.
Flowering Plants	Budda Pea	*Aeschynomene indica*	.	.	.
Flowering Plants	Holly-leaved Pea-flower	*Bossiaea bossiaeoides*	.	.	.
Flowering Plants	Grey Rattlepod	*Crotalaria dissitiflora subsp. rugosa*	.	.	.
Flowering Plants	Trefoil Rattlepod	*Crotalaria medicaginea var. neglecta*	.	.	.
Flowering Plants	Rattlepod	*Crotalaria montana var. angustifolia*	.	.	.
Flowering Plants	New Holland Rattlepod	*Crotalaria novae-hollandiae*	.	.	.
Flowering Plants	New Holland Rattlepod	*Crotalaria novae-hollandiae subsp. lasiophylla*	.	.	.
Flowering Plants	Rattlepod	*Crotalaria ramosissima*	.	.	.
Flowering Plants	Wedge-leaved Rattlepod	*Crotalaria retusa*	.	.	289704
Flowering Plants	Verbine	*Cullen balsamicum*	.	.	.
Flowering Plants	Annual Verbine	*Cullen cinereum*	.	.	.
Flowering Plants	Scurf-pea	*Cullen plumosum*	.	.	.
Flowering Plants	Scurf-pea	*Cullen pustulatum*	.	.	.
Flowering Plants	Scurf-pea	*Cullen walkingtonii*	.	.	.
Flowering Plants	Creeping Tick-trefoil	*Desmodium campylocaulon*	.	.	.
Flowering Plants	Tick-trefoil	*Desmodium filiforme*	.	.	.
Flowering Plants	Tick-trefoil	*Desmodium muelleri*	.	.	.
Flowering Plants	Flemingia	*Flemingia pauciflora*	.	.	.
Flowering Plants	Rusty Glycine	*Glycine tomentella*	.	.	.
Flowering Plants	Sticky Indigo	*Indigofera colutea*	.	.	.
Flowering Plants	Native Indigo	*Indigofera linifolia*	.	.	.
Flowering Plants	Birdsville Indigo	*Indigofera linnaei*	.	.	.
Flowering Plants	Forest Indigo	*Indigofera pratensis*	.	.	.
Flowering Plants	Jacksonia	*Jacksonia odontoclada*	.	.	.
Flowering Plants	Red-flower Trefoil	*Lotus cruentus*	.	.	.
Flowering Plants	Native Pea	*Rhynchosia minima*	.	.	.
Flowering Plants	Peabush	*Sesbania benthamiana*	.	.	.
Flowering Plants	Sesbania	*Sesbania brachycarpa*	.	.	.
Flowering Plants	Yellow Pea-bush	*Sesbania cannabina*	.	.	.
Flowering Plants	Yellow Pea-bush	*Sesbania cannabina var. cannabina*	.	.	.
Flowering Plants	Yellow Pea-bush	*Sesbania chippendalei*	.	.	.
Flowering Plants	Templetonia	*Templetonia hookeri*	.	.	.
Flowering Plants	Tephrosia	*Tephrosia brachycarpa*	.	.	.
Flowering Plants	Red Pea-bush	*Tephrosia brachyodon*	.	.	.
Flowering Plants	Tephrosia	*Tephrosia delestangii*	.	.	.
Flowering Plants	Tephrosia	*Tephrosia leptoclada*	.	.	.
Flowering Plants	Tephrosia	*Tephrosia remotiflora*	.	.	.
Flowering Plants	Tephrosia	*Tephrosia sp. OT Station (S.T.Blake 17659)*	.	.	.
Flowering Plants	Tephrosia	*Tephrosia sp. Willowra (G.M.Chippendale 4809)*	.	.	.
Flowering Plants	Maloga Bean	*Vigna lanceolata*	.	.	.
Flowering Plants	Maloga Bean	*Vigna lanceolata var. lanceolata*	.	.	.
Flowering Plants	Mung Bean	*Vigna radiata var. sublobata*	.	.	.
Flowering Plants	Zornia	*Zornia albiflora*	.	.	.
Flowering Plants	Zornia	*Zornia prostrata*	.	.	.
Flowering Plants	Milkwort	*Polygala gabrielae*	DD	.	.
Flowering Plants	Water-fire	*Bergia pedicellaris*	.	.	.
Flowering Plants	Currant Bush	*Antidesma parvifolium*	.	.	.
Flowering Plants	Quinine Bush	*Petalostigma quadriloculare*	.	.	.
Flowering Plants	Breynia	*Breynia cernua*	.	.	.
Flowering Plants	Euphorbia	*Euphorbia alsiniflora*	.	.	.
Flowering Plants	Euphorbia	*Euphorbia biconvexa*	.	.	.
Flowering Plants	Euphorbia	*Euphorbia comans*	.	.	.
Flowering Plants	Native Gypsophila	*Euphorbia mitchelliana*	.	.	.
Flowering Plants	Euphorbia	*Euphorbia petala*	.	.	.
Flowering Plants	White Currant	*Flueggea virosa subsp. melanthesoides*	.	.	.

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Flowering Plants	Leptopus	*Leptopus decaisnei*	.	.	.
Flowering Plants	Quinine Bush	*Petalostigma nummularium*	.	.	.
Flowering Plants	Phyllanthus	*Phyllanthus exilis*	.	.	.
Flowering Plants	Phyllanthus	*Phyllanthus maderaspatensis var. angustifolius*	.	.	.
Flowering Plants	Striped Seed Plant	*Sebastiania chamaelea*	.	.	.
Flowering Plants	Kerosene Wood	*Erythroxylum ellipticum*	.	.	.
Flowering Plants	Blue Spade Flower	*Hybanthus enneaspermus subsp. enneaspermus*	.	.	.
Flowering Plants	Rock Fig	*Ficus platypoda*	.	.	.
Flowering Plants	Sandpaper Fig	*Ficus aculeata var. aculeata*	.	.	.
Flowering Plants	Small-leaved Rock Fig	*Ficus brachypoda*	.	.	.
Flowering Plants	Fig	*Ficus cerasicarpa*	.	.	.
Flowering Plants	Supplejack	*Ventilago viminalis*	.	.	.
Flowering Plants	Red Ash	*Alphitonia excelsa*	.	.	.
Flowering Plants	Celtis	*Celtis philippensis*	.	.	.
Flowering Plants	Peach-leaved Poison-bush	*Trema tomentosa*	.	.	.
Flowering Plants	Peach-leaved Poison-bush	*Trema tomentosa var. aspera*	.	.	.
Flowering Plants	Split-arse-jack	*Capparis lasiantha*	.	.	.
Flowering Plants	Spiderflower	*Cleome cleomoides*	.	.	.
Flowering Plants	Spiderflower	*Cleome tetrandra var. tetrandra*	.	.	.
Flowering Plants	Tickweed	*Cleome viscosa*	.	.	.
Flowering Plants	Grubweed	*Corchorus fascicularis*	.	.	.
Flowering Plants	Grubweed	*Corchorus pumilio*	.	.	.
Flowering Plants	Grubweed	*Corchorus sericeus*	.	.	.
Flowering Plants	Flannel Weed	*Corchorus sidoides*	.	.	.
Flowering Plants	Flannel Weed	*Corchorus sidoides subsp. vermicularis*	.	.	.
Flowering Plants	Grubweed	*Corchorus tridens*	.	.	.
Flowering Plants	Emu Berries	*Grewia retusifolia*	.	.	.
Flowering Plants	Burbark	*Triumfetta albida*	.	.	.
Flowering Plants	Burbark	*Triumfetta plumigera*	.	.	.
Flowering Plants	Velvet Hibiscus	*Melhania oblongifolia*	.	.	.
Flowering Plants	Waltheria	*Waltheria indica*	.	.	.
Flowering Plants	Red-flowering Kurrajong	*Brachychiton paradoxus*	.	.	.
Flowering Plants	Native Rosella	*Abelmoschus ficulneus*	.	.	.
Flowering Plants	Native Cotton	*Gossypium australe*	.	.	.
Flowering Plants	Spiny Sida	*Sida spinosa*	.	.	292614
Flowering Plants	Mallow	*Abutilon hannii*	.	.	.
Flowering Plants	Ballerina Hibiscus	*Hibiscus meraukensis*	.	.	.
Flowering Plants	Native Hibiscus	*Hibiscus pentaphyllus*	.	.	.
Flowering Plants	Bladder Ketmia	*Hibiscus trionum var. vesicarius*	.	.	.
Flowering Plants	Sida	*Sida cleisocalyx*	.	.	.
Flowering Plants	Silver Sida	*Sida fibulifera*	.	.	.
Flowering Plants	Sida	*Sida laevis*	.	.	.
Flowering Plants	Shrub Sida	*Sida rohlenae subsp. rohlenae*	.	.	.
Flowering Plants	Red Wax Plant	*Thecanthes punicea*	.	.	.
Flowering Plants	Thecanthes	*Thecanthes sanguinea*	.	.	.
Flowering Plants	Emu Apple	*Owenia vernicosa*	.	.	.
Flowering Plants	Emu Apple	*Owenia acidula*	.	.	.
Flowering Plants	Whitewood	*Atalaya hemiglauca*	.	.	.
Flowering Plants	False Hopbush	*Distichostemon barklyanus*	DD	.	.
Flowering Plants	False Hopbush	*Distichostemon hispidulus*	.	.	.
Flowering Plants	Yellow Hop-bush	*Dodonaea lanceolata var. lanceolata*	.	.	.
Flowering Plants	Balloon Hopbush	*Dodonaea physocarpa*	.	.	.
Flowering Plants	Coonta	*Ehretia saligna*	.	.	.
Flowering Plants	Heliotrope	*Heliotropium plumosum*	.	.	.
Flowering Plants	Heliotrope	*Heliotropium tanythrix*	.	.	.
Flowering Plants	Cattle Bush	*Trichodesma zeylanicum*	.	.	.
Flowering Plants	Conkerberry	*Carissa lanceolata*	.	.	.
Flowering Plants	Milk Bush	*Wrightia saligna*	.	.	.
Flowering Plants	Caustic Vine	*Sarcostemma brevipedicellatum*	DD	.	.
Flowering Plants	Mitre Plant	*Mitrasacme connata*	.	.	.
Flowering Plants	Mitre Plant	*Mitrasacme gentianea*	.	.	.
Flowering Plants	Mitre Plant	*Mitrasacme multicaulis*	.	.	.
Flowering Plants	Bedstraw	*Dentella minutissima*	.	.	.

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Flowering Plants	Native Gardenia	*Gardenia pyriformis subsp. orientalis*	.	.	.
Flowering Plants	Pavetta	*Pavetta rupicola*	.	.	.
Flowering Plants	Canthium	*Psydrax attenuata var. myrmecophila*	.	.	.
Flowering Plants	Buttonweed	*Spermacoce argillacea*	.	.	.
Flowering Plants	Buttonweed	*Spermacoce auriculata*	.	.	.
Flowering Plants	Buttonweed	*Spermacoce dolichosperma*	.	.	.
Flowering Plants	Buttonweed	*Spermacoce pogostoma*	.	.	.
Flowering Plants	Hygrophila	*Hygrophila angustifolia*	.	.	.
Flowering Plants	Flypaper Trap	*Byblis liniflora*	.	.	.
Flowering Plants	Musk Basil	*Basilicum polystachyon*	.	.	.
Flowering Plants	Poison Creeper	*Jasminum calcareum*	.	.	.
Flowering Plants	Stiff Jasmine	*Jasminum molle*	.	.	.
Flowering Plants	Josephinia Burr	*Josephinia eugeniae*	.	.	.
Flowering Plants	Dainty Bush Flower	*Buchnera linearis*	.	.	.
Flowering Plants	Rhamphicarpa	*Rhamphicarpa australiensis*	.	.	.
Flowering Plants	Sticky Bluerod	*Stemodia viscosa*	.	.	.
Flowering Plants	Witchweed	*Striga curviflora*	.	.	.
Flowering Plants	Long-leaved Desert Fuchsia	*Eremophila longifolia*	.	.	.
Flowering Plants	Smooth Spiderbush	*Clerodendrum floribundum*	.	.	.
Flowering Plants	Black Plum	*Vitex glabrata*	.	.	.
Flowering Plants	Creeping Polymeria	*Polymeria ambigua*	.	.	.
Flowering Plants	Grey-vine	*Bonamia media var. media*	.	.	.
Flowering Plants	Bonamia	*Bonamia pannosa*	.	.	.
Flowering Plants	Blue Periwinkle	*Evolvulus alsinoides*	.	.	.
Flowering Plants	Cow-vine	*Ipomoea argillicola*	.	.	.
Flowering Plants	Cow-vine	*Ipomoea brassii*	DD	.	.
Flowering Plants	Cow-vine	*Ipomoea coptica*	.	.	.
Flowering Plants	Small Pink Convolvulus	*Ipomoea eriocarpa*	.	.	.
Flowering Plants	Slender Bindweed	*Ipomoea gracilis*	.	.	.
Flowering Plants	Common Cow-vine	*Ipomoea lonchophylla*	.	.	.
Flowering Plants	Bell Vine	*Ipomoea plebeia*	.	.	.
Flowering Plants	Silky Cow-vine	*Ipomoea polymorpha*	.	.	.
Flowering Plants	Purple-flowered Jungle Creeper	*Jacquemontia paniculata*	.	.	.
Flowering Plants	Potato Vine	*Operculina aequisepala*	.	.	.
Flowering Plants	Morning Vine	*Xenostegia tridentata*	.	.	.
Flowering Plants	Native Thornapple	*Datura leichhardtii*	C	.	289904
Flowering Plants	Bush Tomato	*Solanum chippendalei*	.	.	.
Flowering Plants	Wild Gooseberry	*Physalis angulata*	.	.	291984
Flowering Plants	Solanum	*Solanum eburneum*	.	.	.
Flowering Plants	Solanum	*Solanum melanospermum*	.	.	.
Flowering Plants	Desert Daisy	*Streptoglossa adscendens*	.	.	.
Flowering Plants	Cobbler's Pegs	*Bidens bipinnata*	.	.	288764
Flowering Plants	Daisy	*Blumea saxatilis*	.	.	.
Flowering Plants	Daisy	*Blumea tenella*	.	.	.
Flowering Plants	Yellow Twin Stem	*Flaveria australasica*	.	.	.
Flowering Plants	Cudweed	*Gnaphalium diamantinensis*	.	.	.
Flowering Plants	Daisy	*Hullsia argillicola*	DD	.	.
Flowering Plants	Fruit Salad Bush	*Pterocaulon serrulatum*	.	.	.
Flowering Plants	Fruit Salad Bush	*Pterocaulon serrulatum var. serrulatum*	.	.	.
Flowering Plants	Apple Bush	*Pterocaulon sphacelatum*	.	.	.
Flowering Plants	Spreading Nut-heads	*Sphaeromorphaea australis*	.	.	.
Flowering Plants	Stinkweed	*Streptoglossa bubakii*	.	.	.
Flowering Plants	Sunflower Daisy	*Wedelia asperrima*	.	.	.
Flowering Plants	Silky Goodenia	*Goodenia fascicularis*	.	.	.
Flowering Plants	Bushy Fanflower	*Scaevola ovalifolia*	.	.	.
Flowering Plants	Split-end Goodenia	*Goodenia byrnesii*	.	.	.
Flowering Plants	Goodenia	*Goodenia lamprosperma*	.	.	.
Flowering Plants	Goodenia	*Goodenia odonnellii*	.	.	.
Flowering Plants	Fanflower	*Scaevola amblyanthera var. amblyanthera*	.	.	.
Flowering Plants	Fanflower	*Scaevola glabrata*	.	.	.
Flowering Plants	Wavy Marshwort	*Nymphoides crenata*	.	.	.
Flowering Plants	Water Snowflake	*Nymphoides indica*	.	.	.
Flowering Plants	Desert Triggerplant	*Stylidium desertorum*	.	.	.
Frogs	Spencer`s Frog	*Opisthodon spenceri*	.	.	.
Frogs	Green Tree-frog	*Litoria caerulea*	.	.	.
Frogs	Peter`s Frog	*Litoria inermis*	.	.	.
Frogs	Pale Frog	*Litoria pallida*	.	.	.
Frogs	Roth`s Tree-Frog	*Litoria rothii*	.	.	.

Group	Common Name	Scientific Name	NT Status	National Status	ID
Frogs	Red Tree-frog	*Litoria rubella*	.	.	.
Frogs	Wotjulum Frog	*Litoria wotjulumensis*	.	.	.
Reptiles	Fat-tailed Gecko	*Diplodactylus conspicillatus*	.	.	.
Reptiles	Dwarf Dtella	*Gehyra minuta*	.	.	.
Reptiles	Bynoe`s Gecko	*Heteronotia binoei*	.	.	.
Reptiles	Three-lined Knob-tailed Gecko	*Nephrurus levis*	.	.	.
Reptiles	Beaked Gecko	*Rhynchoedura ornata*	.	.	.
Reptiles	Spiny-tailed Gecko	*Strophurus ciliaris*	.	.	.
Reptiles	Three-Spined Rainbow Skink	*Carlia triacantha*	.	.	.
Reptiles	Leopard Ctenotus	*Ctenotus pantherinus*	.	.	.
Reptiles	Pretty Ctenotus	*Ctenotus pulchellus*	.	.	.
Reptiles	Rock Ctenotus	*Ctenotus saxatilis*	.	.	.
Reptiles	Spalding`s Ctenotus	*Ctenotus spaldingi*	.	.	.
Reptiles	Carpentarian Ctenotus	*Ctenotus striaticeps*	.	.	.
Reptiles	Slender Snake-Eyed Skink	*Proablepharus tenuis*	.	.	.
Reptiles	Common Blue-Tongued Lizard	*Tiliqua scincoides*	DD	.	.
Reptiles	Ring-tailed Dragon	*Ctenophorus caudicinctus*	.	.	.
Reptiles	Military Dragon	*Ctenophorus isolepis*	.	.	.
Reptiles	Central Netted Dragon	*Ctenophorus nuchalis*	.	.	.
Reptiles	Two-Lined Dragon	*Diporiphora bilineata*	.	.	.
Reptiles	Lally`s Two-line Dragon	*Diporiphora lalliae*	.	.	.
Reptiles	Canegrass Dragon	*Diporiphora winneckei*	.	.	.
Reptiles	Gilbert`s Dragon	*Lophognathus gilberti*	.	.	.
Reptiles	Central Bearded Dragon	*Pogona vitticeps*	.	.	.
Reptiles	Ridge-tailed Monitor	*Varanus acanthurus*	.	.	.
Reptiles	Sand Goanna	*Varanus gouldii*	.	.	.
Reptiles	Mertens` Water Monitor	*Varanus mertensi*	VU	.	347295
Reptiles	Mitchell`s Water Monitor	*Varanus mitchelli*	DD	.	.
Reptiles	Spencer`s Monitor	*Varanus spenceri*	DD	.	.
Reptiles	Green Tree Snake	*Dendrelaphis punctulata*	DD	.	.
Reptiles	Little Spotted Snake	*Suta punctata*	.	.	.
Birds	Emu	*Dromaius novaehollandiae*	VU	.	176363
Birds	Stubble Quail	*Coturnix pectoralis*	.	.	.
Birds	Brown Quail	*Coturnix ypsilophora*	.	.	.
Birds	Plumed Whistling-Duck	*Dendrocygna eytoni*	.	.	.
Birds	Pink-eared Duck	*Malacorhynchus membranaceus*	.	.	.
Birds	Green Pygmy-Goose	*Nettapus pulchellus*	.	.	.
Birds	Grey Teal	*Anas gracilis*	.	.	.
Birds	Pacific Black Duck	*Anas superciliosa*	.	.	.
Birds	Hardhead	*Aythya australis*	.	.	.
Birds	Australasian Grebe	*Tachybaptus novaehollandiae*	.	.	.
Birds	Common Bronzewing	*Phaps chalcoptera*	.	.	.
Birds	Flock Bronzewing	*Phaps histrionica*	.	.	.
Birds	Crested Pigeon	*Ocyphaps lophotes*	.	.	.
Birds	Spinifex Pigeon	*Geophaps plumifera*	.	.	.
Birds	Diamond Dove	*Geopelia cuneata*	.	.	.
Birds	Peaceful Dove	*Geopelia striata*	.	.	.
Birds	Tawny Frogmouth	*Podargus strigoides*	.	.	.
Birds	Spotted Nightjar	*Eurostopodus argus*	.	.	.
Birds	Australian Owlet-nightjar	*Aegotheles cristatus*	.	.	.
Birds	Australasian Darter	*Anhinga novaehollandiae*	.	.	.
Birds	Little Pied Cormorant	*Microcarbo melanoleucos*	.	.	.
Birds	Little Black Cormorant	*Phalacrocorax sulcirostris*	.	.	.
Birds	Australian Pelican	*Pelecanus conspicillatus*	.	.	.
Birds	Black-necked Stork	*Ephippiorhynchus asiaticus*	.	.	.
Birds	Black Bittern	*Ixobrychus flavicollis*	DD	.	.
Birds	White-necked Heron	*Ardea pacifica*	.	.	.
Birds	Eastern Great Egret	*Ardea modesta*	.	.	.
Birds	Intermediate Egret	*Ardea intermedia*	.	.	.
Birds	White-faced Heron	*Egretta novaehollandiae*	.	.	.
Birds	Little Egret	*Egretta garzetta*	.	.	.
Birds	Nankeen Night Heron	*Nycticorax caledonicus*	.	.	.
Birds	Australian White Ibis	*Threskiornis molucca*	.	.	.
Birds	Straw-necked Ibis	*Threskiornis spinicollis*	.	.	.
Birds	Royal Spoonbill	*Platalea regia*	.	.	.
Birds	Yellow-billed Spoonbill	*Platalea flavipes*	.	.	.
Birds	Whistling Kite	*Haliastur sphenurus*	.	.	.
Birds	Black Kite	*Milvus migrans*	.	.	.

Group	Common Name	Scientific Name	NT Status	National Status	ID
Birds	Brown Goshawk	*Accipiter fasciatus*	.	.	.
Birds	Collared Sparrowhawk	*Accipiter cirrhocephalus*	.	.	.
Birds	Spotted Harrier	*Circus assimilis*	.	.	.
Birds	Wedge-tailed Eagle	*Aquila audax*	.	.	.
Birds	Nankeen Kestrel	*Falco cenchroides*	.	.	.
Birds	Brown Falcon	*Falco berigora*	.	.	.
Birds	Black Falcon	*Falco subniger*	.	.	.
Birds	Brolga	*Grus rubicunda*	.	.	.
Birds	Eurasian Coot	*Fulica atra*	.	.	.
Birds	Australian Bustard	*Ardeotis australis*	VU	.	176354
Birds	Black-winged Stilt	*Himantopus himantopus*	.	.	.
Birds	Black-fronted Dotterel	*Elseyornis melanops*	.	.	.
Birds	Masked Lapwing	*Vanellus miles*	.	.	.
Birds	Pectoral Sandpiper	*Calidris melanotos*	DD	.	.
Birds	Red-chested Button-quail	*Turnix pyrrhothorax*	.	.	.
Birds	Little Button-quail	*Turnix velox*	.	.	.
Birds	Australian Pratincole	*Stiltia isabella*	.	.	.
Birds	Red-tailed Black-Cockatoo	*Calyptorhynchus banksii*	N	.	223765
Birds	Galah	*Eulophus roseicapilla*	.	.	.
Birds	Little Corella	*Cacatua sanguinea*	.	.	.
Birds	Sulphur-Crested Cockatoo	*Cacatua galerita*	N	.	223772
Birds	Cockatiel	*Nymphicus hollandicus*	.	.	.
Birds	Varied Lorikeet	*Psitteuteles versicolor*	.	.	.
Birds	Red-winged Parrot	*Aprosmictus erythropterus*	.	.	.
Birds	Northern Rosella	*Platycercus venustus*	.	.	.
Birds	Australian Ringneck	*Barnardius zonarius*	.	.	.
Birds	Budgerigar	*Melopsittacus undulatus*	.	.	.
Birds	Night Parrot	*Pezoporus occidentalis*	CR	EN	247103
Birds	Pheasant Coucal	*Centropus phasianinus*	.	.	.
Birds	Horsfield`s Bronze-Cuckoo	*Chalcites basalis*	.	.	.
Birds	Pallid Cuckoo	*Cacomantis pallidus*	.	.	.
Birds	Southern Boobook	*Ninox novaeseelandiae*	.	.	.
Birds	Eastern Barn Owl	*Tyto javanica*	.	.	.
Birds	Blue-winged Kookaburra	*Dacelo leachii*	DD	.	.
Birds	Red-backed Kingfisher	*Todiramphus pyrrhopygius*	.	.	.
Birds	Sacred Kingfisher	*Todiramphus sanctus*	.	.	.
Birds	Rainbow Bee-eater	*Merops ornatus*	.	.	.
Birds	Black-tailed Treecreeper	*Climacteris melanura*	.	.	.
Birds	Great Bowerbird	*Ptilonorhynchus nuchalis*	.	.	.
Birds	Red-backed Fairy-wren	*Malurus melanocephalus*	.	.	.
Birds	Variegated Fairy-wren	*Malurus lamberti*	.	.	.
Birds	Weebill	*Smicrornis brevirostris*	.	.	.
Birds	White-throated Gerygone	*Gerygone albogularis*	.	.	.
Birds	Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	.	.	.
Birds	Red-browed Pardalote	*Pardalotus rubricatus*	.	.	.
Birds	Striated Pardalote	*Pardalotus striatus*	.	.	.
Birds	Singing Honeyeater	*Lichenostomus virescens*	.	.	.
Birds	White-gaped Honeyeater	*Lichenostomus unicolor*	.	.	.
Birds	Grey-headed Honeyeater	*Lichenostomus keartlandi*	.	.	.
Birds	Grey-fronted Honeyeater	*Lichenostomus plumulus*	.	.	.
Birds	Yellow-tinted Honeyeater	*Lichenostomus flavescens*	.	.	.
Birds	Yellow-throated Miner	*Manorina flavigula*	.	.	.
Birds	Bar-breasted Honeyeater	*Ramsayornis fasciatus*	.	.	.
Birds	Rufous-throated Honeyeater	*Conopophila rufogularis*	.	.	.
Birds	Crimson Chat	*Epthianura tricolor*	.	.	.
Birds	Banded Honeyeater	*Cissomela pectoralis*	.	.	.
Birds	Brown Honeyeater	*Lichmera indistincta*	.	.	.
Birds	Black-chinned Honeyeater	*Melithreptus gularis*	.	.	.
Birds	White-throated Honeyeater	*Melithreptus albogularis*	.	.	.
Birds	Silver-crowned Friarbird	*Philemon argenticeps*	.	.	.
Birds	Little Friarbird	*Philemon citreogularis*	.	.	.
Birds	Grey-crowned Babbler	*Pomatostomus temporalis*	.	.	.
Birds	Varied Sittella	*Daphoenositta chrysoptera*	.	.	.
Birds	Ground Cuckoo-shrike	*Coracina maxima*	.	.	.
Birds	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	.	.	.
Birds	White-bellied Cuckoo-shrike	*Coracina papuensis*	.	.	.
Birds	White-winged Triller	*Lalage sueurii*	.	.	.
Birds	Rufous Whistler	*Pachycephala rufiventris*	.	.	.
Birds	Sandstone Shrike-thrush	*Colluricincla woodwardi*	.	.	.
Birds	Grey Shrike-thrush	*Colluricincla harmonica*	.	.	.
Birds	Olive-backed Oriole	*Oriolus sagittatus*	.	.	.
Birds	White-breasted Woodswallow	*Artamus leucorynchus*	.	.	.

Group	Common Name	Scientific Name	NT Status	National Status	ID
Birds	Masked Woodswallow	*Artamus personatus*	.	.	.
Birds	White-browed Woodswallow	*Artamus superciliosus*	.	.	.
Birds	Black-faced Woodswallow	*Artamus cinereus*	.	.	.
Birds	Little Woodswallow	*Artamus minor*	.	.	.
Birds	Pied Butcherbird	*Cracticus nigrogularis*	.	.	.
Birds	Australian Magpie	*Cracticus tibicen*	.	.	.
Birds	Grey Fantail	*Rhipidura albiscapa*	.	.	.
Birds	Willie Wagtail	*Rhipidura leucophrys*	.	.	.
Birds	Australian Raven	*Corvus coronoides*	.	.	.
Birds	Little Crow	*Corvus bennetti*	.	.	.
Birds	Torresian Crow	*Corvus orru*	.	.	.
Birds	Restless Flycatcher	*Myiagra inquieta*	.	.	.
Birds	Magpie-lark	*Grallina cyanoleuca*	.	.	.
Birds	Jacky Winter	*Microeca fascinans*	.	.	.
Birds	Hooded Robin	*Melanodryas cucullata picata/westralensis*	.	.	.
Birds	White-browed Robin	*Poecilodryas superciliosa*	.	.	.
Birds	Singing Bushlark	*Mirafra javanica*	.	.	.
Birds	Golden-headed Cisticola	*Cisticola exilis*	.	.	.
Birds	Rufous Songlark	*Cincloramphus mathewsi*	.	.	.
Birds	Fairy Martin	*Petrochelidon ariel*	.	.	.
Birds	Mistletoebird	*Dicaeum hirundinaceum*	.	.	.
Birds	Zebra Finch	*Taeniopygia guttata*	.	.	.
Birds	Double-barred Finch	*Taeniopygia bichenovii*	.	.	.
Birds	Long-tailed Finch	*Poephila acuticauda*	.	.	.
Birds	Painted Finch	*Emblema pictum*	.	.	.
Birds	Pictorella Mannikin	*Heteromunia pectoralis*	.	.	.
Birds	Australasian Pipit	*Anthus novaeseelandiae*	.	.	.
Mammals	Long-tailed Planigale	*Planigale ingrami*	.	.	.
Mammals	Common Wallaroo	*Macropus robustus*	.	.	.
Mammals	Red Kangaroo	*Macropus rufus*	.	.	.
Mammals	Little Red Flying-fox	*Pteropus scapulatus*	.	.	.
Mammals	Northern Free-tailed Bat	*Chaerephon jobensis*	.	.	.
Mammals	Gould`s Wattled Bat	*Chalinolobus gouldii*	.	.	.
Mammals	Inland Broad-nosed Bat	*Scotorepens balstoni*	.	.	.
Mammals	Central Short-tailed Mouse	*Leggadina forresti*	.	.	.
Mammals	Delicate Mouse	*Pseudomys delicatulus*	.	.	.
Mammals	Western Chestnut Mouse	*Pseudomys nanus*	.	.	.
Mammals	Common Rock-rat	*Zyzomys argurus*	.	.	.
Mammals	Long-haired Rat	*Rattus villosissimus*	.	.	.

EX = Extinct EW = Extinct in the Wild ER= Extinct in the NT EN = Endangered
EN/VU = One Endangered subspecies/One Vulnerable subspecies
VU=Vulnerable
VU/- = One or more subspecies vulnerable EN/- = One or more subspecies endangered

More species info: Go to www.landmanager.org.au/view/index.aspx?id=####
where #### is the ID number from the tables above for the species of interest.

Species listed in the table above were recorded from all the grid cells (red/blue line) shown below that overlap undefined

undefined Weeds and Potential Weeds

Introduced plants recorded in the grid cell(s) in which undefined occurs and that have been identified as problem weeds in one or more locations in northern Australia. Occurence based on Department of Natural Resources, Environment and The Arts databases.

Common Name	Scientific Name	NT Status	National Status	Other Status	ID
Awnless Barnyard Grass	*Echinochloa colona*	.	.	*DEU*	290114
Caribbean Stylo	*Stylosanthes hamata*	.	.	*DEU*	292974
Coffee Senna	*Senna occidentalis*	*B C*	.	*G&M DEU*	292474
Khaki Weed	*Alternanthera pungens*	*B C*	.	*DEU NSW SA*	288354
Native Thornapple	*Datura leichhardtii*	*C*	.	*WA1 WA3 WA4*	289904
Noogoora Burr	*Xanthium strumarium*	*B C*	.	*MP WA1 WA2 WA4 DEU NSW SA*	183498
Sicklepod	*Senna obtusifolia*	*B C*	.	*WA1 WA2 Q2 G&M CYP DEU*	131903
Spiny Sida	*Sida spinosa*	.	.	*DEU*	292614
Ulcardo Melon	*Cucumis melo subsp. melo*	.	.	*DEU*	289734

Status Codes:
1. NATIONAL STATUS CODES
WONS, Weeds of National Significance
Alert, Alert List for Environmental Weeds (Please call Exotic Plant Pest Hotline 1800 084 881 if you think you have seen this weed)
Sleeper, National Sleeper Weed
Target,Targeted for eradication. (www.landmanager.com.au/view/index.aspx?id=449837)

2. NT STATUS CODES
A, NT Class A Weed (to be eradicated)
B, NT Class B Weed (growth & spread to be controlled)
C, NTClass C Weed (not to be introduced) (www.landmanager.com.au/view/index.aspx?id=449869)

3. OTHER STATUS CODES
C&E, Csurhes, S. & Edwards, R. (1998) Potential Environmental Weeds in Australia. Candidate Species for Preventative Control. Environment Australia, Canberra (www.landmanager.com.au/view/index.aspx?id=394504)
CYP, Draft Cape York Peninsula Pest Management Plan 2006-2011 (www.landmanager.com.au/view/index.aspx?id=371200)
DEU, Plants listed as environmental weeds by the Desert Uplands Strategic Land Resource Assessment (www.landmanager.com.au/view/index.aspx?id=332123)
G&M, Grice AC, Martin TG. 2005. The Management of Weeds and Their Impact on Biodiversity in the Rangelands. Cooperative Research Centre (CRC) for Australian Weed Management and CSIRO Sustainable Ecosystems. Commonwealth Australia (www.landmanager.com.au/view/index.aspx?id=163572)
Gr, Groves et al. 2003. Weed categories for natural and agricultural ecosystem management. Bureau of Rural Sciences (www.landmanager.com.au/view/index.aspx?id=388018)
K0, High Priority Weeds not yet established in the Katherine region
K1, High Priority Weeds posing environmental threats in the Katherine region
K2, High Priority Weeds posing existing threats in the Katherine region, as described in the Katherine Regional Weed Management Strategy 2005-2010 (www.landmanager.com.au/view/index.aspx?id=130286)
MP, Northern Territory Parks & Conservation Masterplan (www.landmanager.com.au/view/index.aspx?id=144141)
NAQS, North Australian Quarantine Strategy Target List (www.landmanager.com.au/view/index.aspx?id=449416)
NSW, Declared Noxious Weed in NSW (www.landmanager.com.au/view/index.aspx?id=449983)
Q1, QLD Class 1 Weed (not to be introduced, kept or supplied-
Q2, Class 2 Weed (eradicate where possible, not to be introduced, kept or supplied)
Q3, Qld Class 3 Weed (to be controlled near environmentally sensitive areas- not to be supplied/sold without a permit) (www.landmanager.com.au/view/index.aspx?id=190714)
SA, Declared Plant in South Australia (www.landmanager.com.au/view/index.aspx?id=449996)
WeedsAus, Listed as a significant weed by Weeds Australia (www.landmanager.com.au/view/index.aspx?id=14576)
WA1,WA Weed Class P1 (movement prohibited)
WA2, WA Weed Class P2 (aim to eradicate)
WA3, WA Weed Class P3 (control infestations)
WA4, WA Weed Class P4 (prevent spread)
WA5, WA Weed Class P3 (control infestations on public land) (www.landmanager.com.au/view/index.aspx?id=449884).

More species info: Go to www.landmanager.org.au/view/index.aspx?id=####
where #### is the ID number from the tables above for the species of interest.

Plants listed in the table above were recorded from all the grid cells shown below (red/blue line) that overlap undefined

undefined Pest and Potential Pest Animals

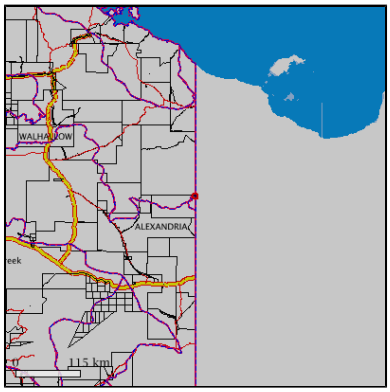
Animals with pest potential recorded in the bioregion(s) in which undefined occurs. Occurence based on Department of Natural Resources, Environment and The Arts databases.

Common Name	Scientific Name	NT Status	National Status	ID
Cane Toad	*Chaunus marinus*	P	.	183252
Asian House Gecko	*Hemidactylus frenatus*	P	.	188964
Rock Dove	*Columba livia*	P	.	183336
Red-tailed Black-Cockatoo	*Calyptorhynchus banksii*	N	.	223765
Sulphur-Crested Cockatoo	*Cacatua galerita*	N	.	223772
Agile Wallaby	*Macropus agilis*	N	.	223786
House Mouse	*Mus musculus*	P	.	187720
Black Rat	*Rattus rattus*	P	.	183236
Dingo / Wild dog	*Canis lupus*	N	.	183280
Cat	*Felis catus*	P	.	183259
Donkey	*Equus asinus*	P	.	183287
Horse	*Equus caballus*	P	.	183315
Pig	*Sus scrofa*	P	.	183329
Swamp Buffalo	*Bubalus bubalis*	P	.	183245
Cattle	*Bos indicus / Bos taurus*	P	.	183266

NT STATUS CODES:
P, Prohibited species (all exotic vertebrates except those listed as non-prohibited (www.landmanager.com.au/view/index.aspx?id=450509)
Int, Introduced species (all non-prohibited vertebrates, and all other exotic species (www.landmanager.com.au/view/index.aspx?id=280771)
N, Native species with pest potential.

More species info: Go to www.landmanager.org.au/view/index.aspx?id=####
where #### is the ID number from the tables above for the species of interest.

Potential pest animals listed in the table above were recorded from the bioregions shown below (red/blue line) that overlap undefined



Generated from NT Infonet (http://www.infonet.cdu.edu.au/nrm) Tue Aug 11 16:47:37 GMT+09:30 2009

Graphs refer to land area only. Please note that calculations are made on the basis of map unit extent, and should be taken as a guide only. Accuracy cannot be guaranteed. For small areas, figures should be rounded to the nearest whole number.

Appendix B: Flora and Fauna Field Survey Reports

Dry Season Survey September 2009
Wet Season Survey April 2010

Flora and Fauna
Survey and Study Results for
Highland Plains Phosphate Project

October 2009

Prepared for: **Phosphate Australia Limited**

Prepared by: **EcOz Environmental Services**

DOCUMENT CONTROL

Project number:	POZ_0901
File ref:	\\audrwbos01\vbmdata$\Data\NT Darwin\Data_Repository\C Environmental Design\Folder 1\D000001058 0002 A.docx
Report by:	Kate Bauer

Date:	Revision Status:	Reviewed and approved for distribution by:	Document distribution
5/11/2009	Draft	Tom Reilly	Phosphate Australia
30/11/2009	Draft	Lisa Wells	EcOz
03/11/2009	Final Draft	Ray Hall	Phosphate Australia
22/02/2010	Final	Lisa Wells	Phosphate Australia

RELIANCE STATEMENT AND USES

LIMITATIONS

This study, report and analyses have been based on the information available to EcOz at the time of the study. EcOz accepts responsibility for the report and its conclusions to the extent that the information was sufficient and accurate. EcOz does not take responsibility for errors and omissions due to incorrect information or information not available to EcOz at the time of the study.

EXECUTIVE SUMMARY

Introduction

The results of field surveys conducted in October 2009 have been combined with desktop study results to provide the following information on the Highland Plains Phosphate Project, granted tenement EL25068, which is located approximately 140 km north of the town of Camooweal, or 230 km south of the Gulf on the NT/QLD border.

Phosphate Australia Limited have been exploring phosphate resources within the 'project area' (tenement EL25068), and plan to continue doing so. EcOz (of the VDM Consulting Group) were commissioned to undertake a flora and fauna field survey of the project area in order to increase available flora and fauna baseline data, and to inform environmental management procedures.

The following report discusses both desktop study (to which EcOz was commissioned in August 2009) results and field survey results.

Methodology

Particular attention has been paid to the area within the project area that is high in phosphate, and thus a likely impact area should mining be undertaken in the future. Particular attention was also paid to species of current or potential conservation significance.

Field surveys were conducted over three days and three nights, involving trapping and searching at six 50 metre square quadrats purposely located within a variety of habitat types. Survey and trapping methodology was in accordance with standard, best practice methodology used within the Top End of the Northern Territory. Incidental sightings of fauna within the project area were recorded in addition to trapping and search data. Searches were also conducted briefly at the nearby Border Waterhole under the assumption that fauna species here were likely to range into the project area when water is more readily available.

Results and Discussion

The surveys were conducted in early October, the driest time of year (end of the dry season) at Highland Plains, which is latitudinally located such that it is influenced by both tropical and arid climates. The nearest available water to the survey quadrats was heavily impacted by cattle and approximately 1.8 kilometres from the closer quadrats; Quadrats 1 and 2, and over 3.4 kilometres from the further quadrats; Quadrats 5 and 6 (closer water sources undetected during the survey period may be available to some fauna species).

Buffel Grass *Cenchrus ciliaris*, an introduced species within the NT that has the potential to alter fire regimes, was scattered throughout Quadrats 2, 3, 5 and 6 at the time of survey.

Live frogs and small mammals were not recorded during the survey, which is likely to be a result of the dry conditions and relatively long distances to water. A reasonable diversity of birds and reptiles were recorded during the survey period.

The only native mammal species recorded within the project area were Dingo and Red Kangaroo. Searches and scat analysis of the Border Waterhole (just north of the project area and 2.4 km north of Quadrats 1 and 2) revealed three additional mammal species and several additional bird species.

Matters of Conservation Significance

The only species of current conservation significance recorded during the survey was the **Australian Bustard** *Ardeotis australis*. This large bird is considered vulnerable under Northern Territory legislation. These birds, however, are quite mobile, utilise a range of habitats, and are common within the region. The sightings within the project area were all outside, and to the south of the potential impact area.

Though not recorded within the area, desktop research has indicated that there is a chance that **Gouldian Finch** *Erythrura gouldiae* will utilise the north-eastern corner of the project area during the dry season.

Several species of conservation significance, including the **Gulf Snapping Turtle** (Endangered), the **Freshwater Sawfish** (Vulnerable), and the **Merten's Water Monitor** (Vulnerable) may inhabit watercourses downstream of the ephemeral waterways within the project area.

Other species that may become threatened in the future whose presence was confirmed through surveys, or deemed likely through desktop research, include:

- **Gravelly Soil Ctenotus** *Ctenotus lateralis* (Data Deficient); and
- **Long-haired Rat** *Rattus villosissimus* (Near Threatened).

Limitations

Several limitations affect standard fauna surveys such as these, the most pertinent to this survey involving timing during extremely dry conditions. It is possible that fauna species that could reside in the vicinity of the survey quadrats during wetter months had migrated closer to available water sources. It is also possible that some species, particularly amphibians, were harder to find during active searches because they were conserving their own water stores by remaining inactive and / or buried underground.

Conclusion and Recommendations

The project area is unlikely to provide critical habitat for any species of conservation significance, even at times when water is more readily available.

Phosphate Australia and any future project area managers should minimise the spread of Buffel Grass and any other introduced species through exploration and mining activities wherever possible.

At this point, no exploration is carried out in waterways. In the event that phosphate mining commences in the future, mitigation and management of issues such as sedimentation and pollution must be practiced near the ephemeral watercourses of the project area such that species of conservation significance that may inhabit downstream waters are not adversely impacted when the waterways flow during the wet season.

We recommend managing to ensure wildfires are not started through exploration or mining activities on the lease. Phosphate Australia is currently limited in the actions that it can take to influence environmental and land management issues other than those that may be impacted by their exploratory activities. The pastoral lease holder or indigenous landholder is the only person with the rights to manage fire regimes. Land management responsibilities will upscale to a certain degree should the area become a mining lease in the future.

TABLE OF CONTENTS

Cover Photographs: Clockwise from upper left: Habitat within the project area; Red-backed Kingfisher; Fat-tailed Gecko *Diplodactylus conspicillatus*; Gravelly Soil Ctenotus *Ctenotus lateralis* and Red Kangaroo *Macropus rufus* (centre).

TABLES

FIGURES

APPENDICES

ACKNOWLEGEMENTS

We would like to thank Maurice of Phosphate Australia for orientating us to the site and his diligent assistance with digging pit trap holes into rock and clay. Utmost appreciation to Sarah (also of Phosphate Australia) for making us so welcome at the camp, ensuring our safety, and attending to our every need. Sincere thanks to Caroline, the best camp cook we have ever come across, for maintaining our blood sugar levels. Thanks also to the 'Drill Crew' who alerted us to the friendly dragon and thus increased the recorded reptile diversity at the tenement.

1 INTRODUCTION

In late July 2009, Phosphate Australia contracted VDM Consulting EcOz to conduct a desktop flora and fauna study over the tenement area. In September 2009, Phosphate Australia also requested a field flora and fauna survey over the same tenement area. The results of both the desktop study and field survey are presented in this report. The tenement area is hereafter referred to as the Highland Plains Phosphate Project area, or the 'project area'.

The Highland Plains Phosphate Project consists of one granted tenement, EL25068 which occurs on the NT/QLD border, around 140 km north of where the Barkley Highway crosses the border (nearby to the town of Camooweal). The area of tenement EL25068 is just over 16 square kilometres.

Most of the NT side of the tenement area is within Mount Drummond pastoral property, land which also has a Native Title claim of the same name (Mount Drummond). The QLD side of the tenement area overlaps with the Waanyi Peoples Native Title claim.

1.1 Study Objectives

Phosphate Australia plan to explore available phosphate resources within the tenement area (refer to **Error! Reference source not found.Error! Reference source not found.**). The objective of the flora and fauna desktop and field studies is to gather baseline data (prior to potential impact) on the flora and fauna species, including introduced species, that inhabit the project area. Particular attention is paid to species of conservation significance that are recorded, or have the potential to reside within the project area. Phosphate Australia's focus on species or habitats of conservation significance is a result of the commitments within their Environmental Management Plan to comply with Commonwealth law (*Environment Protection and Biodiversity Conservation Act 1999 – EPBC Act*).

Under the *EPBC Act*, a person must not take an action that:

(a) has or will have a significant impact on a listed threatened species included in the Extinct, Critically endangered, Endangered species, Vulnerable species, Critically endangered communities or Endangered communities in the wild category; or

(b) is likely to have a significant impact on a listed threatened species included in the Extinct, Critically endangered, Endangered species, Vulnerable species, Critically endangered communities or Endangered communities in the wild category.

Species identified through this study that are confirmed to inhabit the area, or are identified as potentially occurring in the area, must be considered in environmental management of the project area. These species are listed in **Table 8**, along with their habitat requirements.

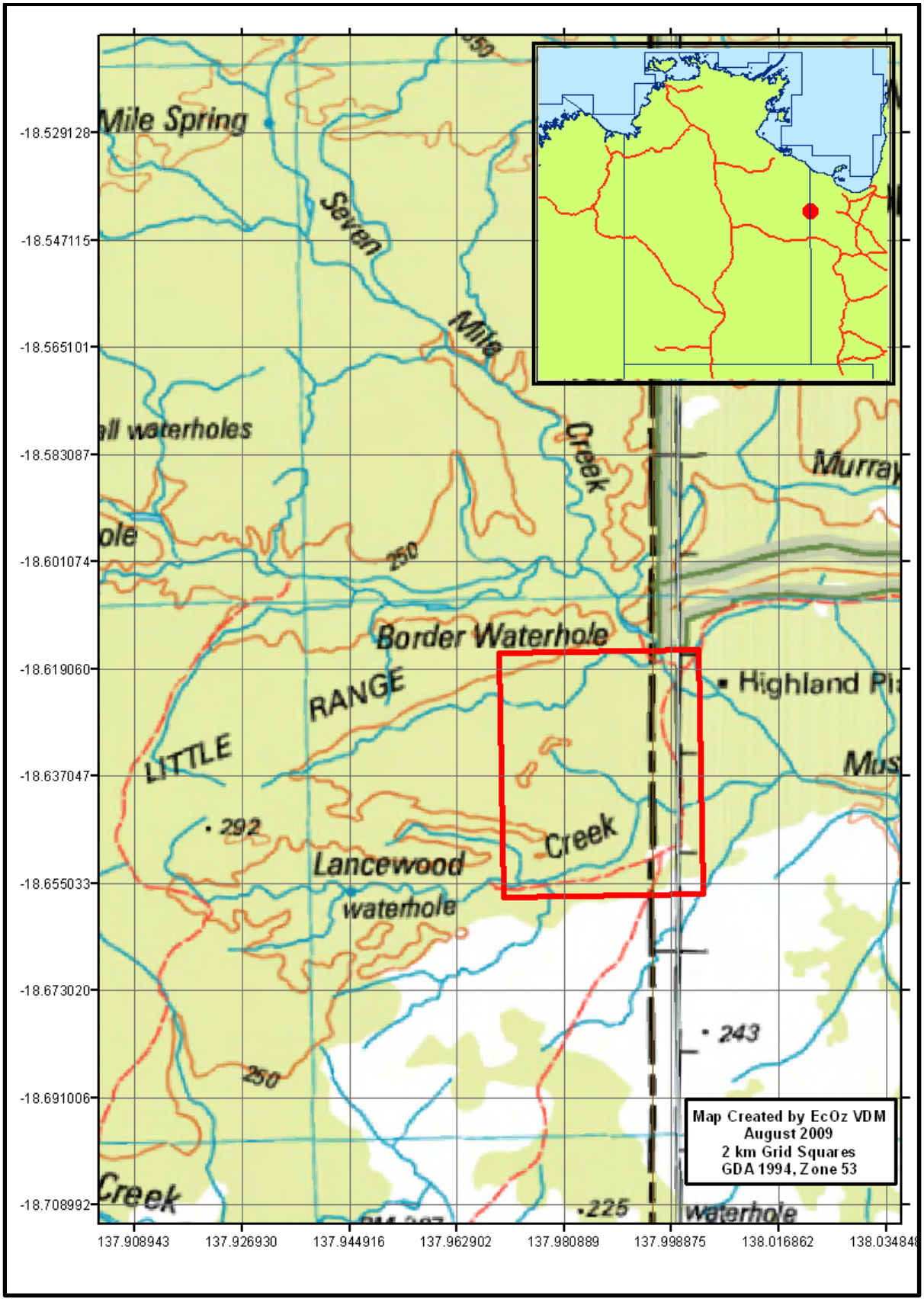


Figure 1: Location Map of the project area

2 METHODOLOGY

Fieldwork was undertaken between the 29th of September and the 3rd of October 2009 by Kate Bauer and David van den Hoek of EcOz Environmental Services.

The methods selected for this survey aimed to gather baseline data on flora and fauna of the Phosphate Australia tenement. Survey effort concentrated on the areas discovered through exploration drilling to contain high levels of phosphate. It was understood that these areas in particular have the potential to be mined for phosphate in the future.

The main components of the survey included:

- Desktop review of Tenement EL25068 (conducted in August 2009);
- Standard Fauna Survey (survey period of three nights);
- Habitat Assessments at each fauna survey site (during the fauna survey period); and
- Incidental fauna records of the whole tenement and the nearby Border waterhole (prior to the fauna survey period).

2.1 Desktop Study

The main data sources utilised for the desktop study completed in August 2009 included:

- NT Fauna Atlas records provided by the Parks and Wildlife Service of the Northern Territory (PWSNT) for the region within a 10 km radius of the project boundary;
- Land System information (1:250,000) sourced from the NT government department of Natural Resources, Environment, The Arts and Sport (NRETAS) because Land Unit information is not available for the Highland Plains region;
- EPBC Act Protected Matters Search Tool for the project area;
- Bioregional summaries for the Gulf Fall and Uplands and the Mt Isa Inlier bioregions (http://www.nt.gov.au/nreta/wildlife/nature/bioregional.html accessed 12th August 2009); and
- Scientific papers and reference books.

The results of the desktop review were used to identify fauna and flora species and habitats of conservation significance that occur in or near the project area.

NT Fauna and Flora Atlas Database

The NT Fauna and Flora Atlas database is maintained by the Parks and Wildlife Service NT (PWSNT). This contains point locations of fauna species identified in miscellaneous surveys and from viable incidental records. Survey effort has been concentrated in certain areas and as a result many areas in the Northern Territory are currently data deficient. The NT Fauna and Flora Atlas database was utilised to identify species likely to occur within 10 km radius from the project area, and to assess whether or not species classified as threatened under Northern Territory or Commonwealth legislation have been previously recorded.

EPBC Database Search Tool

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) database is maintained by the Department of Environment, Water, Heritage and the Arts (DEWHA) – a Department of the Federal Government. This database is provided to assist members of the public in understanding the EPBC Act and their rights, obligations and

requirements under the Act. The database holds mapped locations of World Heritage properties, RAMSAR wetlands, threatened species, migratory and marine species, threatened ecological communities and protected areas. It is used to determine whether development is likely to affect a matter of National Environmental Significance and consequently require referral for assessment and approval under the EPBC Act 1999. Whether or not an action will trigger assessment under the EPBC Act 1999 depends on the particular location, scope, timing and other circumstances of the proposed action. The EPBC database and data contained in the other datasets listed in this section were used to identify matters of national environmental significance that may occur within the Highland Plains Phosphate Project area.

Northern Territory NRM Infonet online database

The NT NRM Infonet website was developed for the Natural Resource Management Board of the NT during collaboration between Tropical Savannas CRC and the NT Department of Natural Resources, Environment and The Arts. It produces custom reports detailing native species, threatened species, weeds, pest animals, fire history and various other outputs of interest in natural resource management within a selected area (i.e. the tenement area).

Data obtained from NT NRM Infonet complements that of the EPBC Database Search Tool and incorporates more detailed local information. These reports provide an indication of what species may be present in the selected area.

2.2 Field Survey

This survey was based on methods outlined in *Guidelines for the Terrestrial Biodiversity Component of Environmental Impact Assessment*, developed by the Biodiversity Conservation Division of DIPE (now NRETAS) in August 2005. These guidelines provide appropriate methodology for undertaking surveys to inform Phosphate Australia on flora and fauna within EL25068, especially targeting potential phosphate mining areas.

Surveys were undertaken over three nights and three days between the 29th of September and 3rd of October 2009 by two experienced ecologists.

2.2.1 Survey Site Selection

Standard fauna surveys in the NT (DIPE 2005) require 6 fauna survey quadrats of 50 metres square. Sites were selected where possible such that quadrats were paired within each of the three main recognisable habitat types. All quadrats were located in areas predicted to be impacted by mining activities in the future (refer to **Figure 6**).

Table 1 identifies site name, coordinates, landform, and basic rationale for site selection and presents quadrat locations on background Google Earth Pro imagery.

Table 1: Flora and Fauna Survey Quadrats

Survey Site		Central Coordinate (WGS 84, Zone 53)		Land System	Rationale for Site Selection
		Easting	Northing		
1	Quadrat 1	815389	7936997	Emmerugga	Rocky lower slopes with some limestone
2	Quadrat 2	815235	7936991	Emmerugga	Similar habitat type to Quadrat 1
3	Quadrat 3	815470	7936450	Emmerugga	Valley associated with and ephemeral creek line and a variety of dominant tree species.
4	Quadrat 4	815498	7936272	Emmerugga	Similar habitat type to Quadrat 3
5	Quadrat 5	814765	7935512	Emmerugga / Wilfred	Red rock, upper steep upper slopes.
6	Quadrat 6	814634	7935403	Wilfred	Similar habitat type to Quadrat 5

2.2.2 Fauna Trapping

The layout of traps at each survey quadrat is based on the standard and accepted NT fauna survey guidelines developed in 2005, this involved:

- 20 Elliott traps around the perimeter – 5 on each side approximately 8 m apart;
- 4 Cage traps, one in each corner;
- 4 Pitfall traps (2 x 20L and 2 x 10L buckets), each with 10 m of drift fence; and
- 4 Funnel traps set against pitfall drift fences.

Pitfall traps were either 10 L or 20 L white plastic buckets which were dug to ground level and set with 10 m of drift-fence. Where possible, the pits were located within different microhabitats in the quadrat. The pit traps were opened for 3 nights and 3 days, checked early each morning and rechecked at midday. The Elliott traps and cage traps were rebaited each afternoon, opened overnight and closed for the duration of the day. The bait involved a mixture of oats, peanut butter, honey and sardines. Trapped animals were identified and released near the capture point. There was no need to mark captured animals because the purpose of this survey was to investigate species diversity rather than population size. The layout of each fauna site is illustrated in **Figure 2**.

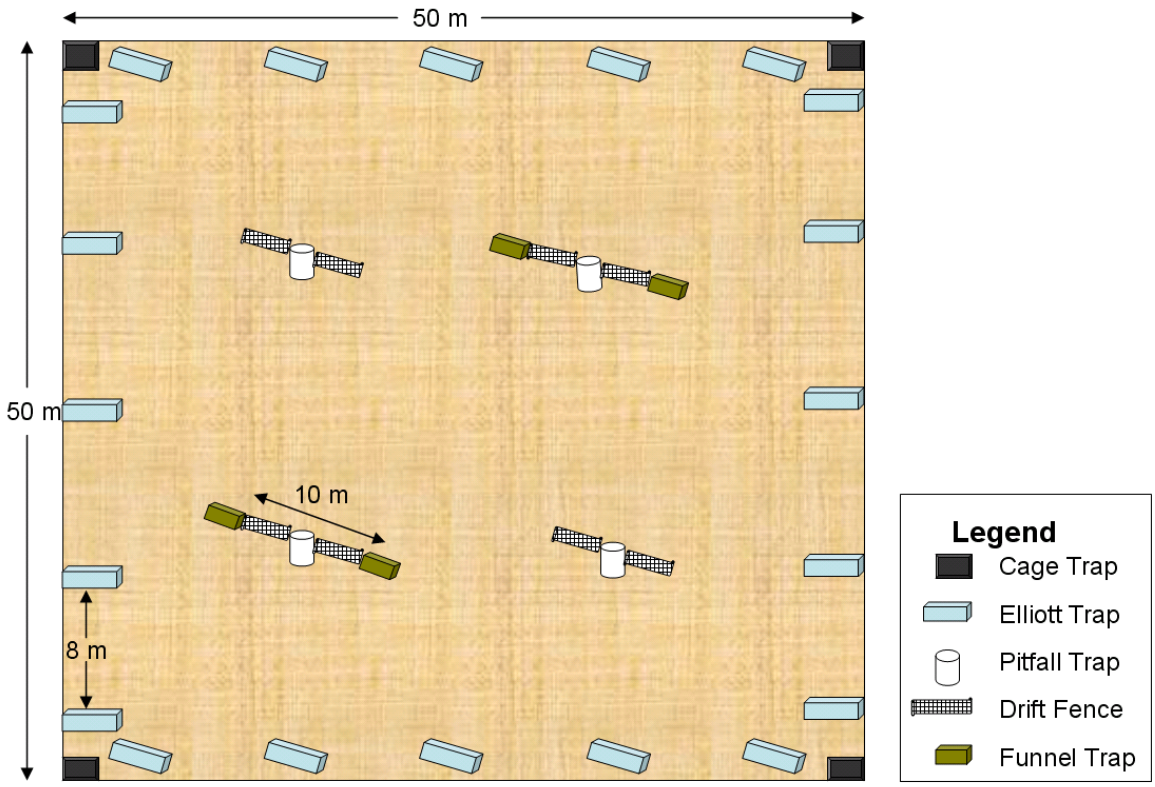


Figure 2: General layout of a standard fauna survey quadrat

2.2.3 Bird Census

Bird species were counted within a 25 m extended boundary around each quadrat, resulting in a 100 m^2 area. Each quadrat was censused on six occasions during daylight hours. Bird counts mainly occurred during early morning and late afternoon (generally times of higher bird activity), with a few counts during the day. Each count was considered an instantaneous count of all the birds within the quadrat, and involved viewing the quadrat for five minutes. Birds that were noted outside of the time of bird count, or outside the quadrats, were noted as incidentals. Only birds using the quadrat were counted – birds merely flying across or overhead were not included. Raptors were included if they were hunting overhead. One nocturnal bird count occurred within each survey quadrat. In general, bird species diversity, not abundance, was surveyed due to the fact that resident birds may be recorded during most bird counts.

2.2.4 Active Searching

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

Active searches lasted for 20 minutes and involved:

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

Opportunistic observations made while travelling within EL25068 were also recorded.

Active searching was also conducted at the Border Waterhole, and scats were collected for identification by Robyn Carter Hair ID (refer to **Appendix 8**).

2.2.5 Bat Survey

Bats were surveyed using an Anabat II Bat Detector, which was set up to record overnight at three locations; near Quadrats 3 and 4 (29th September), near Quadrat 6 (30th September), and at the Phosphate Australia camp (1st October). Kyle Armstrong of Specialised Zoological was contracted to analyse the resulting bat call sequences and provide a summary report noting bat species presence.

As the Anabat results can provide a reasonable indication of species presence, physically trapping the bats was not necessary for this survey.

2.2.6 Hair Analysis from Scats

Robyn Carter runs a small company called Robyn Carter Hair ID. She is able to extract grooming hairs, or hairs from mammals predated upon by carnivores from scat material. Robyn then uses a microscope, reference hairs, and her significant experience to gain a reasonably accurate (to genus level) idea of the mammals present within the area.

Several scats were collected from Border Waterhole, and a dog/dingo scat was collected from the project area. These scats were then sent to Robyn Carter for analysis. Analysis results area available in **Appendix 8**.

2.2.7 Incidental Fauna Observations, including Border Waterhole

Fauna observed outside survey sites, but within the Phosphate Australia project area were recorded as incidentals. Often incidental observations were made whilst travelling between the camp (located to the south of the project area) and the survey sites. These incidental records are included in total species lists and discussions (refer to **Appendix 5**). In addition to the project area incidentals, a separate list of animals was recorded at the Border Waterhole. This list was compiled through active searching for birds, reptiles, mammals (mammals are unlikely to be found through day time searches such as this), scats and signs.

The Border Waterhole, only 380 metres north of the project area, provides a permanent and reliable water source, and thus may be a refuge for nearby fauna during dry times such as the time of this field survey. Some of the species recorded at the waterhole may therefore inhabit the project area when water is more widely available.

2.2.8 Vegetation and Habitat Survey

Habitat information was recorded for each survey quadrat. Information collected is based on standard habitat description datasheets used by PWSNT and assesses floristic structure, composition and nature of the landscape. Datasheets included the following information (at minimum):

- GPS Coordinates (GDA94, Zone 53, UTM);
- Site description of vegetation and habitat;
- Description of physical environment;
- Description of the level of disturbance;
- Vegetation classification and species identified;

- Fire history and impact;
- Evidence of weeds;
- Soil description;
- Digital photographs; and
- Any other relevant information.

The flora component of this survey aimed to identify as many species as possible within each survey quadrat to get an indication of composition, habitat condition and floral diversity. A code was applied to each species to describe its presence at the time of survey; 1 – abundant, 2 – common, 3 - scattered and 4 – rare. This survey does not attempt to be comprehensive in identifying all species present within the project area (refer to Field Survey Limitations **Error! Reference source not found.Error! Reference source not found.**).

Unidentified flora species were sampled and preserved for later identification at the NT Herbarium.

2.2.9 Nomenclature

Current scientific and common names for fauna species during this survey have been identified from Schedule 1 of the *TPWC Act 2000*. Flora species names have been taken from the Checklist of NT Vascular Plant Species (Kerrigan and Albrecht 2007) provided by the Northern Territory Herbarium.

The following resources were used for species identification:

- **Amphibians** – Field Guide to Frogs of Australia (Tyler & Knight 2009), Frogs of the Northern Territory (Tyler & Davies 1986); Reptiles and Amphibians of Australia (Cogger 2000).
- **Reptiles** – A Complete Guide to Reptiles of Australia (Wilson and Swan 2003), and Reptiles and Amphibians of Australia (Cogger 2000).
- **Birds** – Field Guide to Australian Birds (Morcombe 2008), Field Guide to the Birds of Australia (Simpson & Day 1994), The New Atlas of Australian Birds (Barrett *et al.* 2003).
- **Mammals** – The Mammals of Australia (Menkhorst & Knight 2001), Australian Bats (Churchill 2008).
- **Flora** – A Field Guide to Plants of the Barkly Region, Northern Territory (Purdie *et al.* 2008), Eucalypts, Volume 3, Northern Australia (Brooker & Kleinig. 2004), Native Plants of Northern Australia (Brock 1993), Plants of the Northern Australian Rangelands (Wheaton 1994), A Key to the Grasses of the Northern Territory (Simon & Latz 1994), and Plants of the Kimberley Region of Western Australia (Petheram and Kok 2003).

2.3 Evaluating Species of Conservation Significance

The conservation significance of flora, fauna and habitats recorded on this survey, or previously recorded within the area, were assessed with reference to:

- Species classified as threatened nationally with the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*;
- Species classified as migratory in accordance with the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*; and

- Species classified as threatened in the Northern Territory in accordance with the Territory *Parks and Wildlife Conservation Act 2000* (*TPWC Act*) (Dept NRETA 2007).

As a large part of the project area falls within the Northern Territory, impacts on species listed under the *TPWC Act 2000* must also be minimised through environmental management practices.

As such, species that are currently of conservation significance under either the *EPBC* or *TPWC* Acts, or are likely to be of conservation significance in the near future according to these two Acts, have been discussed within the following **Matters of Conservation Significance** section.

3 RESULTS AND DISCUSSION

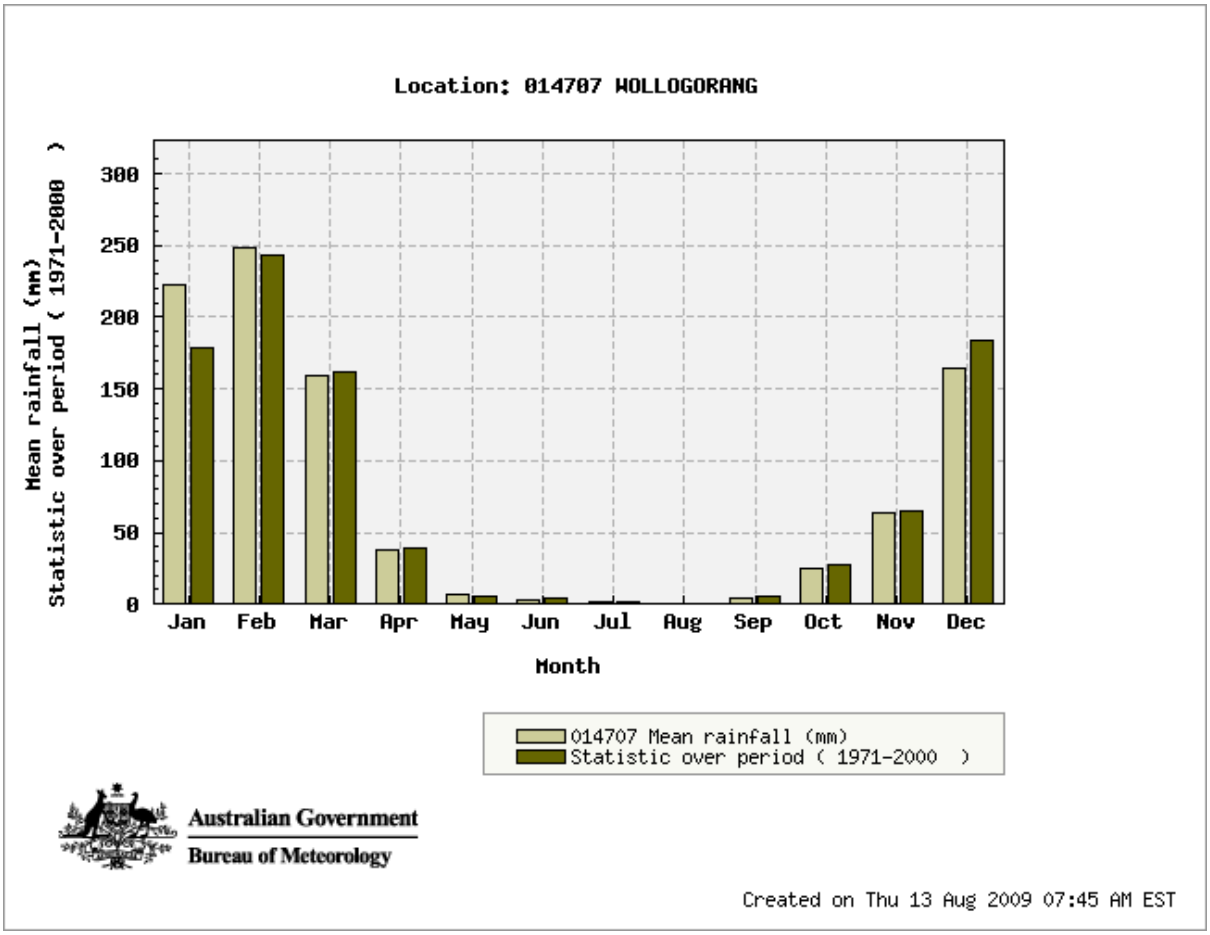
3.1 Climatic Information

The project area is situated between the monsoon tropics of northern Australia, where a large percentage of the region's rainfall falls between November and April with high temperatures and humidity (Purdie *et al.* 2008), and more arid climates (less rainfall and humidity) of central Australia. The Highland Plains area is on the edge of the tropics zone, thus supporting a transition zone between tropical and arid ecosystems (Purdie *et al.* 2008). Climate statistics for Wollogorang Station (approximately 160 km north of the project area) are displayed in **Table 2**, and average rainfall data pictured in **Figure 3**.

Table 2: Climate Statistics for Wollogorang Station (014707) from Bureau Meteorology

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Temperature															
Mean maximum temperature (°C)	34.9	34.4	34.5	33.8	31.4	29.0	29.3	31.0	34.3	36.7	37.6	36.8	33.6	26	1974 2009
Mean minimum temperature (°C)	24.2	24.1	22.7	19.7	16.0	12.1	11.4	12.2	15.8	19.8	22.5	24.2	18.7	26	1974 2009
Rainfall															
Mean rainfall (mm)	222.6	248.5	158.9	38.1	6.9	3.2	1.4	0.7	3.7	25.2	63.6	164.4	957.5	33	1967 2009
Decile 5 (median) rainfall (mm)	175.6	193.7	107.2	19.4	0.2	0.0	0.0	0.0	0.0	8.0	58.7	128.2	941.9	33	1967 2009
Mean number of days of rain ≥ 1 mm	11.1	12.3	7.7	2.7	0.6	0.4	0.1	0.1	0.3	1.9	5.2	8.2	50.6	33	1967 2009
Other daily elements															
Mean number of clear days	1.9	1.4	6.8	9.7	15.4	17.7	21.7	22.0	16.5	13.9	8.0	4.2	139.2	23	1974 2009
Mean number of cloudy days	16.6	17.3	11.4	5.6	3.6	3.1	1.3	1.2	2.0	3.4	6.8	12.1	84.4	23	1974 2009
9 am conditions															
Mean 9am temperature (°C)	29.6	28.9	28.7	27.8	24.7	21.3	20.9	22.8	27.0	30.3	31.5	31.0	27.0	26	1974 2009
Mean 9am relative humidity (%)	72	75	68	55	48	47	44	41	41	45	50	62	54	25	1974 2009
Mean 9am wind speed (km/h)	4.7	4.7	5.1	6.9	8.4	8.2	8.2	9.9	8.7	8.1	6.4	5.3	7.0	27	1974 2009
3 pm conditions															
Mean 3pm temperature (°C)	32.6	32.0	33.0	32.6	30.4	28.3	28.4	30.1	33.2	35.1	35.5	34.3	32.1	22	1974 2009
Mean 3pm relative humidity (%)	60	63	50	41	36	32	28	27	29	34	40	50	41	20	1974 2009
Mean 3pm wind speed (km/h)	5.8	6.2	6.4	6.7	7.1	6.4	6.8	7.9	7.6	7.1	6.0	5.8	6.6	22	1974 2009

Figure 3: Rainfall Summary Graph for Wollogorang from Bureau of Meteorology



The Gulf Falls and Uplands bioregion climate has been described as having a wide range of conditions. In the southeast of this bioregion (where the project area lies, rainfall decreases to 400 mm (http://www.anra.gov.au/topics/rangelands/overview/qld/ibra-gfu.html#climate).

3.2 Bioregion and Land Systems Information

The Highland Plains Phosphate Project area falls within two different bioregions, and spans three land system types.

Most of the project area falls within the **Gulf Fall and Uplands Bioregion**, which comprises undulating terrain with scattered low, steep hills on Proterozoic and Palaeozoic sedimentary rocks, often overlain by lateritised Tertiary material. Soils are mostly skeletal or shallow sands. The most extensive vegetation is woodland dominated by Darwin Stringybark *Eucalyptus tetrodonta* and Variable-barked Bloodwood *C. dichromophloia* with spinifex understorey (*Triodia* species), and woodland dominated by Northern Box *Eucalyptus tectifica* with tussock grass understorey (http://www.nt.gov.au/nreta/wildlife/nature/gulffalls.html). The Gulf Fall and Uplands bioregion extends from the Arnhem Plateau into Western Queensland (Purdie *et al.* 2008).

The sensitive environments within the Gulf Fall and Uplands bioregion include the limited areas of monsoon rainforest, riparian areas, and wetlands (particularly swamps, springs and soaks). The mammal fauna of this bioregion has had a low to moderate rate of loss. Of the 52 mammal species recorded, 2 are regionally extinct, 2 have undergone serious decline, 3 have declined and 45 species are stable (http://www.nt.gov.au/nreta/wildlife/nature/gulffalls.html)

The **Mount Isa Inlier Bioregion** (the same small extent of the project area as the land system labelled Bukalara) is described as rugged hills and mountain ranges separated by undulating valleys, experiencing a semi-arid climate with erratic rainfall (http://www.anra.gov.au/topics/rangelands/overview/nt/ibra-mii.html).

Relevant land system descriptions are listed in **Table 3** and mapped over the area in **Figure 4**. Digital land system information was sourced from the Northern Territory Government, thus coverage does not extend into Queensland (**Figure 4**), however, as the Gulf Fall and Uplands bioregion is consistent to the QLD project area boundary (refer to **Appendix 1**), it could be assumed that the NT land system descriptions can be extrapolated into the QLD side of the border.

Table 3: Land System types within the project area

Land System Type	Coverage within Project Area	Basic Description	Detailed Description
Emmerugga	Predominant Land System (approximately 70%) within central portion of the project area	Sandstone plains and rises	Plains and rises mostly on sandstone and siltstone, commonly shallow soils with surface stone and rock outcrop.
Wilfred	Southern (approximately 25%) portion of the project area	Sandstone plains and rises	Plains and rises mostly on sandstone and siltstone; commonly shallow soils with surface stone and rock outcrop
Bukalara	Very small portion (approximately 5%) of the north-western corner of the project area	Rugged quartz sandstone plateaux and hills	Steep rocky plateaux and hills on quartz sandstone and siltstone; shallow sandy soils and rock outcrop

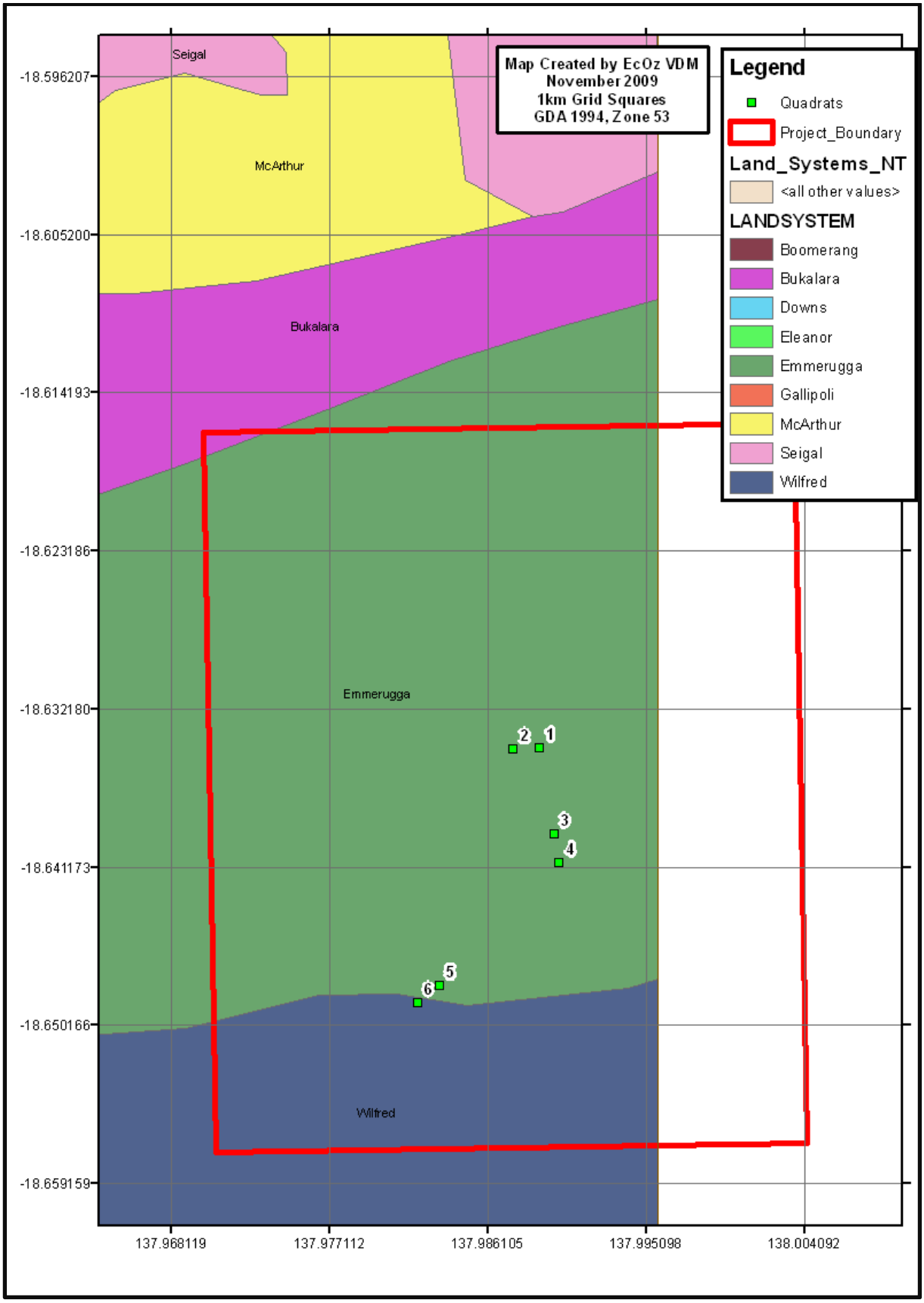


Figure 4: Land System coverage within the Project area

3.3 NT Flora and Fauna Atlas Data

Flora and Fauna Atlas records for the area are sparse, and not evenly spread across the area of interest (refer to **Figure 5**), thus the presence of species types within the region may be discussed, but not their distributions or comparative species diversity. Species recorded during the survey that were previously recorded within 10 kms of the area according to the NT Fauna Atlas Database are indicated in **Appendix 5**.

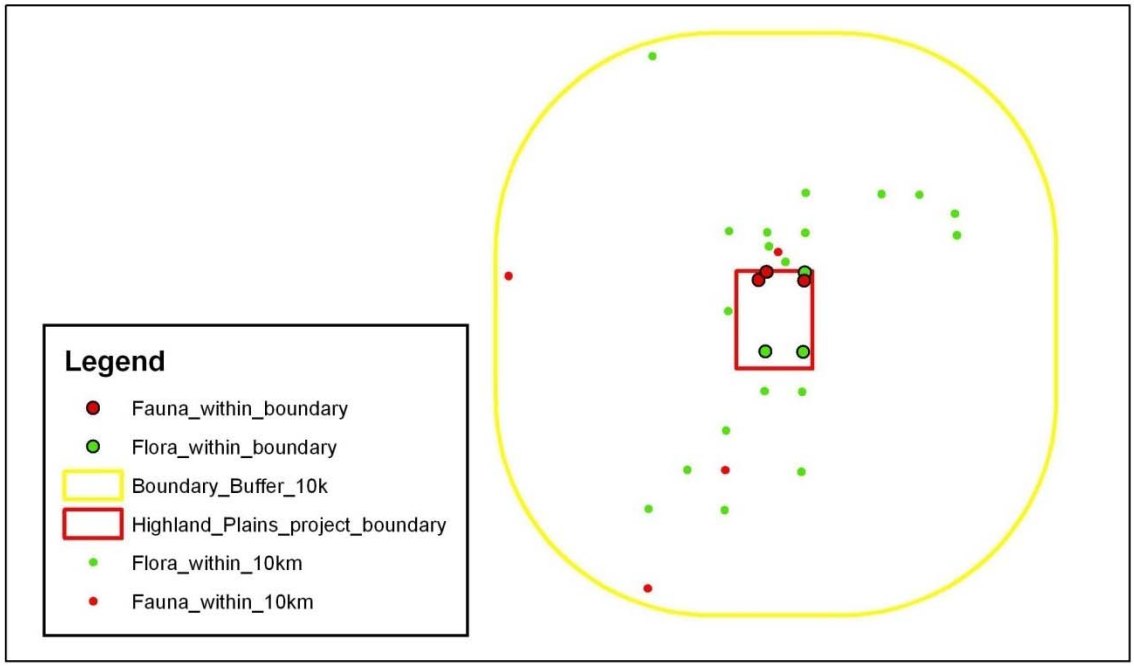


Figure 5: Distribution of Flora and Fauna Atlas records within the project area

3.4 Survey Site Locations

Error! Reference source not found.Error! Reference source not found. provides an overview of the potential mine impact area and survey quadrat locations within the project area. **Error! Reference source not found.Error! Reference source not found.** provides an indication of the terrain within which the quadrats were located.

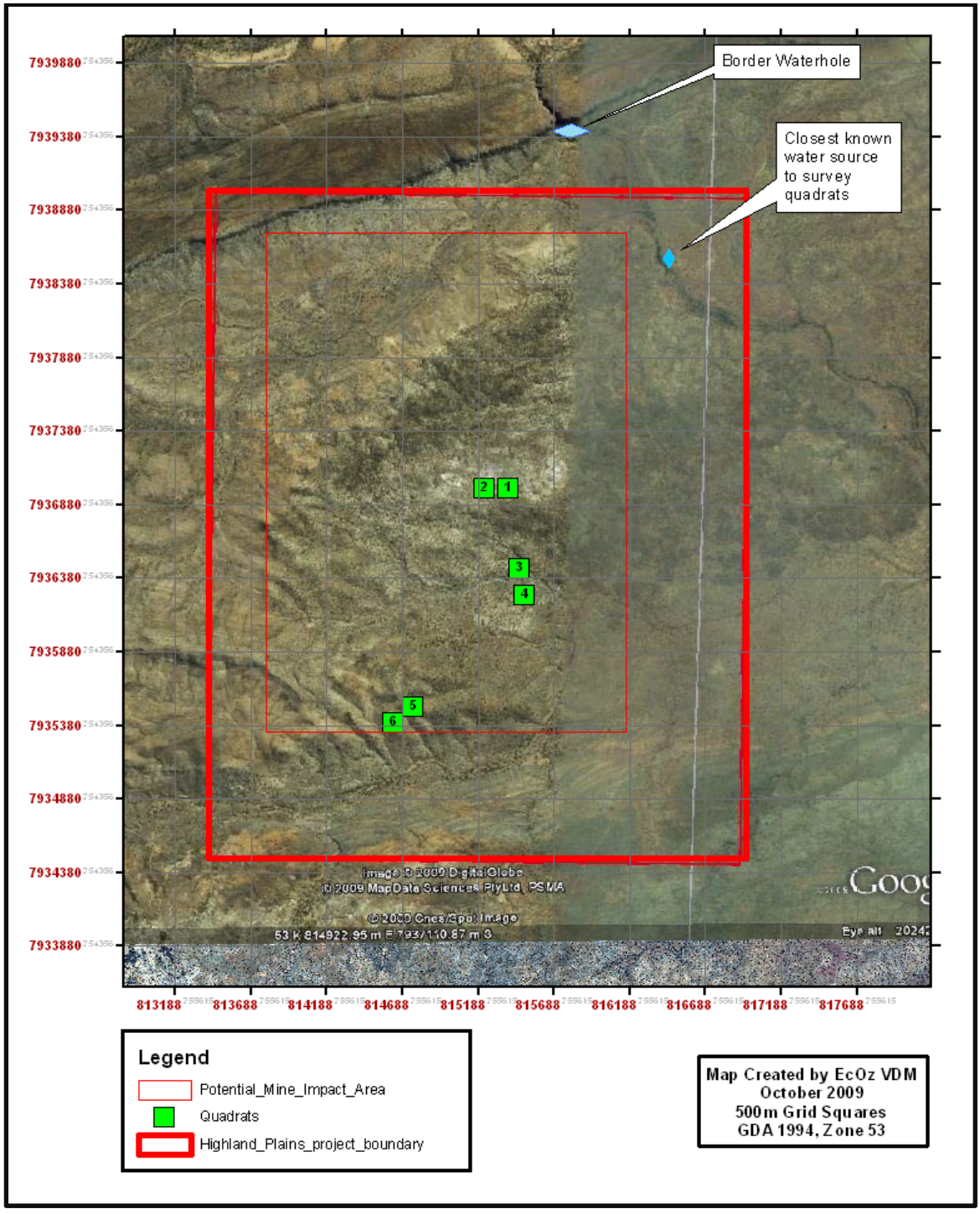


Figure 6: Project Area Overview

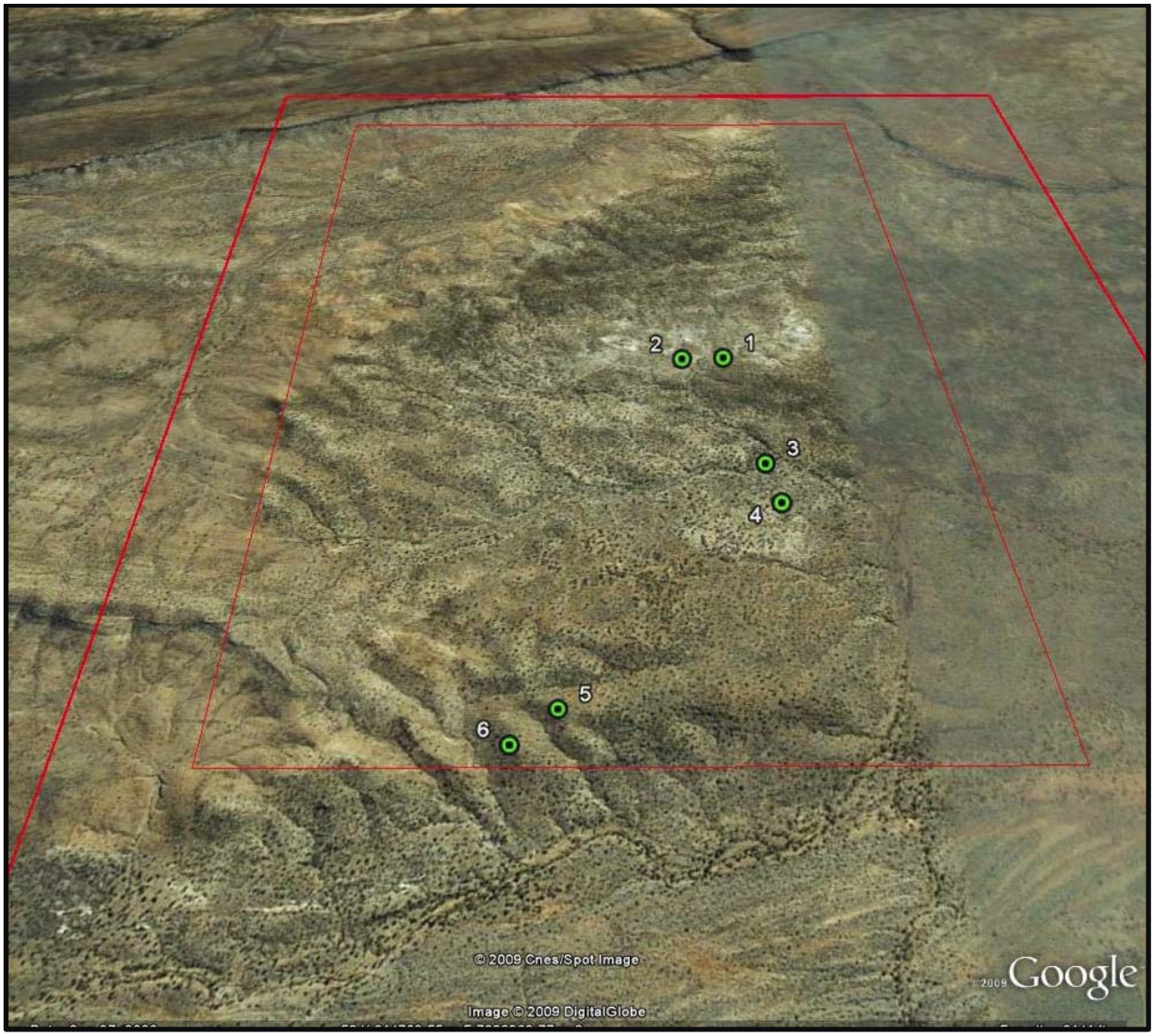


Figure 7: Terrain within which Survey Quadrats were located

3.5 Nearest Available Water Sources

Border Waterhole, at the base of an extensive sandstone escarpment, is slightly north of the project area and 2.4 km north of the closest quadrats; Quadrats 1 and 2. Border Waterhole sustains more monsoon forest plant species, associated with the permanent water and sandstone escarpment. It is somewhat impacted upon by cattle and human visitors.

The 'On-site Waterhole' still held some water at the end of the dry season, however it was heavily impacted by cattle. Nonetheless, it appeared to provide an important water source to a high diversity of birds that visited in large numbers. This on-site waterhole was by all accounts the closest available water source discovered during the survey period. This water source was approximately 1.8 kilometres from the closer quadrats; Quadrats 1 and 2, and over 3.4 kilometres from the further quadrats; Quadrats 5 and 6 (closer water sources undetected during the survey period may be available to some fauna species).

3.6 Vegetation and Flora Study

A search of the EPBC database revealed that there are no World Heritage properties, National Heritage places, Wetlands of International Significance, nor Threatened Ecological Communities listed within the project area, or in the immediate vicinity of the project area.

A total of 40 flora species have been previously recorded within the project area and 158 flora species have been recorded within a 10 kilometre radius (numbers of species reflect survey effort in the region, and should not be used as an indication of floral diversity) of the project area.

The NT Flora atlas database does not contain flora species of conservation significance records within the project area, or within a 10 km radius. The EPBC database does not hold any threatened plant species records within the project area. Threatened plant species were not recorded during the field survey. Several plant species recorded within 10 km of the project area are listed as Data Deficient under the *Territory Parks and Wildlife Conservation Act* (*TPWC Act 2000*), of which *Arachne racemosa* has been recorded within the actual project area. However none of the Data Deficient species that potentially occur within the region were recorded within the survey quadrats during the field surveys.

Data Deficient species recorded within 10 km of the project area include:

- *Arachne racemosa;*
- *Enneapogon robustissimus;*
- *Ipomea brassii;*
- *Polycarpa multicaulis;* and
- *Pterocaulon sphaeranthoides.*

Species listed as Data Deficient may or may not be in decline, requiring further study to understand their population dynamics.

None of the flora species identified within each of the survey quadrats (refer to **Appendix 2**) are of current or potential conservation significance.

3.7 Field Survey Habitat Descriptions

Habitat descriptions covering vegetation, landform and soils were undertaken for the six survey quadrats during the fieldwork of September/October 2009. The following sections provide summary habitat information for each targeted survey area. An indication of the land form around each of the survey quadrats can be viewed (green boxes represent survey quadrats) in **Error! Reference source not found.Error! Reference source not found.**. Overall, the landscape is vegetated with open woodland dominated by Snappy Gum *Eucalyptus leucophloia* in the upper storey and Spinifex *Triodia bitextura* in the lower storey. Mature Snappy Gum woodland is renowned for providing numerous hollows, favoured refuges for many fauna species, including the Endangered Gouldian Finch.

A habitat description table for each survey quadrat is provided in **Appendix 1**. Photographs of the vegetation at each survey site are also provided in **Appendix 1**. Summary habitat descriptions for each survey area are also detailed below.

Quadrat 1

The landform within this quadrat includes a hillock bordered by a small ephemeral creek line. Erosion is evident in the creekline. Soils are moderately well drained, consisting of brown sandy clay, estimated to continue to depths greater than 40 centimetres. Within Quadrat 1, there is a moderate coverage of pebbles ranging to small rocks up to 20 centimetres, with no rock outcrop present. Rock types identified included phosphate and dolomitic. A fire has not been through this site for at least 3 years, and tree hollows and fallen logs are common in the area, providing fauna habitat. The vegetation type within Quadrat 1 is open woodland, dominated by Snappy Gum *Eucalyptus leucophloia* and Spinifex *Triodia bitextura*. The upper and mid storey species cover only 10% and 3% of the quadrat respectively. Lower stratum vegetation covers 30% of the quadrat (60% of ground cover is gravel) and contains a particularly high diversity of species. Domed termite mounds to a height of 0.6 metres are common within the quadrat.

Quadrat 2

Landform within this quadrat is variable, including; lower and mid slope, ridge, and upper slope. Erosion is evident in the small drainage line that crossed the lower slope. Soils are moderately well drained, consisting of light to medium brown clays, estimated to range in depth between 10 and 40 centimetres. Within Quadrat 2, there is a moderate coverage of pebbles ranging to big rocks up to 2 metres, with 2-10% rock outcrop present. Rock types identified included phosphate and dolomitic. A fire has not been through this site for at least 3 years, and scattered tree hollows and fallen logs provide some fauna habitat. The vegetation type within Quadrat 2 is open woodland, dominated by Snappy Gum *Eucalyptus leucophloia* and Spinifex *Triodia bitextura*. The upper and mid storey species cover only 7% and 5% of the quadrat respectively. Lower stratum vegetation covers 40% of the quadrat and contains a high diversity of species. Domed termite mounds to a height of 0.7 metres are common within the quadrat, and Buffel Grass *Cenchrus ciliarus*, an introduced species with the potential to spread rapidly and alter fire regimes, is scattered within the quadrat.

Quadrat 3

The landform within this quadrat includes a hillock, lower slope, and a small ephemeral creek line. Erosion was evident in the creekline. Soils in Quadrat 3 are moderately well drained, consisting of light to medium brown clays, estimated to range in depth between 10 and 40 centimetres. There is a moderate coverage of chert pebbles ranging through to rocks up to 60 centimetres, with no rock outcrop present. Plant species cover 50% of the quadrat, whilst gravel covers 35%. A fire has not been through this site for at least 3 years, tree hollows are common and fallen logs abundant, providing good fauna habitat. The vegetation type within Quadrat 3 is open woodland, dominated by Snappy Gum *Eucalyptus leucophloia*, *Corymbia terminalis* and Spinifex *Triodia bitextura*. The upper, mid, and lower storey species cover 15%, 10%, and 50% of the quadrat respectively. The mid stratum within this quadrat was particularly diverse compared to other quadrats. Domed termite mounds are sparsely distributed. Buffel Grass *Cenchrus ciliarus*, an introduced species with the potential to spread rapidly and alter fire regimes, is scattered within the quadrat.

Quadrat 4

The landform within this quadrat includes a south east facing hillock bordering an ephemeral creek. Erosion was evident in the creek line. Soils are moderately well

drained, consisting of brown sandy clay, estimated to range in depth between 10 and 40 centimetres. Within Quadrat 4, there is a moderate coverage of pebbles ranging to small rocks up to 20 centimetres, with no rock outcrop present. Rock types identified included phosphate and dolomitic. A fire has not been through this site for at least 3 years, and tree hollows are scattered and fallen logs are common in the area, providing fauna habitat. The vegetation type within Quadrat 4 is open woodland, dominated by Snappy Gum *Eucalyptus leucophloia* and *E. pruinosa*. The upper and mid storey species cover only 10% and 3% of the quadrat respectively. Lower stratum vegetation covers 40% of the quadrat (50% of ground cover is gravel) and contains a high diversity of species. Tower termite mounds to a height of 0.6 metres are common within the quadrat.

Quadrat 5

This quadrat is on a north-facing upper slope, with no noticeable erosion. Soils are rapidly draining, consisting of light to medium brown clays, estimated to extend to depths greater than 40 centimetres. Within Quadrat 5, there is a moderate coverage of pebbles ranging to rocks up to 60 centimetres, with no rock outcrop present. Rock type is primarily chert. A fire has not been through this site for at least 3 years, and scattered fallen logs provide the only noticeable fauna habitat. The vegetation type within Quadrat 5 is open woodland, dominated by Snappy Gum *Eucalyptus leucophloia* and Spinifex *Triodia bitextura*. The upper storey species; Snappy Gum *Eucalyptus leucophloia* and *E. pruinosa* are estimated to cover only 8% of the quadrat. 5% of the quadrat is covered with a relatively high diversity of mid storey species, of which Whitewood *Atalaya hemiglauca* is dominant. Lower stratum vegetation at 80% covers the majority of the quadrat and is dominated by *Enneapogon polyphyllus* (gravel comprises only 15% of the groundcover within Quadrat 5). Domed termite mounds (to 0.5 metres high) are sparsely distributed, and Buffel Grass *Cenchrus ciliarus*, an introduced species with the potential to spread rapidly and change fire regimes, is scattered within the quadrat.

Quadrat 6

Landform within this quadrat includes a ridge and southwest facing upper slope. Erosion is not evident within the area. Soils are rapidly draining, consisting of light to medium brown clays, estimated to range in depth between 10 and 40 centimetres. Within Quadrat 6, there is a moderate coverage of small rocks of 2cm ranging to big rocks up to 2 metres, with chert rock outcrop present over 2-10% of the quadrat. A fire has not been through this site for at least 3 years. Potential fauna habitat such as tree hollows and fallen logs is not available at this site. The vegetation type within Quadrat 6 is open woodland, dominated by Snappy Gum *Eucalyptus leucophloia*, *Corymbia flavescens*, and Spinifex *Triodia bitextura*. The upper and mid storey species cover only 3% and 5% of the quadrat respectively. Lower stratum vegetation at 80% covers the majority of the quadrat and is dominated by Spinifex *Triodia bitextura*. Domed termite mounds to a height of 0.4 metres are common within Quadrat 6, and Buffel Grass *Cenchrus ciliarus*, an introduced species with the potential to spread rapidly and change fire regimes, is scattered within the quadrat.

3.8 Exotic Plant Species and Potential Weeds

The NT Flora Atlas does not hold exotic plant species (weeds or potential weeds) records within the project area, however the following exotic plant species have been recorded within a 10 kilometre radius (Purdie *et al.* 2008):

- Kapok Bush *Aerva javanica* – is not a declared weed, but has spread alarmingly in some areas, especially along highways*;*
- Awnless Barnyard Grass *Echinochloa colonum* – can spread rapidly, usually in clay soils in damp areas; and
- Roly Poly *Salsola tragus* – an indicator of poor pasture condition, it is usually present in disturbed areas.

Buffel Grass *Cenchrus ciliaris*, an introduced species with the potential to spread rapidly and change fire regimes, is scattered within the quadrat., was the only weed species recorded during the survey period within the project area. This weed was scattered within Quadrats 2, 3, 5 and 6 in October 2009. Land owners with Buffel Grass do not have a legislative requirement to control the growth and spread of these species, however it is recommended that the growth and spread of this species is kept in check as it can significantly increase the fire risk within bushland environments (which can reduce biodiversity values and also pose threat to mine staff and infrastructure).

Thus, we recommend that Phosphate Australia and any future project area managers avoid the spread of Buffel Grass through exploration activities wherever possible. For example, we recommend inspecting vehicles and machinery for Buffel Grass seed and remove any seed before moving plant to new off-track areas of the project area (further detail on the impacts of Buffel Grass is provided in the Weed Management Guide in Appendix 9).

Indian Couch Grass *Bothriochloa* (?) *pertusa*, a species introduced to the Territory, was recorded in Quadrat 1 as having a scattered distribution. Although exotic, Indian Couch is not a declared weed under National or Territory legislation (NRETAS Weeds 2007). Note that NT Herbarium staff were not certain of the identification of this specimen to species level.

Should any other species listed in Table 8Table 4 be discovered within the project area, Phosphate Australia should ensure that exploration activities do not contribute to their spread within the project area.

Table 4: Weed species to control and weeds that should be controlled if they are discovered to occur within the project area

Common Name	Scientific Name	Description
Buffel Grass	*Cenchrus ciliaris*	An erect, deep-rooted perennial grass. This grass forms dense tussocks up to 1m tall. Seed heads are white to pale purple in a fluffy, spike-like raceme up to 15cm long. The seeds drop off when ripe (January to July) as burrs about 5mm in diameter. This species is found in disturbed areas, and is carried in the fur of animals or in vehicle tyres. The burrs also float and are thus further dispersed by floodwaters.
Coffee Senna	*Senna occidentalis*	Annual or short lived perennial shrubs to 2m high, leaves divided into opposite pairs of leaflets. Flowers yellow with 5 petals. Pods slender, sickle shaped, slightly indented around the seeds. Seeds dark brown, flattened. Grows in dense stands in disturbed areas.
Khaki Weed	*Alternanthera pungens*	Khaki weed grows in dense patches and "flat on the ground". It is easily distinguishable by its many white/yellow prickly burrs. When mature, these burrs stick to bare feet, shoes, motor tyres etc. Source: http://www.northwestweeds.nsw.gov.au/khaki_weed.htm
Noogoora Burr	*Xanthium strumarium*	Annual, much-branched woody herb to 60cm tall. Stems and base of each leaf covered with 3-pronged spines. Leaves divided into irregular lobes, green above, paler below. Fruits hard woody burrs, brown, covered with yellowish hairs and numerous hooked spines. Grows in disturbed areas.
Sicklepod	*Senna obtusifolia*	Very similar to *Senna occidentalis*, but does not generally occur in such dense stands.

Source: Smith (2002)

3.9 Fauna Study Results

The survey conducted in October 2009 recorded 72 fauna species within the project area, including 2 amphibians, 8 reptiles, 52 birds, and 10 mammals (including introduced species). Trapping was not conducted at Border Waterhole, however active searching revealed one reptile, several bird species, and scats that were later attributed to three new mammal records for the region.

The NT Fauna Atlas records 34 fauna species within the project area and 50 fauna species within a 10 km radius (numbers of species reflect survey effort in the region, and should not be used as an indication of faunal diversity).

Of the species recorded during the survey both within the project area, and also at Border Waterhole; 53 were new species records for the region (refer to **Table 5** and shaded squares in **Appendix 5**), i.e; 53 species recorded during the survey period had not been previously recorded according to the NT Fauna Atlas database. All species records generated from this survey will be provided to the Northern Territory Parks and Wildlife Service for inclusion into the NT Fauna Atlas Database.

Table 5: Additions to the NT Fauna Database within a 10 km radius of the Project Area

Family	Scientific Name	Common Name
Hylidae	Litoria caerulea	Green Tree-frog
Bufonidae	Chaunus marinus	Cane Toad
Crocodylidae	Crocodylus johnstoni	Freshwater Crocodile
Gekkonidae	*Diplodactylus conspicillatus*	Fat-tailed Gecko
Gekkonidae	Gehyra australis	Northern Dtella
Gekkonidae	Gehyra nana	Northern Spotted Rock Dtella
Gekkonidae	Oedura rhombifer	Zig-zag Gecko
Agamidae	Chlamydosaurus kingii	Frilled Lizard
Agamidae	Ctenophorus nuchalis	Central Netted Dragon
Scinidae	*Ctenotus lateralis*	Gravelly Soil Ctenotus
Scinidae	*Menetia maini*	Main's Menetia
Anhingidae	Anhinga novaehollandiae	Australasian Darter
Phalacrocoracidae	Phalacrocorax varius	Pied Cormorant
Phalacrocoracidae	Phalacrocorax sulcirostris	Little Black Cormorant
Ardeidae	Ardea intermedia	Intermediate Egret
Ardeidae	Nycticorax caledonicus	Nankeen Night-Heron
Otididae	Ardeotis australis	Australian Bustard
Accipitridae	Milvus migrans	Black Kite
Accipitridae	Haliastur sphenurus	Whistling Kite
Accipitridae	Accipiter cirrhocephalus	Collared Sparrowhawk
Columbidae	Geopelia placida	Peaceful Dove
Cacatuidae	Calyptorhynchus banksii macrorhynchus	Red-tailed Black-cockatoo
Cacatuidae	Eolophus roseicapilla	Galah
Cacatuidae	Nymphicus hollandicus	Cockatiel
Psittacidae	Barnardius zonarius	Australian Ringneck
Cuculidae	Centropus phasianinus	Pheasant Coucal
Eurostopdidae	Eurostopodus argus	Spotted Nightjar
Halcyonidae	Dacelo leachii	Blue-winged Kookaburra
Meropidae	Merops ornatus	Rainbow Bee-eater
Halcyonidae	Todiramphus pyrrhopygius	Red-backed Kingfisher
Halcyonidae	Todiramphus sanctus	Sacred Kingfisher
Acanthizidae	Smicrornis brevirostris	Weebill

Family	Scientific Name	Common Name
Meliphagidae	Manorina flavigula	Yellow-throated Miner
Meliphagidae	Lichenostomus plumulus	Grey-fronted Honeyeater
Meliphagidae	Melithreptus albogularis	White-throated Honeyeater
Petroicidae	Microeca fascinans	Jacky Winter
Pachycephalidae	Colluricincla harmonica	Grey Shrike-thrush
Monarchidae	Myiagra inquieta	Restless Flycatcher
Campephagidae	Coracina novaehollandiae	Black-faced Cuckoo-shrike
Campephagidae	Lalage sueurii	White-winged Triller
Artamidae	Artamus personatus	Masked Woodswallow
Artamidae	Cracticus torquatus	Grey Butcherbird
Artamidae	Cracticus nigrogularis	Pied Butcherbird
Artamidae	Cracticus tibicen	Australian Magpie
Estrildidae	Taeniopygia guttata	Zebra Finch
Pseudocheiridae	Petropseudes dahli	Rock Ringtail
Macropodidae	Macropus robustus	Common Wallaroo
Macropodidae	Macropus rufus	Red Kangaroo
Macropodidae	Petrogale purpureicollis	Purple-necked Rock Wallaby
Emballonuridae	Taphozous georgianus	Common Sheath-tailed Bat
Molossidae	Chaerephon jobensis	Northern Free-tailed Bat
Vespertilionidae	Chalinolobus nigrogriseus	Hoary Wattled Bat
Vespertilionidae	Scotorepens greyii	Little Broad-nosed Bat
Canidae	Canis lupus dingo	Dingo
Suidae	Sus scrofa	Pig

3.10 Amphibians

Due to the extremely dry conditions within the survey quadrats (potentially 6 months since the last rainfall), it was not surprising that few frog species were discovered. The only amphibians recorded were at Quadrat 1; the Green Tree Frog *Litoria caerulea* and the introduced Cane Toad *Rhinella marina*. All records were from desiccated specimens discovered within the dry creek bed.

3.11 Reptiles

Twelve reptile species were identified during the survey period within the project area, six of which constituted new species records for the NT Fauna Atlas database for the region (10 km radius). The five new records for the region are listed in **Table 5**, along with the Freshwater Crocodile *Crocodylus johnstoni*, which was recorded at Border Waterhole. The Freshwater Crocodile is listed as Migratory under the *EPBC Act 1999*, but is not listed under Northern Territory legislation (*TPWC Act*). The Gravelly Soil Ctenotus *Ctenotus lateralis* was caught within a pit trap in Quadrat 5. This skink is listed as Data Deficient (DD) under the *TPWC Act,* which means that further information is necessary in order to confirm whether this species should be considered to have conservation significance. The record of this Ctenotus at Quadrat 5 will supplement current distribution knowledge for this species when it is added to the NT Fauna Atlas.

Reptile diversity within the project area was reasonable when compared to other standard fauna surveys within the NT, which may be attributed to the fact that reptiles are able to make use of the habitat complexity within the project area by conserving moisture, thus not needing to travel regularly to water. It is worth noting that the Ridge-

tailed Monitors *Varanus acanthurus* discovered during the survey were of poor condition, indicating that they may only just see the dry season through each year.

3.12 Birds

The bird species identified within the project area totalled 52, which is reasonable relative to other standard fauna surveys within the NT. This may be attributed to the fact that birds a capable of covering larger distances than other vertebrates, and are thus able to utilise the habitat complexity provided within the project area and still travel back and forth from the water. Five birds recorded within 1 hour at Border Waterhole were not recorded within the survey period in the project area; Whistling Kite, Sulphur-crested Cockatoo, Rainbow Bee-eater, Jacky Winter, and Masked Woodswallow.

The Rainbow Bee-eater is listed as Migratory under the *EPBC Act*, thus it has conservation significance despite being reasonably common throughout the Northern Territory during times of migration. The Australian Bustard, listed as Vulnerable under the NT's *TPWC Act*, was recorded on several occasions adjacent the track between the survey quadrats and the camp located south of the project area.

Nine bird species previously recorded within the region under the NT Fauna Atlas were not recorded during the survey period within the project area, whilst 34 birds species recorded in the survey constituted new bird records for the region.

3.13 Mammals

Nine mammal species were identified within the project area; comprising five bat species identified through recorded calls, three introduced mammal species, Dingo, and Red Kangaroo. Three further mammal species were identified at Border Waterhole through analysis of hairs within collected scats (refer to **Appendix 8**); the Rock Ringtail Possum, Common Wallaroo, and the Purple-necked Rock Wallaby.

Cage and Elliot traps were not successful in trapping any small mammals. It is possible that the smaller mammals are not currently present within the area of the survey quadrats as they have moved closer to available water (i.e. Border Waterhole or the on-site waterhole to the north-east).

3.14 Introduced Fauna Species

The Infonet database search indicated several pest or potential pest species likely to occur within the project area (**Table 6**).

Table 6: Pest or Potential Pest species likely to occur within the area (Infonet Database)

Common Name	Scientific Name	NT Status
Cane Toad	*Rhinella marina*	Prohibited species (all exotic vertebrates except those listed as non-prohibited)
Asian House Gecko	*Hemidactylus frenatus*	Prohibited species
Rock Dove	*Columba livia*	Prohibited species
Red-tailed Black-Cockatoo	*Calyptorhynchus banksii*	Native species with pest potential
Sulphur-Crested Cockatoo	*Cacatua galerita*	Native species with pest potential
Agile Wallaby	*Macropus agilis*	Native species with pest potential

House Mouse	*Mus musculus*	Prohibited species
Black Rat	*Rattus rattus*	Prohibited species
Dingo / Wild dog	*Canis lupus*	Native species with pest potential
Cat	*Felis catus*	Prohibited species
Donkey	*Equus asinus*	Prohibited species
Horse	*Equus caballus*	Prohibited species
Pig	*Sus scrofa*	Prohibited species
Swamp Buffalo	*Bubalus bubalis*	Prohibited species
Cattle	*Bos indicus / Bos taurus*	Prohibited species

Of the species listed within **Table 6**, 2009 field surveys confirmed the presence of:

- **Cane Toads**;
- **Sulphur-Crested Cockatoo** (native species with pest potential at Border Waterhole);
- **Dingo / Wild dogs**;
- **Horses**;
- **Pigs**; and
- **Cattle**.

The scats and signs of these introduced species were widespread across the project area. Dead Cane Toads were recorded within the dry creek bed within Quadrat 1. Cattle impact is generally concentrated around water sources, but can range up to 10 kilometres away from the water source in less favourable foraging conditions (Howes & McAlpine 2006). Cattle impact was considerable around the identified water hole within the tenement area, and there was also some degree of cattle impact around Border Waterhole. There were varying degrees of cattle and horse impact at the survey quadrats, which seemed to relate more to ease of terrain rather than proximity to water:

- Quadrat 1: slope 7˚- moderate cow/horse impact;
- Quadrat 2: slope 5-30˚- minor cow/horse impact;
- Quadrat 3: slope 10˚- moderate cow/horse impact;
- Quadrat 4: slope 10˚- moderate cow/horse impact;
- Quadrat 5: slope 15˚- moderate to high cow/horse impact; and
- Quadrat 6: slope 20˚- nil impact from cow/horse.

4 MATTERS OF CONSERVATION SIGNIFICANCE

Several fauna species of current or potential conservation significance have been recorded within the project area, or within a 10 km radius of the project area. Several species of conservation significance have been identified through the EPBC database and Infonet database searches as potentially occurring within the project area, or having preferred habitat within the project area. All of these species of current or potential conservation significance that may occur, or have been previously recorded within the area are listed in

Table 7.

Species in

Table 7 that are associated with flowing watercourses, such as Freshwater Sawfish, Merten's Water Monitor, Gulf Snapping Turtle, Australian Painted Snipe, and Black Bittern are not considered likely to rely critically on the project area which does not contain permanent flowing watercourses. However, any impact to the ephemeral watercourses within the project area may well impact on downstream environs during the wet season, and watercourses downstream of the project area are likely to be inhabited by these species of conservation significance.

The data deficient status of the Gravelly Soil Ctenotus means that further information is necessary in order to confirm whether this species should be listed. The record of this Ctenotus at Quadrat 5 will therefore be duly noted to the Northern Territory's Parks and Wildlife Service to add to distribution knowledge for this species. The Near Threatened Long-haired Rat may be present within the project area, and may benefit from environmental management strategies detailed in the following paragraphs.

Table 7: Species of current or potential conservation significance that have been previously recorded or may occur within the project area

Species Name	Common Name	Listing	EPBC / Infonet/Atlas description
Pristis microdon	Freshwater Sawfish	**Vulnerable** (EPBC Act 1999 and TPWC Act 2000)	EPBC - Species or species habitat likely to occur within area
Varanus mertensi	Merten's Water Monitor	**Vulnerable** (TPWC Act)	Fauna Atlas – previously recorded within the project area
Elseya lavarackorum	Gulf Snapping Turtle	**Endangered** (EPBC Act 1999)	EPBC - Species or species habitat may occur within area
Ctenotus lateralis	Gravelly Soil Ctenotus	Data Deficient (TPWC Act)	Fauna Atlas – previously recorded within a 10km radius of the project area
Ixobrychus flavicollis	Black Bittern	Data Deficient (TPWC Act)	Fauna Atlas – previously recorded within the project area
Erythrura gouldiae	Gouldian Finch	**Endangered** (EPBC Act 1999 and TPWC Act 2000) and Migratory (EPBC Act 1999)	EPBC - Species or species habitat may occur within area
Rostratula australis	Australian Painted Snipe	**Vulnerable** (EPBC Act 1999 and TPWC Act 2000)	EPBC - Species or species habitat may occur within area
Haliaeetus leucogaster	White-bellied Sea-Eagle	Migratory (EPBC Act 1999)	EPBC - Species or species habitat likely to occur within area
Merops ornatus	Rainbow Bee-eater	Migratory (EPBC Act 1999)	EPBC - Species or species habitat may occur within area
Rhipidura rufifrons	Rufous Fantail	Migratory (EPBC Act 1999)	EPBC - Species or species habitat may occur within area
Ardeotis australis	Australian Bustard	**Vulnerable** (TPWC Act 2000)	Infonet – potentially occur within the area
Pezoporus occidentalis	Night Parrot	**Critically Endangered** (TPWC Act 2000) and Endangered (EPBC Act 1999)	Infonet – potentially occur within the area
Rattus villosissimus	Long-haired Rat	Near Threatened (TPWC Act)	Fauna Atlas – previously recorded within a 10km radius of the project area

Migratory Wetland and Migratory Marine species are also listed under the EPBC database as potentially occurring within the region, however as marine habitat is definitely not within the project area, and significant wetland habitat is not recorded within the project area, the presence of these species within the project area is not considered likely:

- Great Egret, White Egret *Ardea alba;*
- Cattle Egret *Ardea ibis;*
- Oriental Plover, Oriental Dotterel *Charadrius veredus;*
- Oriental Pratincole *Glareola maldivarum;*
- Little Curlew, Little Whimbrel *Numenius minutes;*
- Painted Snipe *Rostratula benghalensis s. lat.;* and
- Fork-tailed Swift *Apus pacificus.*

Table 8 prioritises the species listed in

Table 7 for management action according to their conservation status, and the likelihood that they may be impacted by future mining activities within the project area.

Table 8: Prioritisation of species to be considered, including preferred habitat

Nominal Priority	Species Name	Common Name	Listing	Habitat and description	Likelihood of Presence	Potential impact
1	*Erythrura gouldiae*	Gouldian Finch	Endangered (*EPBC Act 1999* and *TPWC Act 2000*) and Migratory (*EPBC Act 1999*)	Open tropical woodland that has a grassy understorey, often in hilly areas	Possible	Direct (habitat loss)
2	*Ardeotis australis*	Australian Bustard	Vulnerable (*TPWC Act 2000*)	Tropical open grassland, grassy woodland, pastoral land, crops	Presence Confirmed	Direct (habitat loss)
3	*Rattus villosissimus*	Long-haired Rat	Near Threatened (*TPWC Act 2000*)	Mesic, densely vegetated sites, but can inhabit range of habitats	Possible	Direct (habitat loss)
4	*Varanus mertensi*	Merten's Water Monitor	Vulnerable (*TPWC Act*)	Inland waters, however it is also a climber and inhabits rocks and trees near water. Major threat currently facing these Monitors is the Cane Toad	Unlikely – no permanently flowing streams in the area	Indirect (upstream impacts)
5	*Elseya lavarackorum*	Gulf Snapping Turtle	Endangered (*EPBC Act 1999*)	Freshwater rivers and creeks of the region, threatened by stock and feral pigs	Low – no permanently flowing streams in the area	Indirect (upstream impacts)
6	*Rostratula australis*	Australian Painted Snipe	Vulnerable (*EPBC Act 1999* and *TPWC Act 2000*)	Marsh with moderate cover	Low – preferred habitat not present	Indirect (upstream impacts)
7	*Pristis microdon*	Freshwater Sawfish	Vulnerable (*EPBC Act 1999* and *TPWC Act 2000*)	Freshwater rivers and creeks of the region	Low – no permanently flowing streams in the area	Indirect (upstream impacts)
8	*Ctenotus lateralis*	Gravelly Soil Ctenotus	Data Deficient (TPWC Act)	Fauna Atlas – previously recorded within a 10km radius of the project area	Presence Confirmed	Direct (habitat loss)
9	*Merops ornatus*	Rainbow Bee-eater	Migratory (*EPBC Act 1999*)	Open country, most vegetation types, sand dunes and banks	Presence confirmed nearby to project area	Direct (habitat loss)
10	*Rhipidura rufifrons*	Rufous Fantail	Migratory (*EPBC Act 1999*)	Prefers wetter forest, possibly riparian areas within the project area	Unlikely – wetter forest was not identified within the area	Direct (habitat loss)
11	*Pezoporus occidentalis*	Night Parrot	Critically Endangered (*TPWC Act 2000*) and Endangered (*EPBC Act 1999*)	Inland plains, breakaways, samphire about salt lakes – project area is north and outside its known distribution	Low – due to Parrot's more southern distribution and lack of preferred habitat within the area	Direct (habitat loss)
12	*Haliaeetus leucogaster*	White-bellied Sea-	Migratory (*EPBC Act 1999*)	Large rivers, and inland waters	Low – no preferred habitat	Indirect (upstream

Nominal Priority	Species Name	Common Name	Listing	Habitat and description	Likelihood of Presence	Potential impact
		Eagle				impacts)

**Colour coded dark blue; presence within the project area is confirmed or possible, through to light blue; likelihood of presence is low.*

The species of potential or current conservation significance identified within **Table 8** as possibly residing within the project area are discussed in further detail in the following sections.

4.1 Gouldian Finch

The Gouldian Finch was not recorded during this survey, despite the fact that, according to research, the survey timing was ideal for sighting Gouldians in that area. In addition, during over two years of history on the project area, exploration personnel have never sighted Gouldians. The Gouldian's preferred habitat; Snappy Gum woodland, is common within the project area, although Gouldian distribution is likely to be restricted to the North-east corner of the project area due to the lack of available water elsewhere (refer to

Figure 8).

The Gouldian Finch *Erythrura gouldiae* is listed as nationally Endangered due to anecdotal and quantitative evidence of range contraction and population decline (Woinarski *et al.* 2007). The endangered listing within the Northern Territory's *TPWC Act* is due to an estimated total population of less than 2500 mature individuals in the NT, with no subpopulation containing more than 250 mature individuals, and evidence of continued decline in population numbers.

Breeding habitat (critical habitat) for Gouldians in the Northern Territory is typically rocky hills with hollow-bearing smooth-barked gums (the Snappy Gum woodland over the rocky hills of the project area fits this description) within **two to four** kilometres of small waterholes or springs that persist throughout the dry season (O'Malley 2006).

The Gouldians occupy two different landscape components on an annual cycle (Dostine *et al.* 2001), generally including wooded hills containing Snappy or Salmon Gums in the dry season (February to October) and lowland drainages with perennial grasses during the wet season (mid December till February) (Woinarski *et al.* 2007). This seasonal movement has led to their additional listing as Migratory under the *EPBC Act* 1999.

Refer to

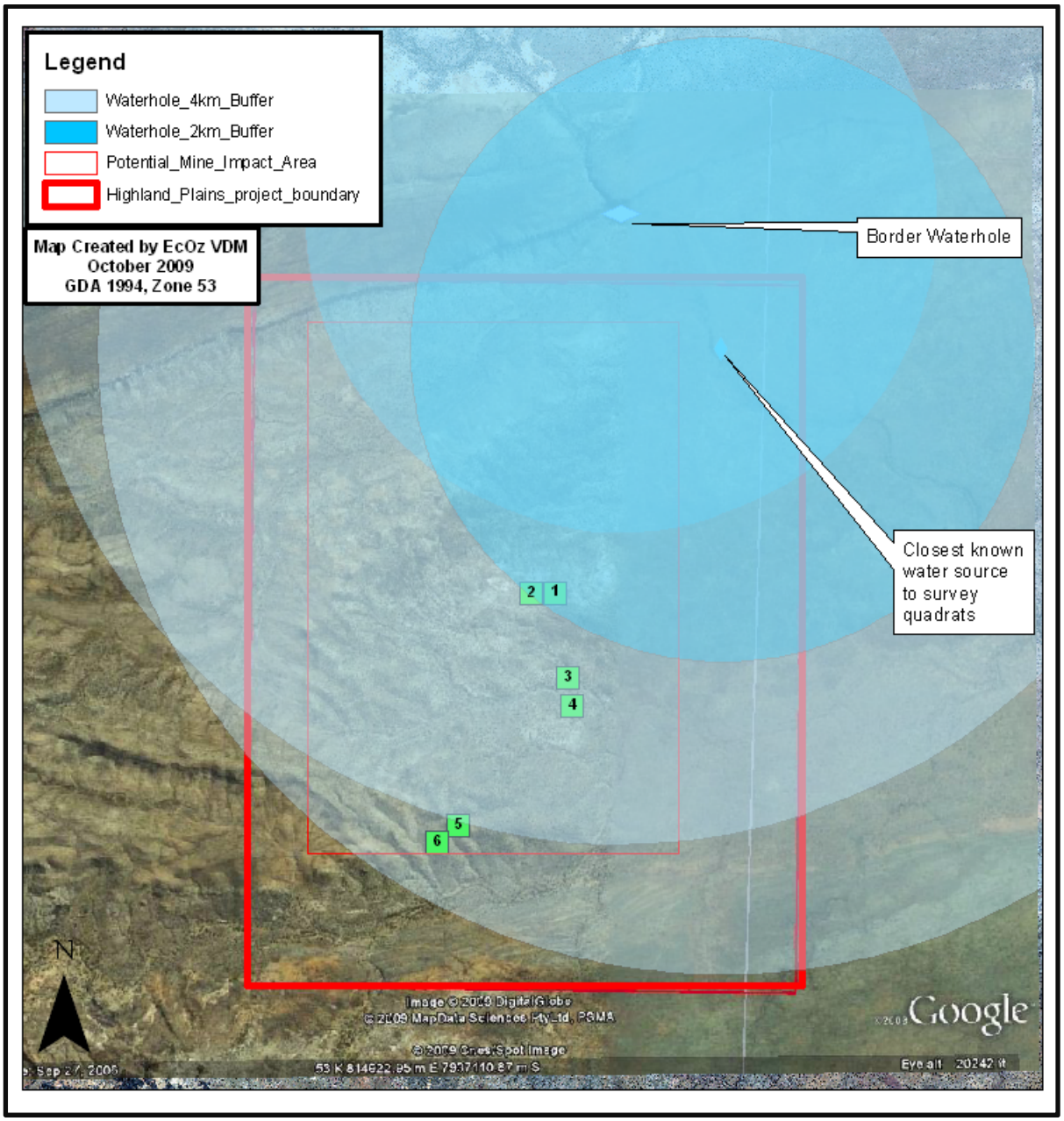
Figure 8 below for potential Gouldian Finch range within the project area, based on the assumption that the identified waterhole is the only source of semi-permanent water within the project area, and that finches are likely to inhabit areas within 2 km and no further than 4 km from water.

There are a variety of threatening processes contributing to Gouldian Finch decline within the Northern Territory, the major threatening process is impact on Gouldian food resources (Woinarski *et al.* 2007). Grazing pressure from livestock and other introduced grazing species, and changes due to alterations from natural fire regimes are believed to be the primary sources of impact on Gouldian food resources. Other threatening processes to the Gouldian Finch include the parasitic mite *Sternostoma tracheacolum*, finch trapping for illegal pet trades, and habitat reduction (Woinarski *et al.* 2007).

The Gouldian Finch has been studied for over two decades, resulting in a number of published scientific papers and reports, and implementation of action plans for the recovery of the species (Dostine 1998; Dostine *et al.* 2001; Franklin 1999; Franklin *et al.* 2005; O'Malley 2006; PWCNT 1994, 2001; Woinarski & Tidemann 1991, 1992; Woinarski *et al.* 2005).

O'Malley (2006) suggests that the best management strategies to conserve Gouldian habitat would involve reducing grazing pressure and improving fire regimes such that hot, late dry season fires are minimised. These management strategies are also likely to improve habitat quality for a variety of other threatened or near threatened species that potentially inhabit the area, such as the Australian Bustard and the Long-haired Rat.

Figure 8: Potential Gouldian Finch Distribution within the Project Area



4.2 Long-haired Rat

This species is renowned for spectacular population fluctuations relating to food availability in the arid regions which it inhabits (Van Dyck & Strahan 2008). It often occurs in densely vegetated habitats, but during plagues can inhabit all inland habitats (DEC 2005). The Long-haired Rat *Rattus villosissimus* was not recorded during the survey period, however it has been recorded previously within the project area (NT Fauna Atlas in 1967). This rat may be present within the project area but was not trapped due to the fact that the available water was some distance from the survey sites. Listed as Near Threatened under the *TPWC Act 2000*, *Rattus villosissimus* could have conservation significance in the near future (it is already considered Vulnerable in New South Wales).

4.3 Rainbow Bee-eater

The Rainbow Bee-eater *Merops ornatus* was recorded at Border Waterhole during the survey period. Due to the close proximity of this waterhole to the project area, it is considered likely that the Bee-eaters may utilise habitat within the project area at various times of the year. Rainbow Bee-eaters are generally a common and wide-spread species in Australia. They are listed as Migratory under the *EPBC Act*, and thus are of Commonwealth conservation significance.

Their preferred habitat includes; open woodlands with sandy soil, sand ridges, riverbanks, beaches, mangroves and rainforests (Morcombe 2008). Open woodland is a common habitat type within the project area, however it is also common throughout the region, thus the project area is unlikely to constitute critical habitat for this species.

4.4 Australian Bustard

Several individual Australian Bustards *Ardeotis australis* were recorded within the southern reaches of the project area (not within the area of potential impact), including a family group.

The Bustard's preferred habitat includes open country, grasslands, shrublands, grassy woodlands and other structurally similar habitats (Woinarski *et al.* 2007). Bustards range widely and tend to track rainfall, fire and food resources, and can fly large distances in search of suitable country for these purposes. The Bustard is listed as Vulnerable in the Northern Territory due to their population declining by more than 30% over the past 10 years. However, populations outside of the Northern Territory are still relatively substantial, and this species is common in the region of the project area. Major threats to this species include predation, altered fire regimes, hunting, habitat disturbance, pesticides and grazing (Woinarski *et al.* 2007). Of these threats, habitat disturbance may be the only threat posed by exploration activities, however the area of disturbance is minimal, and the project area comprises only a small portion of available habitat in the region.

4.5 Gravelly Soil Ctenotus

A Gravelly Soil Ctenotus *Ctenotus lateralis* was caught within a pit trap at Quadrat 5. This species is listed as Data Deficient under the *TPWC Act.* A Data Deficient listing is given to species for which available data is insufficient to understand whether the animal is threatened or locally common. This species may well be locally common, however

until further information on this skink is available, potential impacts to its habitat should be managed until further studies can be undertaken.

5 SURVEY AND STUDY LIMITATIONS

Single standard fauna surveys, such as that conducted within the project area and discussed in this report, do not claim to provide a comprehensive list of species that occupy the area. Despite the fact that this survey methodology is current best practice within the Northern Territory, there are limitations associated with this survey methodology, as listed below.

- The results of flora and fauna surveys are only a snapshot in time, and do not allow for spatial and temporal variations or species migrations;
- Scats cannot always be correctly attributed to species, however where they can be confidently identified, they provide an accurate indication of the presence and habitat preferences of certain species (Telfer *et al.* 2006).
- Detection of nocturnal species by spotlight potentially only detects about 25% of the animals present (e.g. Goldingay & Sharpe 2004), and is affected by environmental factors (Wayne *et al.* 2005). Specific survey conditions can be selected to improve spotlight detection efficiency (Wayne *et al.* 2005).
- Read & Moseby (2001a) concluded that environmental factors affect the capture rates of small reptiles. Unfortunately, planning logistics for fauna surveys such as this around specific environmental conditions is very difficult. Planning to survey in the dry season allows the best chance of favourable environmental conditions.
- The trap types and trapping methodologies utilised in this study do not necessarily provide an unbiased or complete indication of species diversity within an area (Cunningham *et al*. 2005, Read & Moseby 2001b, Thompson *et al*. 2005).
- Species lists of the more dominant species in each survey quadrat were compiled to create the flora inventory for this survey, thus this inventory is by no means a comprehensive flora species list for the whole project area.

On top of these expected limitations, the seasonal timing of this field survey was toward the end of the dry, when very little water was available for resident fauna. The closest available water source discovered during the survey period was approximately 1.8 kilometres from the closer quadrats; Quadrats 1 and 2, and was over 3.4 kilometres from the further quadrats; Quadrats 5 and 6 (closer water sources undetected during the survey period may be available to some fauna species).

It is possible that trapping success was reduced due to the fact that fauna species that would reside in the vicinity of the survey quadrats during wetter months had migrated to the on-site waterhole to the north-east of the project area, or outside the project area to Border Waterhole. It is also possible that some species, particularly amphibians, were conserving their own water stores by remaining inactive and / or buried underground. In summary, the timing of this survey and the distance of the survey area from available water may have limited the diversity of species detected.

6 CONCLUSION AND RECOMMENDATIONS

Despite dry conditions, a reasonable diversity of plant, bird and reptile species were recorded during field surveys within the project area.

Habitat within the project area is not currently considered to be of conservation significance, and similar habitat types are widespread within the greater region. Only one species of conservation significance, the Australian Bustard (listed as Vulnerable within the NT) was recorded during the surveys. Apart from Migratory species, species of conservation significance were not recorded during brief bird, reptile, and scat searches at nearby available water sources (anticipated to attract animals from the surrounding region at that time of year) within or near the project area. It is therefore expected that the project area is unlikely to provide critical habitat for any species of conservation significance, even at times when water is more readily available.

There is potential for species of conservation significance to pass through or inhabit the project area on occasion. For example, although never sighted during the exploration history of the project area, there is a small chance that the Gouldian Finch may utilise the north-eastern corner of the project area on occasion. Several species confirmed as being present or likely to be present in the area are of Migratory Significance (Rainbow Bee-eater) or may be of conservation significance in the future (Gravelly Soil Ctenotus and Long-haired Rat).

As the holder of an exploration lease over the area Phosphate Australia is limited in the actions that it can take to influence environmental and land management issues other than those that may be impacted by their direct actions, i.e. avoid fire resulting from exploration activities, and ensure that machinery and vehicles are not spreading weeds. However, the pastoral lease holder or indigenous landholder is the only person with the rights to manage fire regimes. Land management responsibilities will upscale to a certain degree should the area become a mining lease in the future.

At this stage, exploration activities are not carried out in or near waterways. Should mining activities commence in the future, erosion and sedimentation mitigation measures must be implemented to minimise impacts on species of conservation significance that are known to inhabit downstream reaches of the ephemeral waterways within the project area.

6.1 Recommendations

- Future activities within the project area will need to involve adequate environmental management strategies on the basis that; a diversity of native species inhabits the area, the Australian Bustard inhabits the area (listed as Vulnerable in the NT), and several other species of conservation significance may inhabit the area or be impacted upon by activities.
- Personnel involved in any future mining activities must be made aware of the potential impacts of erosion, sedimentation and pollution of waterways, and management or mitigation measures to avoid impacting upon aquatic species of conservation significance that may inhabit downstream waterways.
- Phosphate Australia and any future project area managers should minimise the spread of any introduced species through exploration activities wherever possible.
- Exploration environmental management strategies for the tenement (in order to protect the Vulnerable Australian Bustard (resident) and the Endangered Gouldian

Finch (potentially resident) should involve minimising risk of bushfire as a result of exploration activities. Ideally, land management by the pastoral leaseholder, or traditional owners or mining companies in the future, would involve minimising late dry season fires (which are often intense due to dry conditions and high fuel loads).

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Appendix 1
Habitat Descriptions for Survey Quadrats

Quadrat	Easting (WGS84 Z53)	Northing (WGS84 Z53)	Landform, slope and aspect	Disturbance Type and Extent	Rock Size and Type	Soil Drainage, Description	Tree Hollows	Fallen Logs (>50cm)	Vegetation Description	Structural formation	Upper Stratum Species			Mid Stratum Species			Lower stratum Species		
											% Cover	Height Range (m)		% Cover	Height Range (m)		% Cover	Height Range (m)	
												Av. Height (m)			Av. Height (m)			Av. Height (m)	
Q1	815389	7936997	Hillock, Creek, north east, 7°	Erosion present in the creekline	2-10% <0.6cm, 10-20% 0.6-2cm, 20-50% 2-6cm, 20-50% 6-20cm, <2% 20-60cm. Phosphate, dolomitic.	Drains moderately well, brown, sandy clay.	Common (6-10)	Common (6-10)	Eucalyptus leucophloia subsp. euroa open woodland on north east facing hillock bordering an ephemeral creekline	Open Woodland	10	3-9 6	*Eucalyptus leucophloia subsp. euroa, Corymbia terminalis*	3	0.6-3 1.5	*Flueggea virosa, Eucalyptus leucophloia subsp. euroa, Cleome viscosa, Senna planitiicola, Carissa lanceolata, Senna notabilis*	30	0-0.6 0.4	*Triodia bitextura, Schizachyrium fragile, Bothriochloa ? pertusa, Themeda triandra, Heteropogon contortus , Eulalia aurea, Sporobolus australasicus, Aristida inaequiglumis, Cymbopogon bombycinus, Acacia phlebocarpa, Sida rohlenae subsp. rohlenae, Eriachne ciliata, Brachyachne ambigua, Mnesithea formosa, Panicum seminudum, Crotalaria montana var. angustifolia, Triumfetta albida, Bulbostylis barbata, Sida sp., Ipomoea polymorpha, Neptunia sp., Operculina aequisepala, Ipomoea plebeia*
Q2	815235	7936991	Lower, and mid slope, ridge, upper slope, North, 5-30°	Erosion present in drainage line and on hillside	2-10% <0.6cm, 10-20% 0.6-2cm, 20-50% 2-6cm, 20-50% 6-20cm, 20-50% 20-60cm, 2-10% 60cm-2m, 2-10% outcrop. Phosphate, dolomitic	Drains moderately well, brown, light medium clay.	Scattered (1-5)	Scattered (1-5)	Eucalyptus leucophloia subsp. euroa open woodland on north facing hillside ridge bordering an ephemeral drainage line	Open Woodland	7	3-6 4	*Eucalyptus leucophloia subsp. euroa,*	5	0.6-3 1.5	*Petalostigma nummularium, Eucalyptus leucophloia subsp. euroa, Cleome viscosa*	40	0-0.6 0.4	*Triodia bitextura, Schizachyrium fragile, Eriachne ciliata, Eulalia aurea, Themeda triandra, Senna planitiicola, Enneapogon oblongus, Streptoglossa bubakii, Ipomoea plebeia, Mnesithea formosa, Sida rohlenae subsp. rohlenae, Sporobolus australasicus, Cenchrus ciliaris, Brachyachne ambigua, Indigofera colutea, Acacia lycopodiifolia, Uraria logopodiodes, Hibiscus meraukensis, Ipomoea polymorpha, Acacia wickhamii subsp. parviphyllodinea*
Q3	815470	7936450	Hillock, lower slope, creek, south, 10°	Erosion present in drainage line. Weeds present (*Centrus ciliaris).*	2-10% <0.6cm, 10-20% 0.6-2cm, 20-50% 2-6cm, 10-20% 6-20cm, 2-10% 20-60cm. Chert.	Drains moderately well, brown, light medium clay.	Common (6-10)	Abundant (> 10)	Eucalyptus leucophloia subsp. euroa and E. pruinosa open woodland on south facing hillock bordering an ephemeral creek line	Open Woodland	15	9-4 7	*Eucalyptus leucophloia subsp. euroa, Eucalyptus pruinosa, Corymbia terminalis*	10	4-0.6 3	*Eucalyptus pruinosa, Atalaya hemiglauca, Flueggea virosa, Carissa lanceolata, Acacia hemignosta, Cleome viscosa, Bauhinia cunninghamii, Abutilon hannii, Capparis lasiantha, Santalum lanceolatum*	50	0.6-0 0.4	*Triodia bitextura, Enneapogon polyphyllus, Sehima nervosum, Eulalia aurea, Pterocaulon serrulatum, Polycarpaea spirostylis, Bulbostylis barbata, Mnesithea formosa, Sporobolus australasicus, Cymbopogon bombycinus, Cenchrus ciliaris, Enneapogon oblongus, Sida sp., Amaranthus cochleitepalus, Panicum seminudum, Acacia phlebocarpa, Ipomoea plebeia, Themeda triandra*

Quadrat	Easting (WGS84 Z53)	Northing (WGS84 Z53)	Landform, slope and aspect	Disturbance Type and Extent	Rock Size and Type	Soil Drainage, Description	Tree Hollows	Fallen Logs (>50cm)	Vegetation Description	Structural formation	Upper Stratum Species			Mid Stratum Species			Lower stratum Species		
											% Cover	Height Range (m)		% Cover	Height Range (m)		% Cover	Height Range (m)	
												Av. Height (m)			Av. Height (m)			Av. Height (m)	
Q4	815498	7936272	Hillock, lower slope, creek, south east , 10°	Erosion present in drainge lines. Weeds present (*Centrus ciliaris* & *Bothriochloa pertusa*).	2-10% <0.6cm, 10-20% 0.6-2cm, 20-50% 2-6cm, 20-50% 6-20cm, Chert.	Drains moderately, brown, medium heavy clay.	Scattered (1-5)	Common (6-10)	Eucalyptus leucophloia subsp. euroa and E. pruinosa open woodland on south east facing hillock bordering an ephemeral creek line	Open woodland	8	8-4 6	*Eucalyptus leucophloia subsp. euroa, Eucalyptus pruinosa, Corymbia terminalis*	3	4-0.6 3	*Cleome viscosa, Eucalyptus pruinosa, Abutilon hannii, Atalaya hemiglauca, Acacia hemignosta, Terminalia canescens*	40	0.6-0 0.4	*Triodia bitextura, Eulalia aurea, Pterocaulon serrulatum, Mnesithea formosa, Enneapogon polyphyllus, Bulbostylis barbata, Cymbopogon bombycinus, Bothriochloa pertusa, Themeda triandra, Crotalaria montana, Polycarpaea spirostylis, Sporobolus australasicus, Enneapogon oblongus, Amaranthus cochleitepalus*
Q5	814765	7935512	Upper slope, north, 15°	Weeds present (*Centrus ciliaris*)	10-20% <0.6cm, 20-50% 0.6-2cm, 20-50% 2-6cm, 10-20% 6-20cm, 2-10% 20-60cm. Chert.	Drains rapidly, brown, light medium clay.	Absent	Scattered (1-5)	Eucalyptus leucophloia subsp. euroa and E. pruinosa open woodland on north facing upper slope	Open woodland	8	7-4 6	*Eucalyptus leucophloia subsp. euroa, Eucalyptus pruinosa*	8	4-0.6 2	*Atalaya hemiglauca, Eucalyptus leucophloia subsp. euroa, Eucalyptus pruinosa, Eremophila longifolia, Santalum lanceolatum, Flueggea virosa, Petalostigma nummularium, Cleome viscosa, Terminalia aridicola, Abutilon hannii, Maytenus cunninghamii*	80	0.6-0 0.4	*Enneapogon polyphyllus, Triodia bitextura, Cenchrus ciliaris, Bothriochloa pertusa, Eulalia aurea, Mnesithea formosa, Sehima nervosum, Triumfetta albida, Indigofera colutea, Themeda triandra, Enneapogon oblongus, Marsdenia australis, Heliotropium sp.*
Q6	814634	7935403	Ridge, upper slope, south west, 20°	Weeds present (Centrus ciliaris)	<2% <0.6cm, <2% 06.2cm, 20-50% 2-6cm, 20-50% 6-20cm, 2-10% 60cm-2m, <2% >2m, 2-10% outcrop. Chert.	Drains rapidly, brown, light medium clay.	Absent	Absent	Eucalyptus leucophloia subsp. euroa and Corymbia flavescens open woodland on south west facing ridge on upper slope	Open woodland	3	7-5 6	*Eucalyptus leucophloia subsp. euroa, Corymbia flavescens*	5	5-0.6 3	*Corymbia flavescens, Cleome viscosa, Eucalyptus leucophloia subsp. euroa, Eucalyptus pruinosa, Flueggea virosa, Abutilon hannii*	70	0.6-0 0.4	*Triodia bitextura, Sehima nervosum, Cenchrus ciliaris, Eulalia aurea, Enneapogon oblongus, Enneapogon sp., Triumfetta albida, Bothriochloa pertusa, Bulbostylis barbata, Eriachne mucronata, Polycarpaea spirostylis, Amaranthus cochleitepalus, Crotalaria novae-hollandiae , Pterocaulon serrulatum, Tephrosia leptoclada, Cymbopogon bombycinus, Sporobolus australasicus, Indigofera colutea, Tephrosia delestangii*

Appendix 2
Flora Species List, October 2009

Family	Species	NT Flora Atlas (within project area)
AMARANTHACEAE	*Amaranthus cochleitepalus*	X
APOCYNACEAE	*Carissa lanceolata*	
APOCYNACEAE	*Marsdenia australis*	
ASTERACEAE	*Pterocaulon serrulatum*	X
ASTERACEAE	*Streptoglossa bubakii*	
BORAGINACEAE	*Heliotropium sp.*	
CAESALPINIACEAE	*Senna notabilis*	
CAESALPINIACEAE	*Senna planitiicola*	
CAPPARACEAE	*Capparis lasiantha*	
CAPPARACEAE	*Cleome viscosa*	X
CARYOPHYLLACEAE	*Polycarpaea spirostylis*	
CELASTRACEAE	*Maytenus cunninghamii*	
COMBRETACEAE	*Terminalia aridicola*	
COMBRETACEAE	*Terminalia canescens*	
CONVOLVULACEAE	*Ipomoea plebeia*	
CONVOLVULACEAE	*Ipomoea polymorpha*	
CONVOLVULACEAE	*Operculina aequisepala*	
CYPERACEAE	*Bulbostylis barbata*	
EUPHORBIACEAE	*Flueggea virosa*	X
EUPHORBIACEAE	*Petalostigma nummularium*	
FABACEAE	*Bauhinia cunninghamii*	
FABACEAE	*Crotalaria montana var. angustifolia*	X
FABACEAE	*Crotalaria novae-hollandiae*	X
FABACEAE	*Indigofera colutea*	X
FABACEAE	*Neptunia sp.*	
FABACEAE	*Tephrosia delestangii*	
FABACEAE	*Tephrosia leptoclada*	
FABACEAE	*Uraria lagopodiodes*	
MALVACEAE	*Abutilon hannii*	
MALVACEAE	*Hibiscus meraukensis*	
MALVACEAE	*Sida rohlenae subsp. rohlenae*	
MALVACEAE	*Sida sp.*	
MIMOSACEAE	*Acacia hemignosta*	
MIMOSACEAE	*Acacia lycopodiifolia*	
MIMOSACEAE	*Acacia phlebocarpa*	X
MIMOSACEAE	*Acacia wickhamii subsp. parviphyllodinea*	X
MYOPORACEAE	*Eremophila longifolia*	
MYRTACEAE	*Corymbia flavescens*	X
MYRTACEAE	*Corymbia terminalis*	
MYRTACEAE	*Eucalyptus leucophloia subsp. euroa*	
MYRTACEAE	*Eucalyptus pruinosa*	
POACEAE	*Aristida inaequiglumis*	
POACEAE	**Bothriochloa pertusa*	
POACEAE	*Brachyachne ambigua*	
POACEAE	**Cenchrus ciliaris*	
POACEAE	*Cymbopogon bombycinus*	
POACEAE	*Enneapogon oblongus*	
POACEAE	*Enneapogon polyphyllus*	
POACEAE	*Enneapogon sp.*	
POACEAE	*Eriachne ciliata*	X
POACEAE	*Eriachne mucronata*	
POACEAE	*Eulalia aurea*	
POACEAE	*Heteropogon contortus*	

Family	Species	NT Flora Atlas (within project area)
POACEAE	*Mnesithea formosa*	
POACEAE	*Panicum seminudum*	
POACEAE	*Schizachyrium fragile*	
POACEAE	*Sehima nervosum*	X
POACEAE	*Sporobolus australasicus*	
POACEAE	*Themeda triandra*	
POACEAE	*Triodia bitextura*	
SANTALACEAE	*Santalum lanceolatum*	
SAPINDACEAE	*Atalaya hemiglauca*	
TILIACEAE	*Triumfetta albida*	

* Repesents Introduced

Appendix 3
Fauna Trapping Results

Family	Scientific name	Common name	Q1				Q2				Q3				Q4				Q5				Q6			
			Elliot	Cage	Funnel	Pit	Elliot	Cage	Funnel	Pit	Elliot	Cage	Funnel	Pit	Elliot	Cage	Funnel	Pit	Elliot	Cage	Funnel	Pit	Elliot	Cage	Funnel	Pit
GEKKONIDAE	*Heteronotia binoei*	Bynoe's Gecko				1																				2
GEKKONIDAE	*Gehyra nana*	Northern Spotted Rock Dtella				1												1								1
GEKKONIDAE	*Diplodactylus conspicillatus*	Fat-tailed Gecko																1								
SCINCIDAE	*Ctenotus lateralis*	Gravelly Soil Ctenotus																1								
SCINCIDAE	*Menetia maini*	Main's Menetia																1								
AGAMIDAE	*Amphilbolurus gilberti*	Gilbert's Dragon															1									
VARANIDAE	*Varanus acanthurus*	Ridge-tailed Monitor																							1	

Appendix 4
Fauna Survey Active Search Results

Family	Scientific Name	Common Name	Site 1 Search	Site 2 Search	Site 3 Search	Site 4 Search	Site 5 Search	Site 6 Search	Within Project Area	Border Waterhole	Total by Class
AMPHIBIANS											
Hylidae	Litoria caerulea	Green Tree-frog	1 R								
Bufonidae	Chaunus marinus	Cane Toad	4 R								2
REPTILES											
Crocodylidae	Crocodylus johnstoni	Freshwater Crocodile								6	
Gekkonidae	Gehyra australis	Northern Dtella			1						
Gekkonidae	Gehyra nana	Northern Spotted Rock Dtella		1				1			
Gekkonidae	Oedura rhombifer	Zig-zag Gecko						1			
Agamidae	Amphibolurus gilberti	Gilbert's Dragon							3	1	
Agamidae	Chlamydosaurus kingii	Frilled Lizard							2		
Agamidae	Ctenophorus nuchalis	Central Netted Dragon							1		
Agamidae	Diporiphora lalliae								1		
Varanidae	Varanus acanthurus	Ridge-tailed Monitor			1						9
BIRDS											
Phasianidae	Coturnix ypsilophora	Brown Quail					X				
Anhingidae	Anhinga novaehollandiae	Australasian Darter							X	X	
Phalacrocoracidae	Phalacrocorax varius	Pied Cormorant							X		
Phalacrocoracidae	Phalacrocorax sulcirostris	Little Black Cormorant							X		
Ardeidae	Ardea intermedia	Intermediate Egret							X		
Ardeidae	Nycticorax caledonicus	Nankeen Night-Heron							X	X	
Otididae	Ardeotis australis	Australian Bustard							X		
Accipitridae	Milvus migrans	Black Kite				X	X	X	X		
Accipitridae	Haliastur sphenurus	Whistling Kite								X	
Accipitridae	Accipiter fasciatus	Brown Goshawk							X		
Accipitridae	Accipiter cirrhocephalus	Collared Sparrowhawk							X		
Falconidae	Falco berigora	Brown Falcon							X		
Columbidae	Geopelia placida	Peaceful Dove							X	X	
Columbidae	Geopelia cuneata	Diamond Dove	X	X	X				X		
Columbidae	Ocyphaps lophotes	Crested Pigeon							X		
Columbidae	Geophaps plumifera	Spinifex Pigeon							X		
Cacatuidae	Calyptorhynchus banksii macrorhynchus	Red-tailed Black-cockatoo							X		
Cacatuidae	Eolophus roseicapilla	Galah							X		
Cacatuidae	Cacatua galerita	Sulphur-crested Cockatoo								X	
Cacatuidae	Nymphicus hollandicus	Cockatiel		X	X	X			X	X	
Psittacidae	Melopsittacus undulatus	Budgerigar							X		
Psittacidae	Barnardius zonarius	Australian Ringneck							X		
Cuculidae	Centropus phasianinus	Pheasant Coucal							X		
Eurostopdidae	Eurostopodus argus	Spotted Nightjar			X						
Halcyonidae	Dacelo leachii	Blue-winged Kookaburra							X		
Meropidae	Merops ornatus	Rainbow Bee-eater								X	
Halcyonidae	Todiramphus pyrrhopygius	Red-backed Kingfisher	X					X			
Halcyonidae	Todiramphus sanctus	Sacred Kingfisher							X	X	
Maluridae	Malurus melanocephalus	Red-backed Fairy-wren							X		
Acanthizidae	Smicrornis brevirostris	Weebill	X	X	X	X	X	X			
Meliphagidae	Philemon argenticeps	Silver-crowned Friarbird		X	X					X	

Family	Scientific Name	Common Name	Site 1 Search	Site 2 Search	Site 3 Search	Site 4 Search	Site 5 Search	Site 6 Search	Within Project Area	Border Waterhole	Total by Class
Meliphagidae	Manorina flavigula	Yellow-throated Miner							X		
Meliphagidae	Lichenostomus flavescens	Yellow-tinted Honeyeater			X				X	X	
Meliphagidae	Lichenostomus plumulus	Grey-fronted Honeyeater							X		
Meliphagidae	Melithreptus albogularis	White-throated Honeyeater								X	
Meliphagidae	Lichmera indistincta	Brown Honeyeater							X	X	
Meliphagidae	Conopophila rufogularis	Rufous-throated Honeyeater			X	X				X	
Pomatostomidae	Pomatostomus temporalis	Grey-crowned Babbler			X				X		
Petroicidae	Microeca fascinans	Jacky Winter								X	
Pachycephalidae	Colluricincla harmonica	Grey Shrike-thrush			X				X		
Rhipiduridae	Rhipidura leucophrys	Willie Wagtail		X	X		X	X		X	
Monarchidae	Myiagra inquieta	Restless Flycatcher							X		
Monarchidae	Grallina cyanoleuca	Magpie-lark							N		
Ptilonorhynchidae	Ptilonorhynchus nuchalis	Great Bowerbird							X		
Campephagidae	Coracina novaehollandiae	Black-faced Cuckoo-shrike	X						X		
Campephagidae	Coracina papuensis	White-bellied Cuckoo-shrike			X	X			X		
Campephagidae	Lalage sueurii	White-winged Triller		X	X	X	X				
Artamidae	Artamus personatus	Masked Woodswallow								X	
Artamidae	Artamus cinereus	Black-faced Woodswallow	X					X	X		
Artamidae	Artamus minor	Little Woodswallow				X					
Artamidae	Cracticus torquatus	Grey Butcherbird							X		
Artamidae	Cracticus nigrogularis	Pied Butcherbird	X	X	X	X		X			
Artamidae	Cracticus tibicen	Australian Magpie							X		
Corvidae	Corvus orru	Torresian Crow				X					
Megaluridae	Cincloramphus mathewsi	Rufous Songlark							X		
Estrildidae	Taeniopygia bichenovii	Double-barred Finch							X		
Estrildidae	Taeniopygia guttata	Zebra Finch	X						X	X	
Estrildidae	Poephila acuticauda	Long-tailed Finch							X		58
MAMMALS											
Pseudocheiridae	Petropseudes dahli	Rock Ringtail								S	
Macropodidae	Macropus robustus	Common Wallaroo								S	
Macropodidae	Macropus rufus	Red Kangaroo							2		
Macropodidae	Petrogale purpureicollis	Purple-necked Rock Wallaby								S	
Emballonuridae	Taphozous georgianus	Common Sheath-tailed Bat							A		
Molossidae	Chaerephon jobensis	Northern Free-tailed Bat							A		
Vespertilionidae	Chalinolobus gouldii	Gould's Wattled Bat							A		
Vespertilionidae	Chalinolobus nigrogriseus	Hoary Wattled Bat							A*		
Vespertilionidae	Scotorepens greyii	Little Broad-nosed Bat							A*		
Canidae	Canis lupus dingo	Dingo							T, S		
Equidae	Equus caballus	Horse							S		
Suidae	Sus scrofa	Pig							T, S		12

Search Key			
Track	T	Nest	N
Scat	S	Anabat	A
Remains	R	Not identified to one species	*

Appendix 5
Fauna Species List, October 2009

Family	Scientific Name	Common Name	Project Area	Border Waterhole Incidentals	NT Fauna Atlas (within 10km)	Conservation Significance
AMPHIBIANS						
Hylidae	*Litoria caerulea*	Green Tree-frog	X			
Bufonidae	*Rhinella marina*	Cane Toad	X			Int
		TOTAL AMPHIBIANS	**2**	**0**	**0**	
REPTILES						
Crocodylidae	*Crocodylus johnstoni*	Freshwater Crocodile		X		M (EPBC)
Gekkonidae	*Diplodactylus conspicillatus*	Fat-tailed Gecko	X		X	
Gekkonidae	*Gehyra australis*	Northern Dtella	X			
Gekkonidae	*Gehyra nana*	Northern Spotted Rock Dtella	X			
Gekkonidae	*Heteronotia binoei*	Bynoe's Gecko	X		X	
Gekkonidae	*Oedura rhombifer*	Zig-zag Gecko	X			
Agamidae	*Amphibolurus gilberti*	Gilbert's Dragon	X	X	X	
Agamidae	*Chlamydosaurus kingii*	Frilled Lizard	X			
Agamidae	*Ctenophorus nuchalis*	Central Netted Dragon	X			
Agamidae	*Diporiphora lalliae*		X		X	
Scinidae	*Ctenotus lateralis*	Gravelly-soil Ctenotus	X		X	DD (NT)
Scinidae	*Menetia maini*	Main's Menetia	X			
Varanidae	*Varanus acanthurus*	Ridge-tailed Monitor	X		X	
		TOTAL REPTILES	**8**	**2**	**6**	
BIRDS						
Phasianidae	*Coturnix ypsilophora*	Brown Quail	X		X	
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter	X	X		
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant	X			
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant	X			
Ardeidae	*Ardea intermedia*	Intermediate Egret	X			
Ardeidae	*Nycticorax caledonicus*	Nankeen Night-Heron	X	X		
Otididae	*Ardeotis australis*	Australian Bustard	X			VUL (NT)
Accipitridae	*Milvus migrans*	Black Kite	X			
Accipitridae	*Haliastur sphenurus*	Whistling Kite		X		
Accipitridae	*Accipiter fasciatus*	Brown Goshawk	X		X	
Accipitridae	*Accipiter cirrhocephalus*	Collared Sparrowhawk	X			
Falconidae	*Falco berigora*	Brown Falcon	X		X	
Columbidae	*Geopelia placida*	Peaceful Dove	X	X		
Columbidae	*Geopelia cuneata*	Diamond Dove	X		X	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon	X		X	
Columbidae	*Geophaps plumifera*	Spinifex Pigeon	X		X	

Family	Scientific Name	Common Name	Project Area	Border Waterhole Incidentals	NT Fauna Atlas (within 10km)	Conservation Significance
Cacatuidae	*Calyptorhynchus banksii macrorhynchus*	Red-tailed Black-cockatoo	X			
Cacatuidae	*Eolophus roseicapilla*	Galah	X			
Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo		X	X	
Cacatuidae	*Nymphicus hollandicus*	Cockatiel	X	X		
Psittacidae	*Melopsittacus undulatus*	Budgerigar	X		X	
Psittacidae	*Barnardius zonarius*	Australian Ringneck	X			
Cuculidae	*Centropus phasianinus*	Pheasant Coucal	X			
Eurostopdidae	*Eurostopodus argus*	Spotted Nightjar	X			
Halcyonidae	*Dacelo leachii*	Blue-winged Kookaburra	X			
Meropidae	*Merops ornatus*	Rainbow Bee-eater		X		M (EPBC)
Halcyonidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher	X			
Halcyonidae	*Todiramphus sanctus*	Sacred Kingfisher	X	X		
Maluridae	*Malurus melanocephalus*	Red-backed Fairy-wren	X		X	
Acanthizidae	*Smicrornis brevirostris*	Weebill	X			
Meliphagidae	*Philemon argenticeps*	Silver-crowned Friarbird	X	X	X	
Meliphagidae	*Manorina flavigula*	Yellow-throated Miner	X			
Meliphagidae	*Lichenostomus flavescens*	Yellow-tinted Honeyeater	X	X		
Meliphagidae	*Lichenostomus plumulus*	Grey-fronted Honeyeater	X			
Meliphagidae	*Melithreptus albogularis*	White-throated Honeyeater		X		
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater	X	X	X	
Meliphagidae	*Conopophila rufogularis*	Rufous-throated Honeyeater	X	X	X	
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned Babbler	X		X	
Petroicidae	*Microeca fascinans*	Jacky Winter		X		
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush	X			
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	X	X	X	
Monarchidae	*Myiagra inquieta*	Restless Flycatcher	X			
Monarchidae	*Grallina cyanoleuca*	Magpie-lark	X		X	

Family	Scientific Name	Common Name	Project Area	Border Waterhole Incidentals	NT Fauna Atlas (within 10km)	Conservation Significance
Ptilonorhynchidae	*Ptilonorhynchus nuchalis*	Great Bowerbird	X		X	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	X			
Campephagidae	*Coracina papuensis*	White-bellied Cuckoo-shrike	X		X	
Campephagidae	*Lalage sueurii*	White-winged Triller	X			
Artamidae	*Artamus personatus*	Masked Woodswallow		X		
Artamidae	*Artamus cinereus*	Black-faced Woodswallow	X			
Artamidae	*Artamus minor*	Little Woodswallow	X		X	
Artamidae	*Cracticus torquatus*	Grey Butcherbird	X			
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird	X			
Artamidae	*Cracticus tibicen*	Australian Magpie	X			
Corvidae	*Corvus orru*	Torresian Crow	X		X	
Megaluridae	*Cincloramphus mathewsi*	Rufous Songlark	X		X	
Estrildidae	*Taeniopygia bichenovii*	Double-barred Finch	X		X	
Estrildidae	*Taeniopygia guttata*	Zebra Finch	X	X		
Estrildidae	*Poephila acuticauda*	Long-tailed Finch	X		X	
		TOTAL BIRDS	**52**	**17**	**21**	
MAMMALS						
Pseudocheiridae	*Petropseudes dahli*	Rock Ringtail		X		
Macropodidae	*Macropus robustus*	Common Wallaroo		X		
Macropodidae	*Macropus rufus*	Red Kangaroo	X			
Macropodidae	*Petrogale purpureicollis*	Purple-necked Rock Wallaby		X		
Emballonuridae	*Taphozous georgianus*	Common Sheath-tailed Bat	X			
Molossidae	*Chaerephon jobensis*	Northern Free-tailed Bat	X			
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	X		X	
Vespertilionidae	*Chalinolobus nigrogriseus*	Hoary Wattled Bat	X			
Vespertilionidae	*Scotorepens greyii*	Little Broad-nosed Bat	X			
Canidae	*Canis lupus dingo*	Dingo	X			
Equidae	*Equus caballus*	Horse	X		X	Int
	Bos indicus / Bos taurus	Cattle			X	Int
Suidae	*Sus scrofa*	Pig	X			Int
		TOTAL MAMMALS	**9**	**3**	**2**	

Appendix 6
Fauna Plates from October 2009

Appendix 7
Bat Report (Specialised Zoology)

Central Netted Dragon *Ctenophorus nuchalis* (Photo credit to Sarah)

Australian Bustard *Ardeotis australis*

Fat-tailed Gecko *Diplodactylus conspicillatus*

Red Kangaroo *Macropus rufus*

Ridge-tailed Monitor *Varanus acanthurus*

Australasian Darter *Anhinga novaehollandiae*

Gilbert's Dragon *Amphibolurus gilberti*

Frilled Lizard *Chlamydosaurus kingii*

Gravelly Soil Ctenotus *Ctenotus lateralis*

Northern Dtella *Gehyra australis*

Northern Spotted Rock Dtella *Gehyra nana*

Pit Trap with Drift Net

Funnel Trap (elongated prawn trap) covered with hessian sack

Elliot Trap

Cage Trap

Specialised Zoological

Bat call identification

from north of Camooweal,

Queensland

Type:	Bat Call Analysis
Prepared for:	EcOz Environmental Services
Date:	11 October 2009
Job No.:	SZ127
Prepared by:	Specialised Zoological Kyle Armstrong and Yuki Konishi ABN 92 265 437 422 0404 423 264 kyle.armstrong@graduate.uwa.edu.au kyle.n.armstrong@gmail.com

SUMMARY

Bat identifications from Anabat echolocation call recordings are provided from c. 150 km north of Camooweal, Queensland. At least five species were identified as being present, with the possibility of one other that cannot be distinguished reliably based on acoustic recordings (Table 1).

Some call types of the northern free-tailed bat *Chaerephon jobensis* can be confused with those of the yellow-bellied sheath-tailed bat *Saccolaimus flaviventris*. In some cases one of these species could be identified based on pulse structure, and in other cases they could not be separated. In addition, the calls of the hoary wattled bat *Chalinolobus nigrogriseus* and the little broad-nosed bat *Scotorepens greyii* are similar and cannot be distinguished reliably.

Details supporting the identifications are provided, as recommended by the Australasian Bat Society (ABS 2006). A summary of pulse parameters is provided in Table 2, and representative call sequences are illustrated in Figure 1. Further data is available should verification be required.

METHODS

Signals as recorded with an Anabat SD1 unit were supplied as downloaded sequences, which were examined in AnalookW 3.7a software. Three call variables were measured on good quality search phase pulses in representative call sequences: pulse duration (milliseconds), maximum frequency (kHz) and characteristic frequency (equivalent to minimum frequency; kHz). Species were identified based on information in Milne (2002). Nomenclature follows Armstrong and Reardon (2006). Species designations of Churchill (2008) are not followed until formal publication of the relevant taxonomic study.

REFERENCES

ABS (2006). Recommendations of the Australasian Bat Society Inc for reporting standards for insectivorous bat surveys using bat detectors. *The Australasian Bat Society Newsletter* 27: 6–9. [ISSN 1448-5877]

Armstrong, K. and Reardon, T. (2006). Standardising common names of bats in Australia. *The Australasian Bat Society Newsletter* 26: 37–42.

Churchill, S.K. (2008). *Australian bats.* 2nd ed. Allen and Unwin, Crows Nest, NSW.

Milne, D.J. (2002). *Key to the bat calls of the Top End of the Northern Territory*. Parks and Wildlife Commission of the Northern Territory, Technical Report No. 71.

TABLE 1. Species identifications, with the degree of confidence indicated by a code. Date correlates with site; see Table 2 for full species names.

	C. gouldii	*C. jobensis*	*C. jobensis / S. flaviventris*	*C. nigrogriseus / S. greyii*	*S. flaviventris*	*T. georgianus*
Date						
Serial 1156						
29/09/2009	H	—	NC	—	—	H
30/09/2009	H	—	NC	—	—	H
1/10/2009	H	H	—	NC	H	H

Definition of confidence level codes:

H High. Unambiguous identification of the species at the site based on measured call characteristics and comparison with available reference material. Greater confidence in this ID would come only after capture and supported by morphological measurements or submission of a specimen/tissue to a museum.

NC Needs Confirmation. Either call quality was poor, or the species cannot be distinguished reliably from another that makes similar calls. Alternative identifications are indicated in the Summary section of this report. If this is a species of conservation significance, further survey work might be required to confirm the record.

TABLE 2. Summary of variables from representative call sequences.

Species	s,p[1]	Duration (msec)[2]	Max Frequency (kHz)[2]	Char frequency (kHz)[2]
Gould's wattled bat *Chalinolobus gouldii*	6,61	8.1 ± 1.9 4.4 – 11.6	38.5 ± 9.3 32.1 – 64.5	31.1 ± 0.9 29.9 – 33.6
Northern free-tailed bat *Chaerephon jobensis*	4,49	13.1 ± 2.2 9.4 – 18.3	29.6 ± 6.4 19.0 – 42.1	19.7 ± 2.1 16.3 – 24.4
Northern free-tailed bat *Chaerephon jobensis* / Yellow-bellied sheath-tailed bat *Saccolaimus flaviventris*	4,36	16.7 ± 2.2 12.6 – 20.0	23.3 ± 1.0 21.1 – 25.2	18.4 ± 0.4 17.8 – 19.2
Hoary wattled bat *Chalinolobus nigrogriseus* / Little broad-nosed bat *Scotorepens greyii*	4,36	5.8 ± 1.7 3.2 – 8.9	52.5 ± 10.2 41.7 – 76.2	39.7 ± 1.5 38.1 – 42.6
Common sheath-tailed bat *Taphozous georgianus*	6,69	14.0 ± 1.6 9.2 – 16.4	25.6 ± 0.5 24.7 – 27.3	24.6 ± 0.3 23.8 – 25.2

[1] s,p: number of sequences measured, combined total number of pulses measured;

[2] Mean ± SD; range.

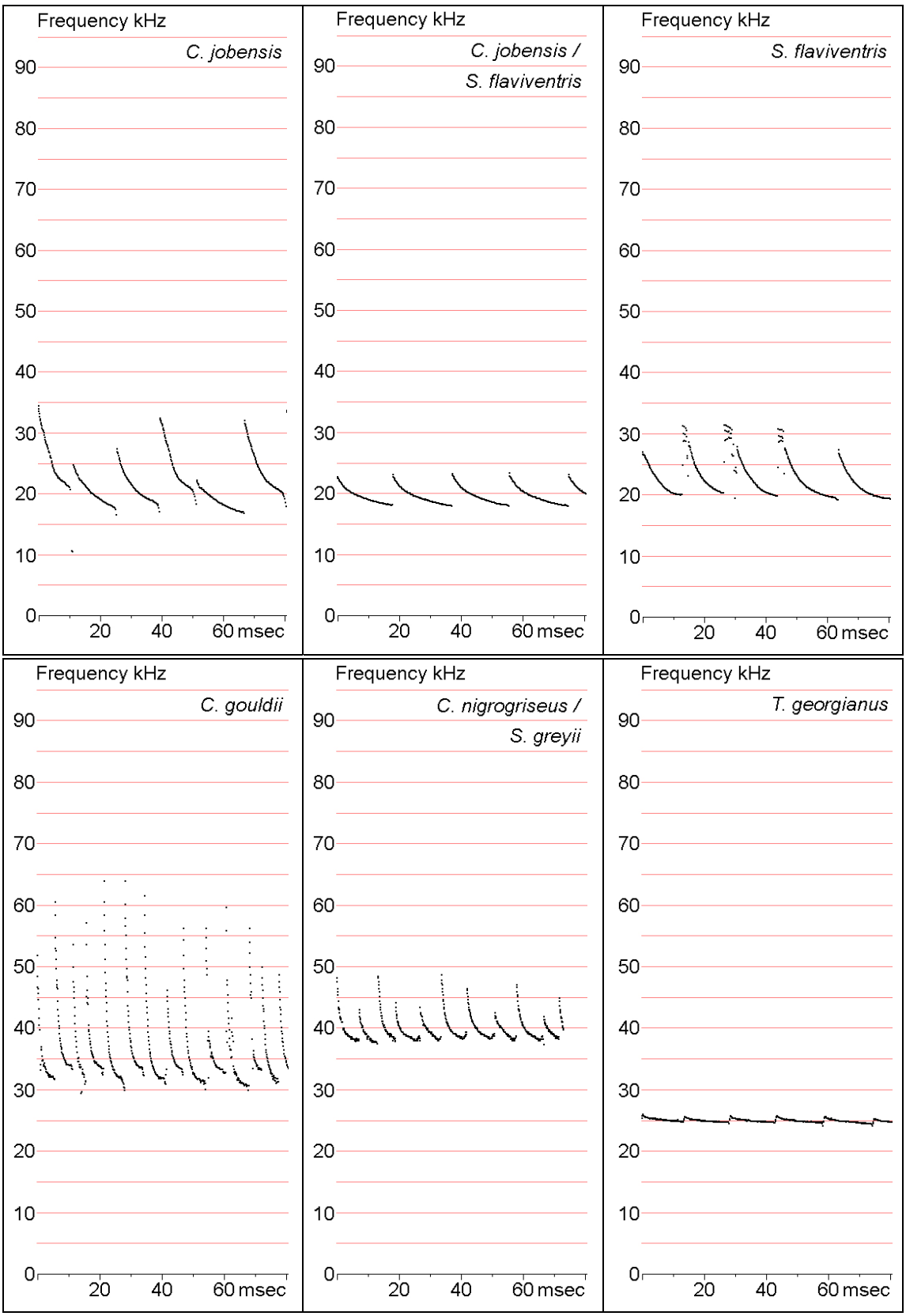


FIGURE 1. Representative call sequences of the species identified (time is compressed between pulses).

Appendix 8
Hair Analysis Report (Robyn Carter Hair ID)

Results from the analysis of scats collected north of Camooweal.

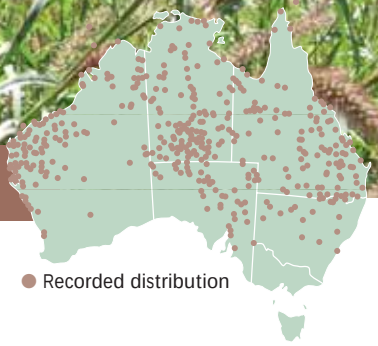
Please note:
1 All predator grooming hair identifications are shown in bold.
2 Probable identifications are provided where there are insufficient diagnostic hairs/bones present to give a definite identification.

SAMPLE	DEFINITE	PROBABLE	COMMENTS
1. Non-predator scat	*Petropseudes dahli* (Rock Ringtail Possum)		
2. Non-predator scat	Macropod	*Macropus robustus* (Common Wallaroo)	Did not find any grooming hairs in scat, so cannot say for sure, but scats looked very like M. robustus
3. Non-predator scat	Macropod	*Petrogale purpureicollis* (Purple-necked Rock Wallaby)	Scats looked like Petrogale. Found a couple of hairs, not great ones, but did indicate Petrogale.
4. "Pig scat"	*Sus scrofa* (Pig)		
5. Dog/Dingo scat	***Canis familiaris* (Dog/Dingo)** Macropod	 *Petrogale purpureicollis* (Purple-necked Rock Wallaby)	A lot of vegetative material in scat Not a lot of hairs. There were a couple of dog grooming hairs and a few that were probably Petrogale.

Appendix 9
Buffel Grass Management Guide

Weed Management Guide

Managing weeds for biodiversity



Buffel grass (*Cenchrus ciliaris*)

The problem

Buffel grass (*Cenchrus ciliaris*) is an introduced, perennial pasture grass that is found across much of the Australian continent, including arid and semi-arid regions. For many decades it has been widely planted for livestock production and land rehabilitation. Its palatability is moderate but it is well regarded as pasture because it grows rapidly under warm, moist conditions and persists under heavy grazing and drought. Buffel grass has spread well beyond planted areas and dominates the ground layer in many native plant communities. It reduces native plant diversity and can affect vegetation structure by changing fire regimes. In arid Australia, buffel grass invades some of the wetter, more fertile parts of the landscape, important for the survival of native plant and animal populations in this highly variable climate. Although it was planted for dust control in central Australia, it also imposes economic costs through the need to manage fire risks and to protect biodiversity assets and infrastructure. Some pastoralists are also concerned that productivity of buffel grass-dominated pastures can decline in the longer term.

Buffel grass has been identified as a major threat to biodiversity in regional natural resource management strategies across Australia (SA Arid Lands, Rangelands (WA), Fitzroy (Queensland) and the Northern Territory). It is becoming recognised that new policies are needed to address the problem of weeds that are also considered useful.

Buffel grass is just one of many perennial grasses invading Australia's native vegetation, particularly grassy plant communities, rangelands and coastal areas. Grasses introduced as pastures, such as gamba grass (*Andropogon gayanus*), mission grass (*Pennisetum polystachion*) and Birdwood grass (*Cenchrus setiger*) are a particular threat to tropical savannas in northern Australia.

Buffel grass (*Cenchrus ciliaris*) can dominate the understorey in arid regions. Central Australia, NT. Photo: R. Davies

Key points

- Buffel grass is widespread in central and northern Australia and has invaded a range of native plant communities.
- It can dominate the ground layer, displacing native grasses and other plants.
- Its rapid regrowth and high biomass may alter the intensity, frequency and extent of fires, changing vegetation structure and composition.
- Buffel grass is still spreading, assisted by continued planting and new cultivars.
- Its seed is readily dispersed by wind, water and animals.
- Control measures can reduce impacts at sites of high conservation significance.
- Mature plants are difficult to remove physically. Herbicide can be effective if applied when plants are actively growing and follow-up action is undertaken. Correct timing is essential.
- The value of buffel grass as a pasture species is well recognised and it is not a declared weed. Public policy issues arising from its positive and negative aspects need to be resolved.

The weed

Numerous forms of buffel grass have been imported to Australia from across its native range. They differ in their drought, temperature and soil tolerance, growth form, palatability, and in quantity and timing of seed production. Eleven have been registered as cultivars in Australia. Two closely related species, *Cenchrus pennisetiformis* (Cloncurry grass) and *C. setiger* (Birdwood grass), have also been planted as pastures in Australia and are naturalised. Their range is similar, but they are less common than *C. ciliaris*.

The most common uses of buffel grass in Australia are:

- as a pasture for livestock production in semi-arid and arid lands (where sowing often follows native vegetation clearing)
- to stabilise areas disturbed by mining, infrastructure development or overgrazing.

Buffel grass is a long-lived tussock grass with a deep, tough root system. While some cultivars can grow up to 1.5 m tall, others are less than 1 m tall. Some have rhizomes up to 0.5 m long. The tough, branched stalks have swollen bases and produce leaves at the basal and higher nodes. Leaves are rough-textured downwards, hairless or with fairly sparse, long hairs. Leaf blades have prominent midribs and leaf sheaths are keeled. The ligule at the junction of the leaf blade and sheath is a row of hairs, 0.2–2 mm long.

Birdwood grass (*Cenchrus setiger*) seed head lacks long, fine bristles.
Photo: Jose Hernandez @ USDA-NRCS PLANTS Database

The flower head is cylindrical, erect, dense, spike-like, 2.5–15 cm long and varies in colour from straw-coloured to purple. It consists of bristly burrs borne on a zigzag central axis. The burr has whorls of flexible bristles, a thin outer whorl and a ciliate (hairy) inner whorl with one longer bristle, 8–16 mm long. The bristles are joined at the very base into a disc. Mature burrs contain a small seed (<2 mm long) and are dispersed by wind, water, animals, clothing, boots and vehicles.

Advantages, disadvantages and broader impacts of buffel grass

Buffel grass has proved useful for pasture and soil retention in a wide range of environments due to its drought tolerance, high biomass, deep roots, rapid response to summer rains, relative palatability and resistance to overgrazing. It produces viable seed so that stands can be self-replacing and pastures may not need to be reseeded. These same characteristics also make it an environmental weed.

Like any pasture species, buffel grass has limitations, such as:

- Through competition with native species, it reduces diversity of pasture including native grasses that are highly valued fodder after rain. The effect may be exacerbated by selective grazing of more palatable species.
- The initial increase in productivity when buffel grass pasture is established is not always maintained, and pastures may run down over time (10 years or less in some soils), especially where environmental conditions do not favour legumes. This problem is difficult to address in a cost-effective manner, especially on less productive lands.
- Once buffel grass has been established as the dominant ground cover, conversion to an alternative pasture would be prohibitively expensive.
- Some cultivars are more palatable than others. The less palatable forms may gradually become dominant in grazing lands through selective grazing.

Buffel grass (*Cenchrus ciliaris*)

Flowering head.
Image: M. Robertson

Shedding seed head, with zigzag axis.
Image: M. Robertson

Burr.
Image: M. Robertson

Ligule at the junction of leaf blade and sheath is a fringe of hairs, 0.2–2 mm long.
Image: M. Robertson

- Old leaves and stalks may persist for several years and are of no value to stock but may restrict their access to fresh growth.

Broader environmental impacts of buffel grass include the following:

- Dry buffel grass foliage forms a relatively continuous flammable ground layer that can carry extensive and intense fires. It recovers its biomass very rapidly when moisture is sufficient and can burn when partly green. Therefore it can carry fire at much shorter intervals than native understorey. More frequent hot fires alter native plant community structure because established trees and shrubs can be killed and young ones destroyed before they have produced seed.
- Patch burning is needed in some native vegetation types such as hummock (*Triodia*) grasslands to maintain biodiversity and bush food resources, and to reduce the risk of large wildfires. It becomes more difficult to manage after buffel grass has invaded the landscape.
- Food sources and habitat for native fauna may be altered. In particular, native grass seed that is eaten by granivorous birds can be depleted, and habitat patchiness and diversity of invertebrates reduced. Loss of trees and shrubs to fire reduces habitat diversity.
- Native plants affected by invasion of buffel grass provide a diminished resource for traditional indigenous livelihoods including bush food, timber and medicine.
- Where buffel grass pasture occurs adjacent to fire-sensitive native vegetation, it can burn hot enough to carry fire into the remnants, opening up the canopy. The edges are then more prone to degradation, including by weed invasion. In this way, the area and integrity of habitat can be progressively reduced.

Mature buffel grass (*Cenchrus ciliaris*) tussocks grow rapidly after summer rains. Uluru NT.
Photo: R. Davies

- Restoration of native vegetation on previously cleared lands may be needed for recovery of threatened species or ecological communities. Buffel grass can be a major constraint to such efforts.

Weed identification and similar native species

A number of grasses in the genus *Cenchrus* and the closely related genus *Pennisetum* occur in Australia, including native and introduced, annual and perennial species. Most have flower heads that are spike-like, consisting of a central axis bearing numerous hairy, bristly or spiny burrs that are actually very short floral branches.

How to identify *Cenchrus* species

The introduced perennial pasture species, buffel grass (*Cenchrus ciliaris*), Birdwood grass (*C. setiger*) and Cloncurry, white or slender buffel grass (*C. pennisetiformis*) have burrs that lack sharp, rigid spines. They are closely related—in fact *C. pennisetiformis* and *C. ciliaris* are sometimes considered to be the same species. Alternative species names for the buffel grasses are *Pennisetum ciliare*, *P. setigerum* and *P. pennisetiforme*. Burrs of buffel grass and Cloncurry buffel grass have soft, ciliate bristles but these are lacking in Birdwood grass. Other *Cenchrus* species in Australia are native perennials and introduced annuals.

Mossman River grass (*Cenchrus echinatus*) is a spiny annual weed in both northern and southern Australia.
Photo: C. Wilson

Annual *Cenchrus* species with spiny burrs can be a nuisance and are often declared noxious. Mossman River grass (*C. echinatus*) is the most widespread in Australia. Innocent weed or gentle Annie (*C. longispinus*) is most prevalent in the south, especially along the Murray River. Indian sandburr or Gallon's curse (*C. biflorus*) is naturalised in northern Australia. *C. brownii* occurs along the northern coast and offshore islands and spiny burr-grass (*C. incertus*) occurs mainly in eastern Australia.

Native species: black bottle-washers (*Enneapogon nigricans*).
Photo: T. Reynolds

Similar native species

The native *Cenchrus* species (*C. elymoides*, *C. robustus* and *C. caliculatus*) are perennial, with various burrs, but lacking the long flexible bristles of buffel grasses and most *Pennisetum* species. *C. elymoides* is confined to the tropics of northern Australia (Kimberley, northern NT and Cape York regions). *C. robustus* and *C. caliculatus* mainly occur in the eastern districts of Queensland and NSW. The flower head of *C. caliculatus* is loosely packed, 4–24 cm long; its burrs have rigid inner bristles (4–11 mm long) and are often dark purplish. *C. robustus* has 45–60 rigid, 9–13 mm long bristles in a single whorl.

Other native grasses with spike-like heads include annual and perennial nine-awn grasses or bottle-washers (*Enneapogon* species), smaller grasses that have florets crowned with a ring of nine hairy awns.

How it spreads

Buffel grass has been spread throughout the dry tropics, subtropics and arid lands of the world by human activities. It is thought to have been introduced inadvertently to Australia in the 1870s in camel harness from western Asia. Camel trains were major means of transport through inland Australia and it is likely that buffel grass became locally established along their routes. Some of its early spread may have been deliberate. From 1910 buffel grass was actively distributed for planting as pasture, initially in WA, then more widely. Introductions of new forms from Africa began in the 1920s and were evaluated by government agencies, mainly in NSW and Queensland. From the 1940s seed was imported from around the world for trials. There is evidence that buffel grass had been planted in central Australia before systematic planting for land rehabilitation began there in the 1960s. Prior to 1972, nine introduced forms had been registered as cultivars in Australia and their seed produced commercially. Buffel grass pastures have been sown in a range of environments across Australia, on land cleared for the purpose, or into native vegetation.

Buffel grass spreads through dispersal of its fluffy burrs by wind, water and animals, particularly along drainage lines and roads. Its spread along roads can also be assisted by vehicle draughts and movement of soil by graders and other vehicles. Buffel grass may be slow to establish initially but it may then spread readily beyond planted areas under favourable seasonal conditions. In the arid zone, it has spread extensively during infrequent episodes when summer rainfall was well above average for several years. This has been documented in the Ashburton River catchment in WA, from 1978 to 2002.

Where it grows

Buffel grass is native to Africa, the Middle East and Asia and naturalised elsewhere, including the USA and Mexico where it is planted for cattle pasture. In Arizona it invades fire-sensitive plant communities and the increased risk of fire poses a threat to the distinctive Saguaro cactus communities.

Buffel grass can survive in areas with average rainfall of more than 200 mm annually (or 170 mm in summer). It occurs naturally in regions having up to 1000 mm annual rainfall. Under higher rainfall, tropical conditions or in regions with winter rainfall of 400 mm or more, buffel grass is less competitive with other plant species, including perennial grasses.

In northern and central Australia buffel grass occurs mainly in the semi-arid to arid zone. In arid regions it is most common along ephemeral watercourses, on alluvial plains, other run-on sites and calcareous rises. It thrives in sandy loam but may be slow to establish on heavy clay and prefers neutral to alkaline soils. It is not highly tolerant of severe frost or prolonged water logging.

At the local scale, studies in central Australia have found that buffel grass is most likely to be found nearer to drainages and tracks, in less rugged terrain, with lower hummock grass cover and on soils with greater clay content than rocky slopes or sand plains. Drainage lines and tracks provide opportunities for dispersal and also favourable sites for establishment (disturbed or bare ground, higher fertility, moisture and lack of plant competition). In fragmented landscapes, small or narrow remnants of native vegetation are more vulnerable to buffel grass invasion than larger patches with an intact canopy.

Native plant communities invaded by buffel grass include:

- Poplar box (*Eucalyptus populnea*) and silver-leaved ironbark (*E. melanophloia*) woodlands in Queensland.
- Mountain coolabah (*Eucalyptus orgadophila*) woodlands in Queensland.
- Brigalow (*Acacia harpophylla* dominant and subdominant) listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

- Gidyea / gidgee (*Acacia cambagei*) shrublands in central west Queensland.
- Riparian and floodplain woodlands throughout the semi-arid and arid zones, eg river red gum (*Eucalyptus camaldulensis*) and teatree (*Melaleuca* species) woodlands on ephemeral rivers in central Australia.
- Vegetation on alluvial plains and other sites of relatively fertile soils in central Australia (eg *Acacia* woodlands and ghost gum (*Corymbia aparrerinja*) and bloodwood (*Corymbia opaca*) open woodlands).
- Coastal vegetation and islands off the Pilbara coast (Western Australia), riparian zones and wetlands, alluvial plains; tussock grasslands, eucalypt woodlands, chenopod shrublands and overgrazed hummock grasslands.
- Mulga (*Acacia aneura*) open / woodlands and shrublands are sometimes invaded at sites of higher moisture and soil fertility.
- Dry rainforest or 'softwood scrub' remnants dominated by species such as bottle tree *Brachychiton rupestris*, belah *Casuarina cristata*, vines etc can be invaded along edges adjacent to pasture if burnt, including semi-evergreen vine-thickets listed as Endangered under the EPBC Act.

Potential distribution

Buffel grass is still spreading within and between regions, unassisted and through planting. Modelling based on climatic and soil requirements has predicted that 25% of Australia is potentially 'highly suitable and 43% suitable for buffel grass growth'.

Extensive areas were mapped as suitable or highly suitable, where buffel grass has not yet been recorded or records are sparse. These included northern SA and adjoining areas. Soil and climate data were classified at a broad scale for the continental mapping. Modelling at finer spatial scales is needed to predict with more certainty where areas of high biodiversity value are under threat.

Mapping of current buffel grass distribution is largely based on accumulated records, particularly herbarium specimens, though the collection of such records has not been comprehensive in space or time. Field surveys are needed to determine how accurately existing records represent the current limits of distribution.

Genetic studies suggest that forms of buffel grass that are not genetically identical to the main cultivars are naturalised in central Australia. Forms other than registered cultivars may have been introduced to the region or new types may be arising in the field. Research is also underway into breeding new types to extend its use as pasture in heavier soils and cooler regions. New forms of buffel grass may have potential to invade a wider range of habitats.

There is inherent uncertainty in predicting the potential limits of distribution due to the wide range of conditions in which buffel grass already occurs; imprecise knowledge of the current range, genetic variation, breeding system and ecology of naturalised populations; and the unknown effects of factors such as future land management changes, cultivar development programs and long-term climatic variation.

Buffel grass (*Cenchrus ciliaris*) infestation on calcareous loamy soil along a creek in Karijini NP, WA. Photo: S. van Leeuwen

Growth cycle

Buffel grass is summer-active. Established plants can respond rapidly to small rains in spring to autumn but make little growth during winter in the inland non-tropics. Seeds germinate rapidly, but will not germinate on light falls of rain. Generally, at least 20–25 mm of rain is required for germination and establishment, as buffel grass seeds need to be moist for about 3–5 days in order to germinate. Plants can germinate from seed, mature and flower within 6 weeks of a significant rainfall event.

Buffel grass seed may survive for up to an estimated 4 years in the soil, but plants can live for many years (possibly up to about 20 years). In drier locations, moisture levels sufficient for high seed production, or for widespread germination and plant establishment, may occur infrequently. The variable climate may result in a dynamic distribution of buffel grass across the landscape, with drier sites being recolonised from moist refuges after prolonged drought.

Buffel grass (*Cenchrus ciliaris*) burnt butts resprouting after summer rain. Uluru, NT.
Photo: R. Davies

What to do about it

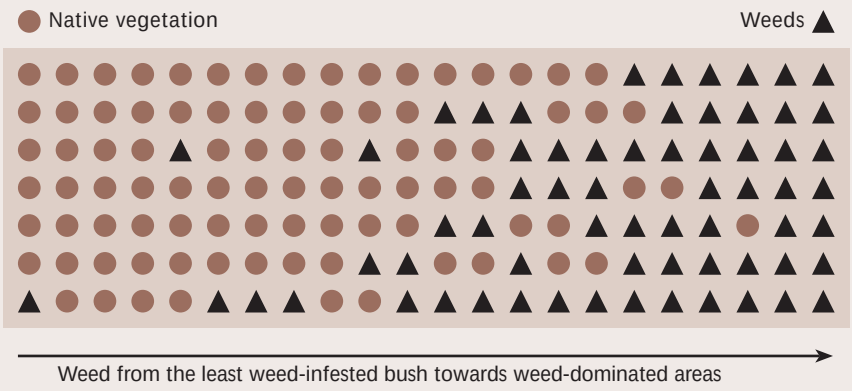
There is potential for buffel grass to spread within and beyond its current range. In regions where its distribution is limited, it may be feasible to contain its further spread through early intervention. Management options that would significantly reduce the abundance of buffel grass on a broad scale are yet to be developed. To minimise existing and potential threats to biodiversity, a range of strategies is needed.

- **Regional planning:** in many regions, buffel grass is both a pasture plant and a major weed of native ecosystems. Processes are needed to resolve policy issues and enable a co-ordinated approach to vegetation management including weed control. Priority areas for control measures should be identified across the region. These include sites of significance for biodiversity and areas where buffel grass is just starting to invade. Long distance dispersal along roadsides into susceptible habitats is probably assisted by road grading and slashing operations. Strategies will be needed to prevent further spread along and from roadsides and other infrastructure corridors.
- **Fire:** the rapid build-up of buffel grass after favourable seasonal conditions can fuel fires of increased extent, frequency and / or intensity, which threaten biodiversity. Clumps of buffel grass under trees and shrubs can also increase localised fire intensity and flame height, damaging woody species. Strategies are needed to prevent more frequent, extensive wildfires. Areas dominated by buffel grass may need to be slashed or grazed to reduce buffel grass biomass where other values would not be at risk. Where fire has removed old buffel grass foliage, there is an opportunity to target fresh regrowth with control measures such as herbicides after significant rainfall.
- **Buffel grass pastures:** native vegetation adjacent to pastures is at risk from buffel grass invasion. To contain buffel grass within the pasture, grazing needs to be managed to minimise seed production and dispersal. A buffer zone with intact vegetation provides competition to buffel grass seedlings. It should be monitored and colonising plants removed. Fires in pastures should be prevented from escaping into native vegetation remnants as they can open them up to buffel grass invasion.
- **Native rangelands containing buffel grass:** it is beneficial for both pastoral and conservation purposes to maintain plant diversity in the long term. Paddocks need to be spelled from grazing to allow native grasses to set seed following rainfall.
- **Areas managed for conservation:** buffel grass is easily the most significant weed in many arid and semi-arid areas of high value for biodiversity conservation. Strategic management is needed to minimise its further spread while mitigating adverse impacts on fire regime, habitat quality, ecosystem processes and plant community restoration. The first step in planning such an approach is often to acquire adequate knowledge about buffel grass distribution patterns and the biodiversity values under threat.
- **Soil stabilisation / rehabilitation:** once buffel grass is established, it persists and may exclude other plant species, prevent recovery of complex vegetation structure in the long term and become an on-going fuel hazard. There are alternative pioneer species and methods for rehabilitation.

Prevent buffel grass spreading

At regional and local levels, a high priority should be to monitor and control buffel grass in locations where the species is absent or sparse. This requires understanding local seasonal conditions that trigger abundant seedling establishment and local dispersal patterns. Spread is most likely soon after adequate warm season rainfall, especially following drought conditions or fire when other ground cover is sparse. Most resources will be needed at this time.

Strategic weeding in native vegetation



- Locate and remove small, isolated infestations before they seed. Particular vigilance is needed along dispersal routes such as roadsides and drainage lines.
- Practise weed hygiene during slashing and road grading:
  - where possible, slash before seeds develop
  - slash into rather than away from patches of buffel grass
  - clean vehicles and clothing before moving to uninfested areas.

Reduce established infestations

Where buffel grass occurs in native vegetation a planned, strategic approach is essential to ensure that, after treatment, buffel grass is replaced by desirable plant cover rather than buffel grass regrowth, seedlings or other weeds. Sites of high biodiversity value should be identified and targeted first. As well as information on buffel grass biology and control methods, a plan should be based on specific knowledge about the site, including the distribution of other major weeds. It requires assessment of the need for revegetation following removal of buffel grass.

Steps to develop and implement a long-term weed management plan are:

1. Investigate the site

- Identify native plants (including grasses) and weeds.
- Map weed infestations: indicate buffel grass density across the site; identify major sources of seed from which re-invasion can occur.
- Map native vegetation condition: assess its capacity for recovery after buffel grass is removed and identify sites of high biodiversity values, such as habitats of rare flora and fauna.
- Values and risks: identify high risk sites for erosion and other factors.

2. Develop the site action plan

- Identify goals and priorities based on the site information.
- Define priority areas for control by overlaying maps of buffel grass density, native vegetation, site values and risks.
- Plan to weed strategically:
  - protect the better quality native vegetation first and consider the needs of rare fauna and flora
  - work from isolated buffel grass plants towards core infestations
  - control plants from upslope to downslope.
- Work in stages. The area targeted at each stage should be of a manageable size so that thorough follow up is possible.
- Include control of other weeds so that they do not establish where buffel grass has been removed.
- Select the most suitable control method for each buffel grass growth stage in each area to avoid damage to native vegetation. Plan appropriate disposal of weed material.
- Plan a rapid response to seasonal changes to maximise the effectiveness of control activities.

3. Implement the action plan

- Remove buffel grass from the least infested areas before tackling more infested areas. Ensure that activities do not spread the seeds into clean areas or disturb native ground cover. Adapt to local seasonal conditions to prevent seedlings maturing and seeding.
- Follow up by treating buffel grass regrowth in areas previously treated before moving to new areas of infestation.
- Seek mechanisms for managing spread from adjacent lands into weed-free or treated areas.

4. Monitor and evaluate outcomes and adapt the plan accordingly

Include monitoring of native plant regeneration. In weed management programs there is often a tendency to focus on the removal of weeds as a goal, but at the site level the ultimate goal is restoration of native vegetation. It is important to monitor native plant regeneration and respond appropriately.

Control methods

Mature buffel grass plants are difficult to kill because they have a tough base and extensive root system and regrow after cutting, grazing or burning. Herbicide treatment is effective only on actively growing foliage. In arid or semi-arid regions the period of active growth may be short and unpredictable. Old, dry growth can shield growing leaves from contact with herbicide and a single application may not be sufficient to kill the plant. Spot spraying or grubbing individual tussocks minimises

chemical wastage and risk of damage to other species. Large-scale mechanical removal favours re-establishment of buffel grass and slashing needs to be combined with other methods to have significant, lasting impact. A combination of physical and chemical treatments may be most effective. Because buffel grass is a valuable forage species, biological control is not an option, but existing organisms affect seed production in some regions.

Physical removal of small or sparse infestations

Small, isolated plants can be dug out from key sites, but mature buffel grass plants have a very tough crown and deep roots. The butt can be more than 30 cm across. Remove the weeds before seeding if possible. Follow up within weeks after rain to check for regrowth and for seedlings.

Foliar spray

To be effective, spraying should be undertaken when the growth rate is high (leaves are bright green and glossy), and the herbicide applied to as much green foliage as possible. The period when conditions are suitable may be short. Spot spray using hand-held equipment (handgun and hose or knapsack) to avoid off-target damage. Persistent dry foliage may shield fresh growth. Follow up is essential using the same or other treatment methods.

The edge of Mazeppa NP, central Queensland 5 years after a hot fire fuelled by buffel grass damaged the tree canopy, promoting further invasion.
Photo: D. Butler

Buffel grass invasion of intact gidgee / brigalow in Mazeppa NP, central Queensland.
Photo: D. Butler

Combined treatment of extensive infestations

Initial slashing of old foliage followed by spraying after effective rainfall can be very effective. It may be desirable to leave slashed material on the ground to protect the soil from erosive rainfall. Follow up with further spraying or grubbing of surviving plants and seedlings when actively growing.

Contacts

State / Territory	Department	Phone	Email	Website
NSW	Department of Primary Industries Department of Environment and Climate Change	1800 680 244 131 555	weeds@dpi.nsw.gov.au info@environment.nsw.gov.au	www.dpi.nsw.gov.au/weeds www.nationalparks.nsw.gov.au/npws.nsf/Content/Weeds
NT	Department of Natural Resources, Environment and the Arts	(08) 8999 2020	weedinfo.nreta@nt.gov.au	www.nt.gov.au/nreta/natres/weeds/index.html
Qld	Environment Protection Authority	EPA Hotline 1300 130 372	Customer service centre csc@epa.qld.gov.au	www.epa.qld.gov.au
SA	Department of Water, Land and Biodiversity Conservation	(08) 8303 9620	N/a	www.dwlbc.sa.gov.au
WA	Department of Agriculture and Food Department of Environment and Conservation	(08) 9368 3333 (08) 9334 0333	enquiries@agric.wa.gov.au info@dec.wa.gov.au	www.agric.wa.gov.au www.naturebase.net/
Australia-wide	Australian Pesticides and Veterinary Medicines Authority (APVMA)	(02) 6272 5852 Fax: (02) 6272 4753	EnquiryLine@apvma.gov.au	www.apvma.gov.au http://services.apvma.gov.au/PubcrisWebClient

Contact details for state and territory agencies with responsibility for weeds are listed above, along with the Australian Pesticides and Veterinary Medicines Authority (APVMA). The APVMA website hosts the PUBCRIS database which contains information on all herbicides that are registered in each Australian state and territory, including minor use permits.

Consult your local natural resource management organisation or council to find local contacts on managing weeds for biodiversity, including community groups working on buffel grass.

Refer to the CRC for Australian Weed Management website (www.weeds.crc.org.au) for weed management guides in this series, as well as guides for Weeds of National Significance and Alert List species. The Introductory Weed Management Manual (also available from this website) may assist in developing a plan tailored to your situation.

...case study

Success managing buffel grass at Alice Springs Desert Park

Alice Springs Desert Park introduces visitors to central Australia's diversity of habitats, plants and animals and to cultural knowledge and use of the environment. The exhibits and infrastructure occupy a core area of 54 hectares within a wider park area of 1300 hectares of natural vegetation, extensively invaded by buffel grass. The park is situated on the lower slopes of the MacDonnell Ranges and the adjacent plain. Throughout the district, buffel grass typically dominates such habitats, where it has largely replaced native grasses and other herbaceous plants.

Chipping individual buffel grass (*Cenchrus ciliaris*) tussocks in Alice Springs Desert Park, NT. Photo: G. Dinham

A buffel grass control program has been conducted in the park since its inception in 1996. The first goal was to eradicate it from the core area, to enable visitors to see and understand more of the native ecosystem. A further goal is to reduce the level of buffel grass fuel in the wider park area to reduce the risk to biodiversity assets and infrastructure from wildfire.

Early control methods employed in the core area included grubbing out individual plants and following up with herbicide spot spraying whenever green shoots appeared after rain. The project is labour intensive and much assistance has been received from volunteers and community work programs. Follow-up work could be needed more than once a year, but the number of work hours decreased greatly over the first two years, both in dense and light infestations. A large proportion of the core area has now been cleared of buffel grass, in spite of unusually wet conditions in 2000 and 2001 which delayed this achievement.

At the start of the program, it was not known whether removal of buffel grass could be achieved. Also unknown was the likely vegetation response to its removal. In fact, there has been a transformation from an understorey consisting almost entirely of buffel grass to a remarkable diversity of native grasses and other herbaceous plants, occurring through natural regeneration. These results suggest that even where buffel grass has become dominant, native plants persist in the seedbank for a number of years and can germinate readily after rain, once the weed is removed. Some resilience of the native understorey is not unexpected, given its adaptation to long periods of little rain, but the maximum longevity of the native seedbank is not known. Much of the spread of buffel grass in central Australia has occurred in the past four decades.

Ongoing monitoring will be needed to prevent buffel grass reinvasion of the core area, especially where soil is disturbed or native understorey is very sparse. Since 2005 buffel grass in the wider park has been sprayed or chipped at strategic locations, with larger areas on relatively flat ground being slashed by machinery. Whipper snippers were used around the base of trees and shrubs. Where possible, the slashing was timed to prevent seed set and the viable seedbank is expected to diminish over time. There has been little recent buffel grass seedling recruitment due to dry conditions.

The slashing has been successful in reducing fuel loads and the threat of wild fire. The reduction in the amount of buffel grass has allowed native plants to grow between the slashed clumps. Slashing has been followed up with spot spraying and grubbing. Slashed clumps are easier to grub when dry and easier to spray after rain events.

The park managers emphasise that there is no point to any treatment unless you have the capacity to do the follow-up spraying after rain events as the buffel grass will return and you will have wasted your time.

case study

Herbicides

Herbicides, including grass-selective chemicals, are registered on labels for controlling buffel grass only in certain crop situations in Australia. A 'Permit to allow minor use of an AGVET chemical product' may be issued to allow registered products to be used for a purpose or in a manner that is not included on the approved label. Permits that include treatment of environmental weeds, including perennial grasses with glyphosate in some non-crop situations exist in NSW, Queensland, SA and WA. The Australian Pesticides and Veterinary Medicines Authority website includes the relevant permit for each state. Glyphosate is a non-residual, systemic chemical and affects both broad-leaved plants and grasses. Glyphosate herbicide formulated for aquatic situations has been effective on buffel grass when applied to actively growing foliage and regrowth.

Trials to control buffel grass in non-crop situations with systemic herbicides, both grass-selective and non-selective, have indicated that a range of factors are critical to successful control of both seedlings and regrowth. These include:

- The plants' condition at the time of treatment will determine its effectiveness. They must be actively growing with no sign of senescence and may be flowering but should not be seeding. If timed well, it may be possible to spray both resprouting mature plants and seedlings at the same time when seedlings are sufficiently developed after heavy summer rain.
- Herbicide should be applied to as much of the green leaf as possible. This is best achieved by spot spraying. Reduced contact in the spray shadow may be unavoidable, necessitating repeated treatment. Treatment that combines slashing followed by spraying may be most effective.
- An assessment should be made of native plants and their susceptibility to different herbicides in order to minimise off-target damage. In some situations, grass-selective and non-selective herbicides may be suitable during different phases of the control program.
- Follow up treatment, using the same or different methods, should be applied to actively growing plants and to seedlings.

To address these critical factors, forward planning is needed. A treatment program should be carefully tailored to each situation and responsive to rainfall events. Unpredictable variation in seasonal conditions may reduce treatment effectiveness at times. Perseverance is vital to maintain buffel grass at low density.

When using herbicides, always read the label and follow instructions carefully. Operators should have formal training in the safe storage, handling, preparation and use of the chosen herbicides. Particular care should be taken to ensure that rainfall runoff will not carry herbicide into waterways.

Legislation

Buffel grasses (*Cenchrus ciliaris*, *C. pennisetiformis* and *C. setiger*) are not proclaimed under any Australian weeds legislation. Buffel grass is a prohibited noxious weed in Arizona, USA, due to the threat to the environment and the fire hazard it creates.

Cenchrus species that are declared in one or more Australian states are: *C. biflorus* (Gallon's curse); *C. brownii* (fine-bristled burr grass); *C. echinatus* (Mossman River grass); *C. incertus*, synonym *C. pauciflorus* (spiny burrgrass); and *C. longispinus* (spiny burrgrass or gentle Annie). These species may also be known as innocent weed or hedgehog grass.

Buffel grass (*Cenchrus ciliaris*) plants have extensive roots.
Photo: M. Robertson

Invasion of native plant communities by exotic perennial grasses has been listed as a key threatening process under the NSW *Threatened Species Conservation Act 1995*. Buffel grass is one of the species of special concern. In WA, buffel grass was identified in the 2007 State of the Environment report among the top five environmental weeds in two of the four major biogeographic regions of the state.

Under the Commonwealth EPBC Act, three ecological communities threatened by buffel grass are listed as endangered:

1. Brigalow (*Acacia harpophylla* dominant and co-dominant)
2. Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions
3. Bluegrass (*Dichanthium* species) dominant grasslands of the Brigalow Belt Bioregions (North and South).

In most of Australia the clearance of native vegetation for establishment of improved pastures is now regulated. Sowing of non-native pasture species in native vegetation may not be defined as clearance but may be regulated on leasehold land. Introduction of non-native species to pastoral leases has been widely encouraged by some government agencies. However, in South Australia the Pastoral Board's permission would be required. Much of the area under threat from buffel grass is pastoral leasehold, conservation reserve, Aboriginal land or vacant crown land. Containing unwanted buffel grass invasion and rehabilitating key areas where it dominates is becoming a major issue for land managers.

A drainage line in buffel grass (*Cenchrus ciliaris*) pasture on heavy clay alluvium near Springsure, central Queensland.
Photo: D. Butler

Knowledge gaps

Relatively few resources have been directed at assessing the long-term consequences for biodiversity, pastoralism and the human population from buffel grass invasion of vast areas of Australia. Maps of current distribution often lack sufficient detail for planning local or regional management. Knowledge of the long-term sustainability of buffel grass pastures in various climates and soils is lacking. Where buffel grass is already widely established, methods to minimise its spread, and to maintain diversity of native understorey and overstorey plant species and vegetation structure, are required. In vegetation where buffel grass is dominant, the nature of its impacts on native fauna (including invertebrates) and on soil nutrient cycles is largely unknown. Its potential distributional limits and the susceptibility of various native vegetation types to invasion under specific management regimes and future climate change are poorly understood.

The possibility that buffel grass roots exude chemicals that inhibit growth of other plant species needs to be investigated.

Acknowledgments

Information and guide revision: M. Friedel, CSIRO; D. Butler, Qld EPA; S. van Leeuwen, WA DEC; J. Virtue, SA DWLBC; D. Agnew, SA Arid Lands NRMB.

Map: Australia's Virtual Herbarium, (*Cenchrus ciliaris*), via Royal Botanic Gardens Melbourne, Council of Heads of Australian Herbaria. www.rbg.vic.gov.au/cgi-bin/avhpublic/avh.cgi.

Case study: G. Dinham, Alice Springs Desert Park.

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Strategic management of buffel grass

Quick reference guide

Regional / local status of buffel grass	Not yet established	Small, isolated outbreaks	Widely established
Management goals	Prevent establishment	Eradicate	Contain infestations and mitigate threat
Strategies required	Maintain native vegetation cover and integrity Regulate planting—define zones at greatest risk Practise weed hygiene Monitor, detect and identify new infestations especially drainage lines, floodouts, calcareous rises, roadsides and bare soil areas Where rainfall is variable, extra vigilance will be needed during a sequence of wetter than average summers	Physical removal or herbicide, or combined treatment Follow up is essential Prevent re-establishment or invasion by other weeds through passive or active site restoration	**Native vegetation:** Identify high priority biodiversity assets under threat from buffel grass and protect them through implementing long-term site management plans **Native / buffel pasture:** Manage grazing and fire to maintain diversity, eg allow native plants to recruit seedlings and set seed in good seasons **Cleared / improved pasture:** Manage seed production and minimise spread into adjacent areas, remove seedlings from outside planted area. Prevent fires spreading from pastures. **Roadsides and other infrastructure corridors:** Map infestations, practise weed hygiene and remove new outbreaks to prevent spread

Apply herbicides during periods of active growth

Herbicide should only be applied when plants are green, leafy and actively growing, generally soon after significant warm season rainfall. In semi-arid and arid climates, the period when spraying can be effective may be quite limited. Plan ahead to take advantage of these times. Follow instructions on the herbicide labels.

Follow up

It is essential to follow up physical or chemical treatment after the next significant rainfall. This will require advance resource planning. Spot spray regrowth from butts while still growing. Consider both physical and chemical treatments as combining them may increase their effectiveness and minimise off-target damage.

Prevent buffel grass re-establishment

Once mature plants have been killed, the focus is on preventing re-establishment from seeds in the soil seedbank or brought in by wind, water or animals. Buffel grass seeds may retain viability for up to 4 years or so and young plants can set seeds in their first season of growth.

1. Identify patterns of invasion and dispersal agents and manage major seed sources. Slashing can be done at any time but, if undertaken before seed set, it will minimise additions to the buffel grass seedbank.
2. Monitor weed-free areas after wet seasons to detect and remove seedlings before they establish deep roots and produce seed.
3. Restore ground-cover vegetation to areas from which buffel grass has been removed.
4. Avoid large-scale disturbance that would create extensive areas of bare soil and favour buffel grass invasion, such as too-frequent fire or overgrazing.

Buffel grass (*Cenchrus ciliaris*) along the highway near the Flinders Ranges, SA. Photo: D. Powell

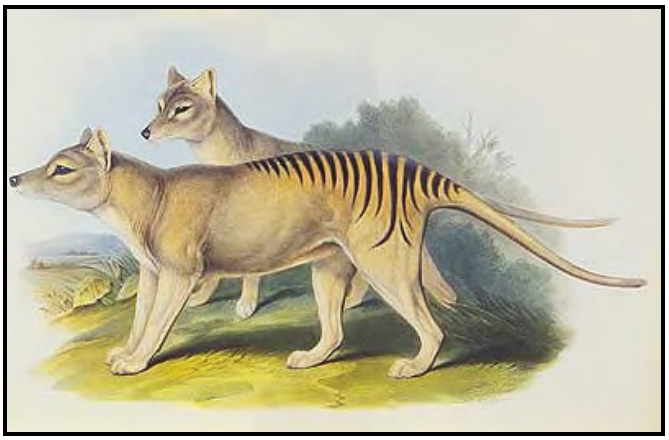
CRC Weed management

Appendix C: Phosphate Australia Environmental Management Plan

POZ MINERALS LIMITED

Environmental Management Plan

Updated January 2017



Restrictions on Use

This report has been prepared specifically for POZ Minerals Limited. Neither the report nor its contents may be referred to or quoted in any statement, study, report, application, prospectus, loan, or other agreement document, without the express approval of POZ Minerals Limited.

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Purpose

This document represents the POZ Minerals Limited ("POZ") Environmental Management Plan and is aimed at addressing the potential environmental impacts that may be encountered during exploration activities and the management actions to be taken for sound environmental practice.

During project works, POZ will comply with Government legislation and ensure permit requirements are met before commencing work.

Compliance with commitments outlined in this document will be internally audited by POZ and may be subject to external audits by the relevant regulatory agencies, including the Northern Territory Geological Survey (NTGS) and Department of Primary Industry and Resources (DPIR).

1.2 Project Overview

The Highland Plains Project consists of one granted tenement, EL25068, which occurs around 220km north northwest along unsealed gazetted roads and station tracks from the town of Camooweal in Queensland. The tenement is prospective for phosphate mineralization in the Cambrian units of the Georgina Basin, host to numerous phosphate occurrences including Wonarah and the Duchess Mine over the border in Queensland.

Work on this tenement was dormant from the 1960s and the only available information was exploration carried out by Australian Geophysical in 1968. A total of 36 drillholes were drilled over a 6km^2 that generated a historical estimate. This estimate is the focus of POZ Minerals' exploration target of 80-85 million tonnes of P_2O_5. The mineralization occurs at surface in the west of the embayment target and dips downwards to the east to a maximum depth of around 43 metres.

POZ Minerals conducted exploration drilling during 2008 and early 2009 in order to bring the historical drilling up to JORC compliance of today's standards.

A JORC compliant inferred resource of 56 Million Tonnes @ 16% P2O5 has been delineated at Highland Plains as a result. Within this, the Western Mine Target Zone has a grade of 14 Million Tonnes @ 20% P2O5.

Key features of the project have included to date:

Exploration work conducted from September 2008 to September 2009 included the following drilling:

1) 94 RC holes at 100 metre spacing
2) 28 RC holes at random spacing on the 200 metre proposed grid
3) 2 RC holes for attempted water bores
4) 6 HQ diameter diamond drill holes
5) 10 PQ diameter diamond drill holes
6) Geophysical Electromagnetic Survey
7) Topographic airborne "LIDAR" Survey
8) Ground Surveying – 2 base station points

9) Development of a sea container camp for up to 15 people. This includes ensuited accommodation which has full plumbing and electrics.
10) On Ground Environmental Survey
11) Drilling of 4 water bores near camp.

Total Drilling Activity:

RC Drilling – 122 holes for 3749 metres
Diamond Drilling – 16 holes for 316 metres

Low impact, environmentally responsible exploration has included the following:

- Access to drill site areas using existing pastoral tracks;
- Access to drill site areas using open ground as the area consists of sparse grasses and scattered vegetation;
- Access to the drill sites for Landcruiser vehicles, Multipurpose Drill rigs and Water Truck;
- Reconnaissance drilling with full rehabilitation of 2008 drillholes which means spreading drill spoil and plugging and covering drillholes.
- Fully rehabilitating all drillholes, including cutting collars and collapsing hole tops.
- Clearing of sumps of 15 diamond drillholes, fully rehabilitated in 2011.
- Establishment of a sea container camp within tenement EL25068 that accommodated up to 18 people. This is kept close together and rubbish management is taken into account to ensure no rubbish goes into the surrounding bush land. The sea container camp was demobilised and fully rehabilitated in 2012.

POZ Minerals conducted a desktop and field flora and fauna study by EcOZ Environmental Consultants. This work confirmed that the style of exploration that the company conducts which includes no track clearing would negligible impact on the few fauna species that may occur within the project area.

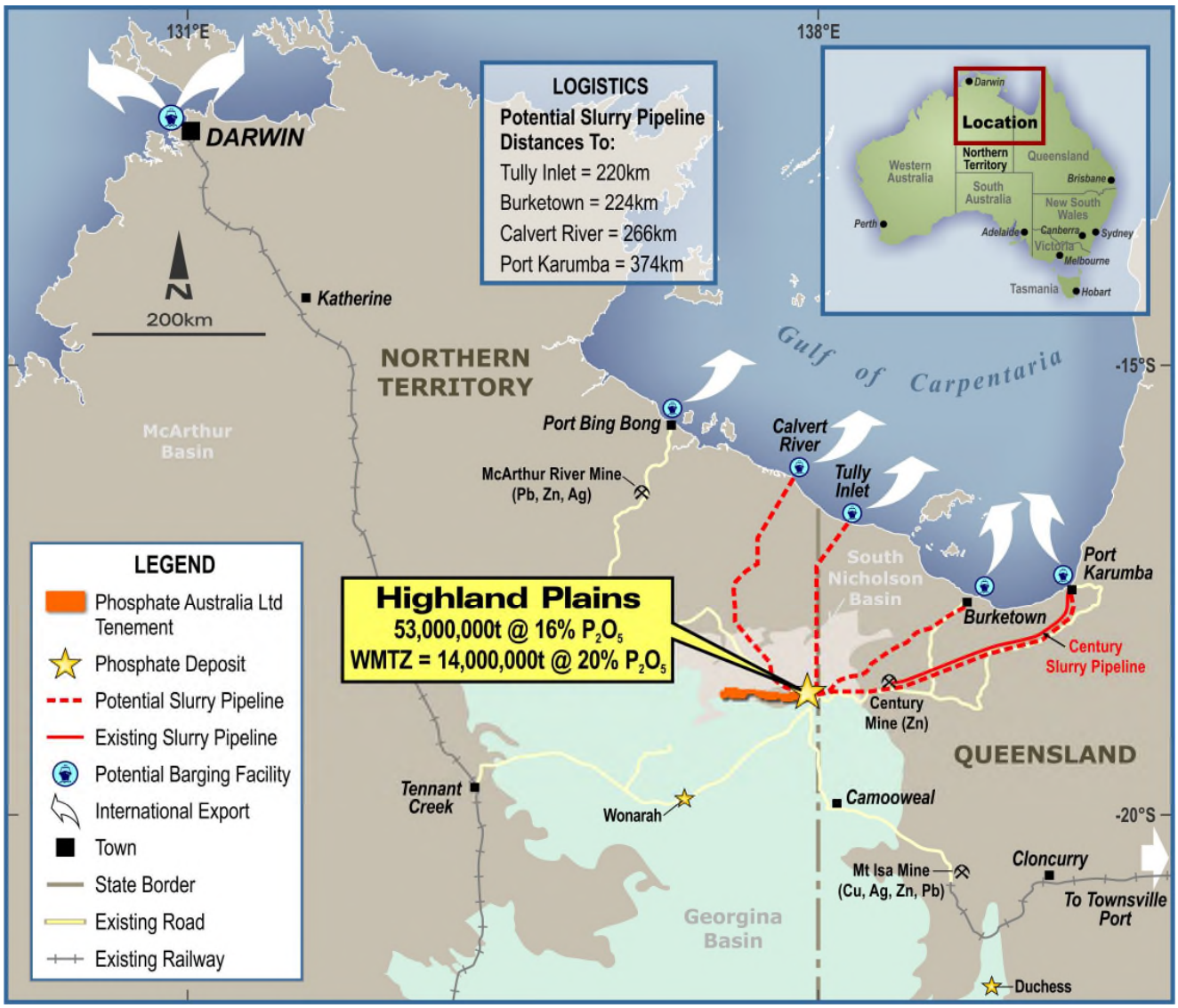
POZ Minerals makes it a policy to conduct exploration activities in an environmentally conscious way, informing staff of the sensitivities and avoiding areas of environmental importance.

2.0 PROJECT DESCRIPTION

POZ Minerals' granted tenement, EL25068, is known as the Highland Plains Phosphate Project. The tenement is situated 235km from the coast in a line from the eastern edge of the tenement, which abuts the border, to the coast.

The project area comprises a typical embayment "C-shaped" geomorphology with the outer bounding edge consisting of rocks of the Proterozoic Nicholson Basin. Cambrian sediments of the Georgina Basin have onlapped this unit and have been the host unit for phosphorite deposition, the target of POZ Minerals' exploration.

POZ Minerals Limited was incorporated on 10 January 2007 under the name of Nicholson Resources before changing its name to Phosphate Australia Limited on 27th February 2008, and subsequently to POZ Minerals Limited on 28th October 2016. All tenements are 100% held by POZ Minerals.



Location Map of Highland Plains

3.0 ROLES AND RESPONSIBILITIES

3.1 STATUTORY REGULATIONS

Environmental Protection & Biodiversity Act 1999
At a national level, flora and threatened ecological communities (TECs) are protected under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (1999 EPBC Act). This Act lists TECs that are Critically Endangered, Endangered or Vulnerable and flora species that are considered Critically Endangered, Endangered, Vulnerable, Conservation Dependent, Extinct or Extinct in the Wild (Appendix D1.1).

According to Commonwealth Law, species that are: Extinct, Critically endangered, Endangered species, Vulnerable species, Critically endangered communities or Endangered communities in the wild

(1) A person must not take an action that:

(a) has or will have a significant impact on a listed threatened species included in the Extinct, Critically endangered, Endangered species, Vulnerable species, Critically endangered communities or Endangered communities in the wild category; or

(b) is likely to have a significant impact on a listed threatened species included in the Extinct, Critically endangered, Endangered species, Vulnerable species, Critically endangered communities or Endangered communities in the wild category

3.2 RESEARCH FINDINGS

3.3 Flora and Fauna Survey Findings

Studies using the EPBC Database have indicated no World Heritage properties, National Heritage places, Wetlands of International Significance, nor Threatened Ecological Communities, are listed within the project area, or in the immediate vicinity of the project area.

Exotic Species that are preferred to be controlled if found may be seen in Table 1 below. POZ Minerals will take measures to limit the spread where possible and not traverse ground where it is found.

A copy of the desktop Flora and Fauna Study is given in Appendix 8. The Flora and Fauna Field Survey Report is given in Appendix 9.

Table 1: List of Exotic Species

Common Name	Scientific Name	Description	
Buffel Grass	*Cenchrus ciliaris*	An erect, deep-rooted perennial grass. This grass forms dense tussocks up to 1m tall. Seed heads are white to pale purple in a fluffy, spike-like raceme up to 15cm long. The seeds drop off when ripe (January to July) as burrs about 5mm in diameter. This species is found in disturbed areas, and is carried in the fur of animals or in vehicle tyres. The burrs also float and are thus further dispersed by floodwaters.	
Coffee Senna	*Senna occidentalis*	Annual or short lived perennial shrubs to 2m high, leaves divided into opposite pairs of leaflets. Flowers yellow with 5 petals. Pods slender, sickle shaped, slightly indented around the seeds. Seeds dark brown, flattened. Grows in dense stands in disturbed areas.	

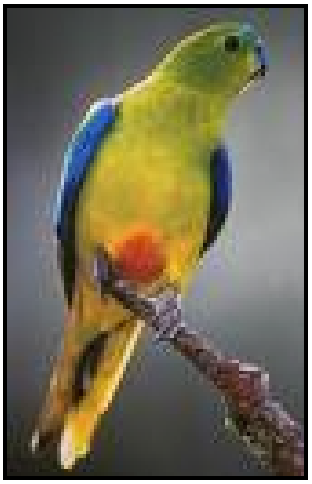
Common Name	Scientific Name	Description	
Khaki Weed	*Alternanthera pungens*	Khaki weed grows in dense patches and "flat on the ground". It is easily distinguishable by its many white/yellow prickly burrs. When mature, these burrs stick to bare feet, shoes, motor tyres etc. Source: http://www.northwestweeds.nsw.gov.au/khaki_weed.htm	
Noogoora Burr	*Xanthium strumarium*	Annual, much-branched woody herb to 60cm tall. Stems and base of each leaf covered with 3-pronged spines. Leaves divided into irregular lobes, green above, paler below. Fruits hard woody burrs, brown, covered with yellowish hairs and numerous hooked spines. Grows in disturbed areas.	
Sicklepod	*Senna obtusifolia*	Very similar to *Senna occidentalis*, but does not generally occur in such dense stands.	

Fauna species of current or potential conservation significance have been recorded within the project area, or within a 10 km radius with potential to occur within the project area according to the EPBC database. All of these species of current or potential conservation significance that may occur or have been previously recorded within the area are listed in Table 2.

Table 2: List of Fauna of Conservation Significance

Species Name	Common Name	Listing	
Varanus mertensi	Merten's Water Monitor	**Vulnerable** (TPWC Act)	
Elseya lavarackorum	Gulf Snapping Turtle	**Endangered** (EPBC Act 1999)	
Ctenotus lateralis	Gravelly Soil Ctenotus	Data Deficient (TPWC Act)	
Ixobrychus flavicollis	Black Bittern	Data Deficient (TPWC Act)	

Species Name	Common Name	Listing	
Erythrura gouldiae	Gouldian Finch	**Endangered** (EPBC Act 1999 and TPWC Act 2000) and Migratory (EPBC Act 1999)	
Rostratula australis	Australian Painted Snipe	**Vulnerable** (EPBC Act 1999 and TPWC Act 2000)	
Haliaeetus leucogaster	White-bellied Sea-Eagle	Migratory (EPBC Act 1999)	
Merops ornatus	Rainbow Bee-eater	Migratory (EPBC Act 1999)	

Rhipidura rufifrons	Rufous Fantail	Migratory (EPBC Act 1999)	
Ardeotis australis	Australian Bustard	**Vulnerable** (TPWC Act 2000)	
Pezoporus occidentalis	Night Parrot	**Critically Endangered** (TPWC Act 2000) and Endangered (EPBC Act 1999)	
Rattus villosissimus	Long-haired Rat	Near Threatened (TPWC Act)	

The study concludes that POZ Minerals carries out responsible exploration activities which are unlikely to impact on the habitat of these fauna. The Highland Plains project area does not have a watercourse so therefore the monitor and turtle should have no impact. The birds can fly away readily and thus the only possible species anticipated to occur on land within the project are the long haired rat and the ctenotus.

If any species detailed in Table 1 or 2 are seen within the project area at Highland Plains, the site manager must be notified and an environmental report filed.

3.4 COMPANY COMPLIANCE

In accordance with the project EMP, all activities will be conducted under the supervision of the Project Manager, or appropriately qualified delegate.

In addition to drilling programme tasks, the role of the Manager will be to:

- Implement and monitor the effectiveness of the Project EMP;
- Provide training for those involved in activities with environmental management procedures;
- Manage environmental aspects of the project;
- Manage contractors and monitor their compliance with the EMP;
- Facilitate communication with government agencies and stakeholders;
- Investigate incidents and ensure appropriate corrective actions are completed.

4.0 ENVIRONMENTAL MANAGEMENT PROCEDURES

The environmental management procedures detailed in this EMP form the basis of the control measures for the POZ Minerals' Highland Plains Project.

The procedures detail the objectives, management actions, performance indicators, monitoring and reporting requirements for each relevant environmental aspect associated with the RC and Diamond Drilling Programme. A periodic review and amendment will be undertaken to ensure currency and effectiveness of management procedures.

EMP-01 Environmental Training

Objective

- To inform site personnel and enhance and maintain environmental awareness; and
- To have a workforce that understands the POZ Minerals commitment to the environment.

Management

An *Environmental Induction* will be provided to all employees and contractors prior to commencing work (Appendix 5). Environmental induction training of the workforce will include:

- POZ Minerals' Environmental Policy (Appendix 1);
- Relevant environmental legislation and responsibilities; and
- Overview of environmental issues and management procedures including;
    - Inspections,
    - Incident Reporting,
    - Aboriginal Heritage,
    - Fauna,
    - Weed and Pest Management,
    - Sump Construction,
    - Topsoil Management,
    - Access Tracks,
    - RC Drilling Operations,
    - Water Requirements for wet drilling,
    - Groundwater,
    - Rehabilitation procedures,
    - Vehicle and Equipment Servicing,
    - Hydrocarbon and Chemical Management and Transport,
    - Hydrocarbon and Chemical Spills,
    - Bushfire Control.

Performance Indicators

- All new staff and contractors will have undertaken the environmental induction and procedure training prior to commencement of work; and
- Attendance at induction to be recorded in **Induction and Training Record** (Appendix 5).

Monitoring

- The Project Manager or delegate will ensure training requirements are identified and met; and
- The Project Manager or delegate is responsible for adherence to procedures and maintaining induction and training records (Appendix 5).

EMP-02 Inspections

Objective

- To reinforce environmental responsibility and detect potential risk situations and practices; and
- To verify that the EMP procedures are being implemented, are effective, and to provide opportunities for improvement.

Management

- Regular inspections will be completed by the Project Manager or delegate at appropriate intervals to ensure compliance with EMPs, legal commitments, and relevant regulations;
- The procedures contained within the each EMP will be reviewed and revised as required as part of continual improvement; and
- Ensure non-conformances are addressed with appropriate corrective action.

Performance Indicators

- Site inspection conducted fortnightly.

Monitoring

- The Project Manager or delegate will conduct fortnightly inspections, and report the results on an **Environmental Inspection Report** (Appendix 6)**.**

EMP-03 Incident Reporting

Objective

- To minimise the impacts of environmental incidents; and
- To track and record remedial measures and reduce the risk of re-occurrence.

Management

- Staff and contractors are required to report environmental incidents, near-misses and potential hazards via their supervisor by completing an **Environmental Incident/Non-conformance Report** (Appendix 7);
- Incidents will be reported immediately;
- Notifiable incidents and emergency events will be reported in accordance with relevant government regulation requirements;
- Any event that may result in prolonged and detrimental environmental impacts such as spills into waterways or large spills that cannot be cleaned up shall be reported to the relevant authorities; and
- Incidents that require reporting include:
    - Inappropriate management of topsoil;
    - New infestations of pests or weeds;
    - Death of fauna;
    - Sighting of fauna of conservation significance;
    - Contamination of ground or surface water;
    - Failure of containment sumps;
    - Major erosion of access tracks;
    - Disturbance to existing, or identification of new Aboriginal, or Non-Indigenous Heritage Sites;
    - Fires;
    - Hydrocarbon or chemical spills;
    - Incorrect disposal of waste, and;
    - Breaches or potential breaches of government regulations or environmental law.

Definitions

Notifiable Incident: -	an incident that is in breach of law or statutory condition that is required to be notified to the relevant government authority.
Non-notifiable Incident: -	incident that does not require reporting to the government but requires internal management.
Hazard: -	a condition or practice that has the potential to cause damage, an environmental impact or loss and requires the completion of a **Hazard Report** (Hazard/Issue Report Booklet).

Immediate Response

In the event of an environmental incident, the person to first observe the incident is required to:

- Implement immediate corrective action, if safe to do so, to minimise and/or eliminate the immediate risk to personnel, property, the natural environment and clean-up liability; and
- Verbally report the incident to their supervisor and/or the Project Manager or delegate.

Supervisors are required to:

- Ensure that resources are available to bring the incident under effective control; and
- Investigate and report the incident to senior POZ management.

Performance Indicators

- All environmental incidents and hazards reported and remedial/preventative actions completed.

Monitoring

- The Project Manager or delegate will be responsible for ensuring that incident reporting procedures are followed;
- Incident reporting will be undertaken using an **Environmental Incident/Non-conformance Report** (Appendix 7); and
- All incidents will be investigated and analysed to determine and address root causes and addressed in weekly OHS&E meetings.

Reporting

- All employees and contractors are responsible for the immediate reporting of all hazards to their supervisor verbally in the first instance;
- All environmental incidents or hazards will be reported to the Project Manager or delegate using an **Environmental Incident/Non-conformance Report** (Appendix 7);
- All notifiable incidents will be reported as per regulatory requirements to the POZ Managing Director and the relevant government department; and
- Records of incidents shall be maintained throughout the life of the project.

EMP-04 Aboriginal Heritage

Objectives

- Avoid disturbance to Aboriginal Heritage sites unless approval has been given under Section 18 of the *Aboriginal Heritage Act* 1972; and
- Ensure protection of known heritage sites.

Management

- Identified Aboriginal Heritage sites within project works impact areas will be appropriately demarcated and avoided;
- Environmental inductions will provide information on Aboriginal Heritage sites in the project area, and the importance of avoiding these sites;
- Where appropriate, heritage protection procedures will be adopted through agreement made between POZ and relevant aboriginal parties;
- No ground disturbing activities to be conducted until approved by relevant Aboriginal Communities with an Anthropologist through an Aboriginal Heritage Notice;
- Any Aboriginal site or suspected sites, which have not previously been identified, will be reported to the Project Manager or delegate immediately upon discovery; and
- For previously unidentified archaeological sites, Section 18 of the *Aboriginal Heritage Act* will be complied with if the site(s) is to be disturbed.

Performance Indicators

- Aboriginal Heritage sites avoided; and
- Compliance with Section 18 of the *Aboriginal Heritage Act* 1972.

Monitoring

- Routine monitoring of known Aboriginal Heritage sites will be undertaken by the Project Manager or delegate in accordance with EMP-02 Inspections, to ensure disturbance to these areas has not occurred.

Reporting

- Any new suspected heritage sites will be reported immediately to the site Project Manager or delegate; and
- Unauthorised interference with identified Aboriginal sites of significance will be reported to the Project Manager according to EMP-03 Incident Reporting.

EMP-05 Fauna

Objective

- Undertake project activities in a manner which minimises the adverse impact to fauna; and
- To ensure that any adverse impacts to threatened species is avoided.

Management

- The desktop environmental study will be made available to all employees for identification purposes;
- Sightings of fauna of conservation significance will be reported to the Project Manager or delegate;
- The Project Manager or delegate will record all sightings of identified species;
- Areas found to contain Rare or Endangered species will be avoided and advice sought from CALM;
- Employees will be required to comply with management actions of vegetation clearance to minimise habitat disturbance as outlined in EMP-07 Vegetation Clearance;
- Native fauna will not be captured or intentionally harmed;
- Disturbed areas will be rehabilitated as soon as practicable to facilitate fauna habitat restoration;
- Introduction of feral/domesticated animals will be prohibited. This will be communicated during the letting of contracts and reiterated during site inductions;
- Observations of feral species will be reported as an incident in accordance with EMP-03 Incident Reporting all employees and Contractors to the Project Manager; and
- Road kills will be regularly removed and reported as an incident in accordance with EMP-03 Incident Reporting by the Project Manager or delegate.

Performance Indicators

- Environmental induction implemented and contains fauna management measures.

Monitoring

- Areas that have been disturbed will be checked for rehabilitation by the Project Manager or delegate.

Reporting

- Where required, a report detailing the status of any specially protected (threatened) fauna will be prepared by the Project Manager or delegate and supplied to CALM;
- All fauna road kills will be reported to the site Project Manager or delegate and reported as an incident in accordance with EMP-03 Incident Reporting; and
- Unauthorized clearing of areas, native animal injury/death will be reported as soon as possible to and investigated by the site Project Manager or delegate .

EMP-06 Weed and Pest Management

Objective

- To prevent the transfer of weed and pest species into the project works area;
- To minimise the risk of outbreaks and to control/reduce any existing infestation of target weed species in construction and earthwork areas; and
- To minimise the spread of identified pest species.

Management

Weed Prevention

- Disturbance to natural vegetation will be minimised to limit invasion by introduced species;
- No plants or animals will be brought into the project area;
- Environmental induction training of all employees/contractors will include identification of weed/exotic species reporting of infestations and hygiene procedures to prevent introduction and spread of weeds;
- Mobile wash down facilities will be provided for vehicles in areas of known weed infestation before movement to non-infested areas;
- Approval will be required before entering or leaving quarantine areas; and
- Vehicles and earthmoving/mobile construction equipment will be washed down and cleaned of all vegetative, soil and rock material:
    - prior to entry to the project area;
    - prior to entering weed free areas at the project area;
    - prior to departure from the project area; and

  A **Mobilisation Hygiene Certificate** (Appendix 2) will be issued by the Project Manager or delegate.

Weed Control

- A weed control programme will be implemented if target species are found to be present. So far it is found that none occur within the 10 kilometre radius of the project. Exotic species preferred to be controlled have been identified within the project and will be prevented from spreading by the implementation of washdowns at the camp area. This way vehicles entering and leaving the site will not spread such species.
- The standing crop of target species will be reduced by appropriate methods within the vicinity of areas to be affected by POZ activities;
- Spot spraying of emergent weed species within project areas will be carried out to gradually deplete seed stocks and reduce or eliminate any new colonisation.

Pest Control

- No animals will be brought into the project area; and
- All rubbish will be disposed of appropriately.

Performance Indicators

- Area of disturbance minimised;
- A significant flora and weed identification guide made available for all persons;
- Weed hygiene procedures implemented;
- **Mobilisation Hygiene Certificates** (Appendix 2) completed;

- Environmental induction implemented, containing weed and pest awareness aspects;
- Control achieved on known weed populations in project areas;
- No persistent new introductions or spread of weeds or pests; and
- Pest hygiene procedures adopted.

Monitoring

- The Project Manager or delegate will monitor weed hygiene compliance using the **Mobilisation Hygiene Register**; and
- Work sites will be inspected in accordance with EMP-02 Inspections.

Reporting

- New infestations of weeds or pests will be reported as an environmental incident according to EMP-03 Incident Reporting by the Project Manager.

EMP-07 Vegetation Clearance – *No track clearing at Highland Plains currently proposed.*

Objectives

- Undertake track and sump construction in a manner which minimises adverse impact to vegetation communities;
- Control the spread of weeds into new areas.

Management

Prior to Land Clearing

- The relevant regulatory permits will be obtained; and before clearing activities commence in previously undisturbed areas, internal approval for clearing will be sought from the Project Manager.

Clearing

- All employees/contractors will be inducted on the importance of minimising vegetation clearing and disturbance, and the avoidance of weed infested areas in accordance with EMP-01 Environmental Training and EMP-06 Weed and Pest Management;
- Any target weed species identified during the surveys will be managed in accordance with EMP-06 Weed and Pest Management;
- Mature trees will be marked with flagging tape and avoided where practicable;
- Any significant flora identified will be clearly demarcated and avoided. Any Declared Rare Flora (DRF) that will be impacted requires Ministerial approval prior to disturbance.
- Cleared vegetation will be stockpiled away from streams/creeks;
- Vegetation will be cleared using the blade-up method where practicable to minimise soil disturbance;
- Where necessary, topsoil will be stripped, stockpiled and managed in accordance with EMP-08 Topsoil;
- Vegetation debris, logs and leaf litter will be retained for reuse during rehabilitation;
- and
- Work is to be carried out in accordance with EMP-18 Bushfire Control.

Performance Indicators

- Topsoil and vegetation direct returned or stockpiled for later use;
- A significant flora and weed identification guide made available for all persons;
- Employees trained in fire safety procedures; and
- Environmental induction implemented, including Vegetation Clearance Procedures.

Monitoring

The Project Manager or delegate will regularly inspect operational areas to ensure:

- Clearing Plans are followed;
- Clearing limits are demarcated adequately;
- Only authorised clearing is being undertaken; and
- Vegetation and topsoil direct returned or stockpiled in suitable locations.

Reporting

- Project Manager will oversee track creation
- The Project Manager or delegate will maintain records of clearing**.**

EMP-08 Topsoil – No track clearing currently proposed at Highland Plains.

Objectives

- Undertake construction and earthwork activities in a manner that maximises the retention and viability of topsoil resources for future rehabilitation; and
- Prevention of the spread of weeds by limiting the relocation of soil material from contaminated areas.

Management

- Vegetation and soil from excavations will not be pushed into surrounding vegetation;
- Where soil disturbance is required, the top 150mm (where available) of the soil profile (Topsoil) will be stripped and windrowed/stockpiled no higher than 1.5 metres in height, and demarcated on site plans;
- Topsoil and cleared vegetation will be 'direct returned' to areas being rehabilitated. Where this is not possible, topsoil will be stockpiled for later use;
- Under extremely dry and dusty conditions topsoil stockpiles may require watering with non-saline water to minimise dust lift-off using an appropriate method.

Performance Indicators

- Site clearing complies with EMP-07 Vegetation Clearance and EMP-09 Access Tracks & Sumps
- Topsoil and vegetation direct returned or stockpiled for later use;
- Progressive rehabilitation of available areas (EMP-19 Rehabilitation); and
- A significant flora and weed identification guide made available for all persons.

Monitoring

- The Project Manager or delegate will regularly inspect operational areas to ensure topsoil is being removed and stockpiled in suitable locations.

Reporting

- Site Disturbance will be managed by the Project Manager or delegate for approval before the works begin in undisturbed areas.

EMP-9 Access Tracks and Sumps

Objective

- To minimise direct and indirect adverse impacts on the flora, fauna, vegetation and surface water drainage systems from the development and maintenance of tracks and sumps.

Management

Planning

- Where practicable, existing roads and tracks will be used in preference to developing new infrastructure;
- Where practicable, track development will be avoided along valleys, drainage lines, dense vegetation, natural drainage systems, rough terrain, rocky outcrops, and steep slopes;
- Mature trees will be avoided;
- Clearing of vegetation along natural drainage systems will be not occur;
- In areas that have not been cleared previously, the route will be clearly marked by flagging tape to ensure that all relevant employees and contractors know the width and location of proposed track ; and
- Significant flora and threatened fauna species will be avoided – areas associated with these species will be demarcated by the Project Manager or delegate prior to the commencement of any work.

Mobilisation

- Clearing will be kept to a minimum by using equipment suited to the task;
- Access tracks will be constructed to the minimum width possible without threatening driver safety;
- Tracks will avoid unnecessary impact on natural drainage;
- Where possible, clearing will not be carried out for tracks which are intended for 'once-only use';
- Erosion will be prevented by breaking windrows to allow drainage;
- Runoff will be directed to the surrounding vegetation where possible and not into drainage lines, and where necessary and possible sediment control measures will be installed; and
- Deep cutting into the soil profile will be avoided.

Sumps

- Sumps are to be kept to the minimum possible size required for safe and practical drilling operations;
- Sumps will be located away from stands of mature vegetation and if possible, will be located in an area that requires minimal or no clearing;
- Vegetation and topsoil disturbed during the site preparation will be managed in accordance with EMP-07 Vegetation Clearance and EMP-08 Topsoil;
- Sumps will be constructed where necessary in accordance with EMP-10 RC Drilling Operations.

Performance Indicators

• Site Disturbance has been approved by Project Manager prior to work commencing in undisturbed areas; • A significant flora and weed identification guide made available for all persons; • Topsoil and vegetation direct returned or stockpiled for later use; • Site clearing complies with EMP-07 Vegetation Clearance and EMP-08 Topsoil; and • Progressive rehabilitation of available areas (EMP-19 Rehabilitation).
Monitoring • The Project Manager or delegate will undertake regular inspections to ensure that tracks and the sumps are established, used and maintained according to the above procedures.
Reporting • Site disturbance areas will be submitted to the Project Manager or delegate prior to construction.

EMP-10 RC Drilling Operations

Objective

- To ensure that the RC drilling operation is planned and conducted in a responsible manner that minimises impact on the environment; and
- To ensure that drill sites are left in a clean and safe state, and progressively rehabilitated.

Management

Drilling

- Frequent preventative maintenance checks will be undertaken on equipment to minimise the chance of hydrocarbon leaks (eg. from hydraulic lines), leaks will be recorded as part of maintenance procedures. Drilling will be suspended until uncontrolled/uncontained leaks have been repaired;
- Only non-hazardous drilling additives will be used;
- Drilling contractors must have available hydrocarbon containment and clean up materials (eg. drip trays, absorbent matting) and be familiar with their proper use; and
- No litter or waste will be disposed down drill holes.

Water Management During Drilling

- Water generated during drilling operations will be reused in the drilling process wherever possible;
- The release of any water down-slope or into vegetation, or its entry into drainage channels or improper collection around the rig will be avoided;

Water Containment

- Water used or encountered during drilling activities will be contained; and
- Small amounts of fresh groundwater encountered during drilling may be contained by establishment of bund walls.
- Sumps 3 metres long, 2 metres wide and 1 metre deep will be used to contain the water where the water is found to be saline.

Sumps

- Before drilling commences, suitably sited sumps will be constructed to collect drilling muds and fluids;
- The size of evaporation sumps will be no larger than required for the containment of drilling muds and fluids;
- Oily films/spillage will be removed immediately from sumps in accordance with EMP-16 Hydrocarbon and Chemical Spills and EMP-14 Hydrocarbon and Chemical Management; and
- Sumps will not be used as a refuse/litter dump.
- Sumps will be rehabilitated directly after drilling if possible otherwise suitable egress used.

Drill Sample Management

- RC Drill samples will be transported directly to designated material stockpile areas.
- Material stockpile area will be designed over a minimum area; and

- Sample bags will comply with asbestos management procedures; and
- Sample bags will be secured at all times to prevent their loss to wind gusts. Any bags that become wind borne will be retrieved immediately where practicable.

Drill Hole Rehabilitation

- Site cleanup will be conducted in accordance with EMP-24 Rehabilitation; and
- Each hole will be immediately capped to prevent fauna entrapment or accidents.
- When completed drillholes will be plugged below surface and covered with topsoil.

Performance Indicators

- Drill holes secured against unsafe situations and fauna entrapment;
- Drill sites are left clean and tidy; and
- There are no adverse environmental impacts as a consequence of the drilling activities.

Monitoring

- Drill sites will be checked as part of site inspection; and
- At completion of operations, inspections will be conducted in accordance with EMP-02 Inspections, to ensure drill holes have been capped and covered over with soil.

Reporting

- Inspections will be conducted in accordance with EMP-02 Inspections.

EMP-11 Surface Water

Objective

- Undertake project activities in a manner which minimises adverse impacts to surface water quality and hydrology.

Management

Hydrology/Watercourses

- Design of access tracks and sumps will be done in a manner so as not to interfere with natural drainage;
- Washing vehicles and equipment (including cookware and camp utensils) will occur only in appropriate and designated locations; and

Water Quality

- Water quality samples will be taken if potential contaminants are believed to have reached natural drainage channels. Water sampling will be undertaken in a manner which ensures sample integrity;
- Management of chemicals and hydrocarbons will be in accordance with EMP-14 Hydrocarbon and Chemical Management and EMP-16 Hydrocarbon and Chemical Spills;
- Servicing of equipment will be undertaken in accordance with EMP-13 Vehicle and Equipment Servicing; and
- Water from drilling operations and will be contained in sumps as detailed in EMP-10 RC Drilling Operations.

Performance Indicators

- Maintenance programme implemented to ensure all drainage structures and erosion control measures are maintained to standard;
- No significant erosion or sedimentation;
- Water samples acquired to test for potential contaminants will be submitted to NATA certified laboratories for analysis.

Reporting

- Major erosion events will be reported immediately to the Project Manager or delegate in accordance with EMP-03 Incident Reporting

EMP-12 Groundwater

Objective

- To minimise the adverse impact of project works on local and regional groundwater resource and quality.

Management

Quantity

- Extraction of groundwater will be in compliance with Groundwater Licences;
- Water used for drilling and ore processing shall be reused where possible to minimise wastage; and
- Saline groundwater will be contained where practicable.

Quality

- Equipment servicing will be undertaken in accordance with EMP-13 Vehicle and Equipment Servicing;
- Water sampling will be undertaken in a manner which ensures sample integrity;
- Management of chemicals and hydrocarbons will be in accordance with EMP-14 Hydrocarbon and Chemical Management and EMP-16 Hydrocarbon and Chemical Spills; and
- Groundwater management will be undertaken consistent with the DoE permits.

Performance Indicators

- Compliance with all relevant NTlicences and monitoring guidelines.

Monitoring

- Water quality sampling will be undertaken by the Project Manager or delegate as part of any investigations into suspected contamination.

Reporting

- The Project Manager or delegate will ensure compliance with NT licence monitoring reporting requirements.

EMP-13 Vehicle and Equipment Servicing

Objective

- To minimise impact to the environment arising from the servicing and maintenance of vehicles and equipment; and
- To dispose of waste associated with the servicing and maintenance of vehicles and equipment in an environmentally acceptable way.

Management

- Refuelling and servicing of vehicles will be in a designated area;
- If drill rigs or other equipment need refuelling or servicing at the drill pad or other site, all relevant precautions should be taken to minimise the probability of hydrocarbon spills;
- Vehicles and equipment within the project area will only be cleaned in designated wash down areas using biodegradable or quick break degreaser or detergents;
- Used oil filters, batteries and other waste resulting from minor servicing and maintenance activities will be retained in the appropriate waste receptacles and disposed of in accordance with EMP-17 Putrescible and Non-Putrescible Waste; and
- Waste oils/liquids, spills and soil contaminated from servicing and maintenance activities will be managed in accordance with EMP-16 Hydrocarbon and Chemical Spills.

Performance Indicators

- Servicing and maintenance of vehicles and equipment occurs in accordance with management procedures;
- Waste generated from servicing and maintenance of vehicles and equipment is stored and disposed of in accordance with EMP-14 Hydrocarbon and Chemical Management, EMP-16 Hydrocarbon and Chemical Spills, and EMP-17 Putrescible and Non-Putrescible Waste; and
- No permanent environmental impact associated with the servicing and maintenance of vehicles and equipment.

Monitoring

- Inspection of areas approved for minor maintenance and servicing of vehicles and equipment be undertaken by the Project Manager or delegate.

Reporting

- Spills or other environmental impacts associated with minor servicing and maintenance of vehicles and equipment will be reported.

EMP-14 Hydrocarbon and Chemical Management

Objective

- To minimise the impact of hydrocarbons/chemicals (solvents, cleaning fluids etc.) on the local and regional environment through the appropriate use, storage and transport of hydrocarbons and chemicals.

Management

General

- All chemicals will be approved for use by the Project Manager prior to being transported to the project area;
- Material Safety Data Sheets (MSDS) will be available for all chemicals used on site. Handling, use and storage of chemicals will be compliant with the relevant MSDS;
- Hydrocarbons and chemicals will be stored, used, transported and disposed in accordance with Dangerous Goods Regulations and DoIR guidelines;
- Hydrocarbons will be stored in accordance to Australian Standards for the Storage and Handling of Flammable and Combustible Liquids (AS 1940 – 1993) and will be segregated, where required, to ensure that incompatible classes of chemical are not stored together;
- Refuelling and servicing of vehicles will be in accordance with EMP-13 Vehicle and Equipment Servicing;
- Drums and Containers to be transported on any service vehicle will be properly secured to restrict movement and spillage;
- The Service Vehicle will have a spill kit on board; and
- Contractor Emergency Response Plans will be in place and suitable training will be undertaken to ensure swift and effective clean up in the event of contamination of surface and groundwater.

Disposal of used hydrocarbons and chemicals*;*

- Empty containers will be labelled, temporarily stored in containment bunds, removed from site and disposed or recycled according to EMP-17 Putrescible and Non-Putrescible Waste;
- Hydrocarbons and oily wastes (e.g. fuels, greases, de-greaser, emulsified oils and oily waste water) generated on site, will be captured and stored for removal from the project area for safe disposal or recycling;
- Hydrocarbons and oily wastes shall be secondarily contained;
- Contaminated soil will be collected and removed from the project area for disposal and treatment at a licensed Land farm facility; and
- Regular reviews of waste management practices and storage of hydrocarbons and chemicals will be undertaken.

Performance Indicators

- Containers are clearly and appropriately labelled;
- Housekeeping inspections undertaken; and
- The transport, storage, handling and disposal of hydrocarbons/chemicals on site comply

with relevant legislation and DoIR guidelines.
Monitoring • Housekeeping inspections will be undertaken by the Project Manager or delegate.
Reporting • Details of quantities and type of hydrocarbons/chemicals will be recorded by the Project Manager or delegate for reporting purposes; and • Accidental spills will be reported immediately as an environmental incident in accordance with EMP-03 Incident Reporting.

EMP-15 Bulk Hydrocarbon Transfer

Objectives

- To reduce the risks of spills resulting from bulk fuel transfer.

Management

- The transfer and storage of bulk fuel will comply with NT guidelines;
- Transfer quantities will be recorded;
- Transport and storage of bulk fuel in the tank will be the responsibility of the driver;
- Transfer of fuel shall be supervised by operator or a spotter at all times during the transfer process; and
- Spill kits will be located in the fuel tanker and at the project area.

Performance Indicators

- Compliance with relevant legislation and regulations;
- The transferral and storage of bulk fuel complies with NT guidelines; and
- No spills or environmental impacts occur.

Monitoring

- Housekeeping inspections will be undertaken weekly by the Project Manager or delegate. This will include inspecting transfer system for leaking bunds, pipes or valves; and
- Inventories of spill response equipment and materials will be maintained.

Reporting

- Details of quantities of bulk fuel will be recorded by the Project Manager or delegate for reporting purposes; and
- Accidental spills will be reported immediately as an environmental incident in accordance with EMP-03 Incident Reporting.

EMP-16 Hydrocarbon and Chemical Spills

Objective

- To ensure that hydrocarbon and chemical spills are appropriately managed to prevent long term or widespread impacts on the environment.

Management

- Major spills that may result in long term or widespread detrimental environmental impact will be reported immediately to the Project Manager or delegate and managed and reported in accordance with EMP-03 Incident Reporting;
- Hydrocarbon and Chemical spills will be managed according to the recommendations in the manufacturer's Material Safety Data Sheets (MSDS);
- Emergency Services will be contacted in the event of a large spill;
- The spill will be contained and the leak stopped as soon as possible. This will include blocking the source of the spill, blocking access to waterways and building dams/dykes around the spill;
- If safe to do so, spills will be cleaned up using absorbent materials or as directed in the MSDS;
- Contaminated material will be disposed of in prescribed lay down areas for removal from the project area;
- Soils contaminated with hydrocarbons will be excavated, sealed and stored for removal from the project area to an appropriate site in consultation with the local shire;
- The likelihood of the spill recurring will be investigated and steps taken to prevent its recurrence. These measures will be documented and made available to workforce;
- Hydrocarbon spill response kits will be provided at all camp and work sites;
- Management actions to restock spill kits will be generated; and
- Reporting of Known or Suspected Contaminated Sites (2001) process will be utilised to determine the level of reporting required for each incident.

Performance Indicators

- Reporting, investigation and clean-up of spills in a prompt and timely manner.

Monitoring

- Housekeeping inspections of waste management practices and storage of hydrocarbons and chemicals will be undertaken by the Project Manager or delegate.

EMP-17 Putrescible and Non-Putrescible Waste

Objective

- To minimise the impact of putrescible and non-putrescible waste on the local and regional environment and prevent pollution of the air, land and water; and
- Ensure putrescible and non-putrescible waste management practices comply with current legislation, industry standards, and waste disposal guidelines.

Management

General

- Vehicles and worksites will have secure rubbish containers for the containment of waste to prevent contamination of the site and the spread of wind-blown litter;
- Littering will not be permitted;
- Waste will be removed from individual work sites (drill sites etc.), and segregated into putrescible, non-putrescible and hydrocarbon/chemical contaminated waste;
- Where possible waste will be re-used or recycled; and
- Housekeeping inspections of facilities will be undertaken by the Project Manager or delegate, including the identification of any fire hazards.

Putrescible Waste

- Putrescible waste will be burned and buried in a tip away from the camp;
- Putrescible waste will be immediately covered with 10cm of clean fill on disposal.

Non-Putrescible Inert Waste

- Oily waste will be managed in accordance with EMP-14 Hydrocarbon and Chemical Management;
- Non-putrescible inert waste will be contained in skips or secure containers at lay down areas; and
- Waste will be stored at the lay down area for removal from the project area.

Monitoring

- Housekeeping inspections will be undertaken by the Project Manager or delegate. This will include inspecting putrescible and non-putrescible waste storage containers and areas.

Reporting

- Details of quantities and type of waste material will be recorded by the Project Manager for reporting purposes.

EMP-18 Bushfire Control

Objective

- To prevent bushfires resulting from project works.

Management

- Fires for food preparation and heating will be controlled with appropriate containment and fire breaks;
- All vehicles will carry firefighting equipment complying with the relevant Australian standards and staff will be trained in the use of this equipment;
- Firefighting equipment will be located at the worksites;
- Fire safety inspections will be periodically undertaken by the Project Manager or delegate according to EMP-02 Inspections;
- Fire frequency and causes for any fires started on site will be investigated and recorded by the Project Manager or delegate;
- Some vegetation may be cleared at drill sites where it is identified that bushfire is a hazard as a result of operations;
- Drill rigs will have fire extinguishers; and
- Diesel powered vehicles will be used on site,

Performance Indicators

- Housekeeping inspections undertaken;
- Firefighting equipment present at stipulated locations on site.

Monitoring

- Housekeeping inspections and routine maintenance of firefighting equipment will be undertaken by the Project Manager or delegate;
- All equipment that may cause fires will be inspected and potential fire hazards addressed.

Reporting

- Bushfire frequency and details will be recorded and maintained on site by the Project Manager or delegate.

EMP-19 Rehabilitation

Objectives

- To ensure that drill sites are left in a clean and safe state, and rehabilitated; and
- To encourage the re-establishment of self-sustaining ecosystems compatible with surrounding undisturbed areas.

Management

General Clean up

- Unless otherwise approved, all evidence of project activities including general rubbish, and contaminated soil will be removed from the site and appropriately disposed of;
- All hydrocarbon spills will be cleaned up and all contaminated soil collected and removed from the site as per EMP-16 Hydrocarbon and Chemical Spills; and
- Contaminated oil absorbent products will be removed from the site and appropriately stored prior to disposal to an approved landfill.

Drill Hole Management

- RC drill holes will be capped below surface and covered over with topsoil after drilling has been completed and they are no longer required.

Sumps

- Water will be allowed to evaporate before sumps are backfilled as seasonal weather conditions and plant scheduling permit;
- Stockpiled substrates will be returned in the reverse order to that of removal (subsoil first followed by topsoil);
- Slurry and earthen bunds will be re-levelled and broken up where the surface has been capped, to allow vegetation to re-establish; and
- Sump sites will be rehabilitated in accordance with EMP-19 Rehabilitation.

Rehabilitation

- Sumps will be filled in and topsoil placed over the top.
- Drillholes will be capped below surface and covered over with soil.
- Long-term visual impact will be minimised by creating landforms which are compatible with the adjacent landscape;
- Reshaped land will be formed so that it is inherently stable, adequately drained and suitable for the desired long-term use;
- Areas with disturbed topsoil to be recovered with topsoil or rock to match adjacent undisturbed areas to a depth of 100mm;
- Local provenance seed and plants may be utilised to boost flora density; and
- Management of noxious or environmental weeds in rehabilitated areas will be in accordance with EMP-06 Weed and Pest Management.

Performance Indicators

- Rehabilitation implemented in adherence to the principles for the rehabilitation of exploration sites;
- Progressive rehabilitation of disturbed areas;
- All RC drill holes will be capped and covered;
- Demobilisation and removal of temporary equipment, supplies, vehicles, waste and infrastructure associated with the exploration area;
- Drill Sites are left clean and tidy;
- Any environmental issues that may require rehabilitation in the future have been noted; and
- Rehabilitation has been completed.

Monitoring

The Project Manager or delegate will routinely inspect rehabilitation areas.

Reporting

- A record of rehabilitation undertaken will be maintained;
- The supervising geologist will make a record of the rehabilitation status on the log sheets upon completion of each drill hole; and
- Information is recorded in the drilling database.

5.0 Summary of Environmental Management

The following table summarises the objectives and management measures that will apply to the Project. This information will be provided to the nominated contractors with a contractual requirement to demonstrate that the management measures have been included in the relevant scope of works, such as through the preparation of specific management procedures, and that an adequate budget has been allowed for to implement the procedures.

Table 5.1 Summary of Environmental Management Procedures

Issue	Objective	Management Actions
1. Environmental Training	To have a workforce that understands and is committed to meeting the environmental expectations and requirements of POZ.	Staff and contractors will be trained in environmental management procedures prior to start of work.
2. Inspections	To reinforce environmental responsibility and detect potential risk situations and practices To verify that the EMP procedures are being implemented, are effective and to provide opportunities for improvement.	Regular inspections will be completed by the Project Manager or delegate at appropriate intervals to ensure compliance with EMP, legal commitments, and relevant regulations. Non-conformances will be addressed with appropriate corrective actions.
3. Incident Reporting	To minimise the impacts of environmental incidents. To track and record remedial measures and reduce the risk of re-occurrence.	Staff and contractors are required to immediately report environmental incidents and potential hazards via their supervisor, and complete an **Environmental Incident/Non-conformance Report** (See EMP Appendix 7).
		Incidents that may result in prolonged and detrimental environmental impacts and emergency events shall be reported in accordance with relevant Government regulation requirements.
4. Aboriginal Heritage	Avoid disturbance to Aboriginal Heritage sites unless approval has been given under Section 18 of the *Aboriginal Heritage Act (1972*). Ensure protection of known heritage sites.	Identified Aboriginal Heritage sites within exploration impact areas will be appropriately demarcated and avoided.
		Environmental inductions will provide information on Aboriginal Heritage sites in the project area, and the importance of avoiding these sites.
		Prior to conducting exploration, Aboriginal Heritage Surveys will be conducted by qualified Anthropologist(s)/Archaeologist(s) and Traditional Owners to identify any Aboriginal Heritage sites not currently included on the Aboriginal Sites Register.
		Any Aboriginal site or suspected sites, which have not previously been identified, must be reported to the Project Manager or delegate immediately upon discovery and the *Aboriginal Heritage Act 1972* complied with if the site(s) is to be disturbed.
5. Fauna	Undertake construction and project activities in a manner which minimises the adverse impact to fauna. To ensure that any adverse impacts to threatened species is avoided.	A handbook of fauna of conservation significance will be made available to all employees for identification purposes.
		Sightings of both fauna of conservation significance and feral species will be reported to the Project Manager or delegate and recorded.
		Areas found to contain Rare or Endangered species will be avoided and advice sought upon immediate notification of Government Authority.
		Introduction of feral/domesticated animals will be prohibited. This will be communicated during the letting of contracts and reiterated during site inductions.

Issue	Objective	Management Actions
6. Weed and Pest Management	To prevent the transfer of weed and pest species between project area and surrounding areas. To minimise the risk of outbreaks and to control/reduce any existing infestation of target weed species in construction and earthwork areas.	No plants or animals are to be brought into the project area. .
		Putrescible waste will be appropriately stored to prevent pest and health issues prior to burial in accordance with EMP-17 Putrescible and Intractable waste.
		Disturbance to natural vegetation will be minimised to limit invasion by introduced species.
		Environmental induction training of all employees/contractors will include identification of weed species/reporting of infestations and hygiene procedures to prevent introduction and spread of weeds.
		Vehicles and earthmoving/mobile construction equipment will be washed down and cleaned of all vegetative, soil and rock material if weeds are suspected: • prior to entry to the project area; • prior to entering weed free areas at the project area; • prior to departure from the project area; and
		A weed control programme will be implemented if target species are found to be present. The standing crop of target species will be reduced by appropriate methods within the vicinity of areas to be affected by the project works.
7. Vegetation Clearing	Undertake clearing and earthwork activities in a manner which minimises adverse impact to vegetation communities. Undertake activities in a manner which minimises adverse impact to Rare and Priority flora. Control the spread of weeds into new areas.	Before clearing activities commence in previously undisturbed areas, approval for clearing will be sought from the Project Manager or delegate.
		Areas to be cleared will be clearly to define the extent of authorised clearing, and mature trees avoided where practicable.
		Any significant flora identified during surveys will be clearly demarcated and avoided. Any Declared Rare Flora (DRF) that will be impacted requires Ministerial approval prior to disturbance. The Project Manager or delegate will consult with CALM regarding any threatened/significant flora which may be impacted.
		Topsoil will be stripped and stockpiled, and vegetation debris, logs and leaf litter will be retained for reuse during rehabilitation. Topsoil to be managed in accordance with Topsoil EMP-08.
		Cleared vegetation will be stockpiled away from streams/creeks and erosion and sedimentation minimised.
8. Topsoil	To undertake activities in a manner that maximises the retention and viability of topsoil resources for future rehabilitation. To prevent the spread of weeds by limiting the relocation of soil material from contaminated areas.	Once vegetation is cleared, the top 150mm of the soil profile (Topsoil) will be stripped and stockpiled no higher than 1.5 metres in height.
		Topsoil and cleared vegetation will be 'direct returned' to areas being rehabilitated.
		Topsoil and subsoil are to be stockpiled separately and replaced in the correct order during rehabilitation.
9. Access Tracks and Drill Pads.	To minimise direct and indirect adverse impacts on the flora, fauna, vegetation and surface water drainage systems from the development and maintenance of access tracks	Where practicable existing roads and tracks will be used in preference to developing new infrastructure. Tracks are only proposed for safety purposes.
		Erosion will be prevented by breaking windrows to allow drainage, and runoff will be directed to the surrounding vegetation rather than into drainage lines.
		Significant flora and threatened fauna species will be avoided – areas associated with these species will be demarcated by the Project Manager or delegate prior to the commencement of any work.

Issue	Objective	Management Actions
		Drill pads will not be used for the reconnaissance drilling operations.
		Sumps will be constructed where necessary in accordance with EMP-10 RC Drilling Operations.
10. RC Drilling Operations	To ensure that the RC drilling operation is planned and conducted in a responsible manner that minimises impact on the environment. To ensure that drill sites are left in a clean and safe state, and progressively rehabilitated.	Frequent preventative maintenance checks will be undertaken on equipment to minimise the chance of hydrocarbon leaks (eg. from hydraulic lines), leaks will be recorded as part of maintenance procedures. Drilling will be suspended until uncontrolled/uncontained leaks have been repaired.
		Drilling contractors must have available hydrocarbon containment and clean up materials (eg. drip trays, absorbent matting) and be familiar with their proper use.
		No litter or waste will be disposed down drill holes and only non-hazardous drilling additives will be used.
		Water generated during drilling operations will be contained and reused in the drilling process wherever possible.
		Drilling will be suspended if the groundwater is highly saline or in significant amounts, until appropriate and approved containment sumps have been constructed.
		Before drilling commences, suitably sited sumps will be constructed to collect drilling muds and fluids.
		RC Drill samples will be transported directly to designated material stockpile areas away from the creek bed.
		All holes will be capped below surface and covered with topsoil.
11. Surface Water	Undertake project activities in a manner which minimises adverse impacts to surface water quality and hydrology.	Design of sites will be done in a manner to minimise interference to natural drainage.
		Washing vehicles and equipment (including cookware and camp utensils) will occur only in appropriate and designated locations.
		Cleared vegetation and topsoil will be stockpiled away from watercourses.
		Water quality samples will be taken if potential contaminants are believed to have reached natural drainage channels. Water sampling will be undertaken in a manner which ensures sample integrity.
		Management of chemicals and hydrocarbons will be in accordance with EMP-14 Hydrocarbon and Chemical Management and EMP-16 Hydrocarbon and Chemical Spills and servicing of equipment will be undertaken in accordance with EMP-13 Vehicle and Equipment Servicing.
		Water from drilling will be contained as detailed in EMP-10 RC Drilling Operations.
12. Groundwater	To minimise the adverse impact of project works on local and regional groundwater resource and quality.	Extraction of groundwater will be in compliance with Groundwater Licences and the amount of water extracted measured for reporting.
		Water used for drilling and ore processing shall be reused where possible to minimise wastage. Dry drilling is preferred.
		Management of chemicals and hydrocarbons will be in accordance with EMP-14 Hydrocarbon and Chemical Management and EMP-16 Hydrocarbon and Chemical Spills and equipment servicing will be undertaken in accordance with EMP-13 Vehicle and Equipment Servicing.
		Groundwater management will be undertaken consistent with the DoE permits.

Issue	Objective	Management Actions
13. Vehicle and Equipment Servicing	To minimise impact to the environment arising from the servicing and maintenance of vehicles and equipment. To dispose of waste associated with the servicing and maintenance of vehicles and equipment in an environmentally acceptable way.	Refuelling and servicing of vehicles will be in a designated area with all relevant precautions taken to minimise the probability of hydrocarbon spills.
		Vehicles and equipment within the project area will only be cleaned in designated wash down areas using biodegradable or quick break degreaser or detergents.
		Used oil filters, batteries and other waste resulting from minor servicing and maintenance activities will be retained in the appropriate waste receptacles and disposed of in accordance with EMP-17 Putrescible and Non-putrescible Waste.
		Waste oils/liquids, spills and soil contaminated from servicing and maintenance activities will be managed in accordance with EMP-16 Hydrocarbon and Chemical Spills.
14. Hydrocarbon and Chemical Management	To minimise the impact of hydrocarbons/chemicals (solvents, cleaning fluids etc) on the local and regional environment through the appropriate use, storage and transport of hydrocarbons and chemicals.	All chemicals will be approved for use by the Project Manager prior to being transported to the project area and Material Safety Data Sheets (MSDS) will be available for all chemicals used on site. Handling, use and storage of chemicals will be compliant with the relevant MSDS.
		Hydrocarbons and chemicals will be stored, used, transported and disposed in accordance with Dangerous Goods Regulations, and Australian Standards for the Storage and Handling of Flammable and Combustible Liquids (AS 1940 – 1993).
		Hydrocarbons and oily wastes shall be secondarily contained.
		Secondary containment areas will be cleaned and free of spills.
		Storage facilities will be equipped with adequate fire control equipment and spill response material/equipment.
		Refuelling and servicing of vehicles will be in accordance with EMP-17EMP-13 Vehicle and Equipment Servicing.
		Service Vehicle will be equipped with a spill kit and, drums and containers to be transported will be properly secured to restrict movement and spillage.
		Empty drums, containers, hydrocarbons and oily wastes (e.g. fuels, greases, de-greaser, emulsified oils and oily waste water) generated on site, will be labelled and stored for removal from the project area for safe disposal or recycling.
		Contaminated soil will be collected and removed from the project area for disposal and treatment at a licensed Land farm facility.
		Contractor Emergency Response Plans will be in place and suitable training will be undertaken to ensure swift and effective clean up in the event of contamination of surface and groundwater.
		Regular reviews of waste management practices and storage of hydrocarbons and chemicals will be undertaken.
15. Bulk Hydrocarbon Transfer	To reduce the risks of spills resulting from bulk fuel transfer.	The fuel transfer system will be designed to prevent backflow into the surrounding environment in the event of a pipe breach. The transfer and storage of bulk fuel will comply with NT guidelines.
		Transfer of fuel shall be supervised by operator or a spotter at all times during the transfer process.
		Spill kits will be located in the fuel tanker and at the project area.

Issue	Objective	Management Actions
16. Hydrocarbon and Chemical Spills	To ensure that hydrocarbon and chemical spills are appropriately managed to prevent long term or widespread impacts on the environment.	Major spills that may result in long term or widespread detrimental environmental impact will be reported immediately to the Project Manager, managed according to the recommendations in the manufacturer's Material Safety Data Sheets (MSDS) and reported in accordance with EMP-03 Incident Reporting.
		Emergency Services will be contacted in the event of a large spill or if hazardous chemicals are involved.
		The spill will be contained and the leak stopped as soon as possible. This will include blocking the source of the spill, blocking access to waterways, building dams/dykes around the spill and if safe to do so, cleaning up as directed in the MSDS.
		Contaminated soils and material will be disposed of in prescribed lay down areas for removal from the project area and the likelihood of the spill recurring will be investigated and steps taken to prevent its recurrence.
		Hydrocarbon spill response kits will be provided at all camp and work sites.
17. Putrescible and Non-putrescible Waste	To minimise the impact of putrescible and intractable waste on the local and regional environment and prevent pollution of the air, land and water. Ensure putrescible and intractable waste management practices comply with current legislation, industry standards and waste disposal guidelines.	Vehicles, worksites and Camp facilities will have secure rubbish containers for the containment of waste to prevent contamination of the site, prevent access by fauna and to deter pests.
		Waste will be removed from individual work sites (drill sites etc.), and segregated into putrescible, non-putrescible and hydrocarbon/chemical contaminated**.**
		Putrescible waste will be buried in a designated pit located in hydrologically non-conductive clay, more than 20 m above the water table and immediately covered with 10cm of clean fill on disposal.
		Littering will not be permitted.
		Oily waste will be managed in accordance with EMP-18EMP-14 Hydrocarbon and Chemical Management.
		Non-putrescible waste will be contained in skips or secure containers at lay down areas for removal from the project area
18. Bushfire Control	To prevent bushfires resulting from project works.	Firefighting equipment complying with the relevant Australian standards will be available at the worksites, generator and in all vehicles. Staff will be trained in the use of this equipment.
		Fires for food preparation and heating will be controlled with appropriate containment and fire breaks.
		Fire safety inspections will be periodically undertaken by the Project Manager or delegate according to EMP-02 Inspections, and fire frequency and causes for any fires started on site will be investigated and recorded by the Project Manager or delegate.
		Diesel powered vehicles will be used on site.
19. Rehabilitation	To ensure that drill sites are left in a clean and safe state, and progressively rehabilitated. To encourage the re-establishment of self-sustaining ecosystems compatible with surrounding undisturbed areas.	All hydrocarbon spills will be cleaned up and all contaminated soil and oil absorbent products collected and removed from the site as per EMP-20EMP-16 Hydrocarbon and Chemical Spills.
		Prior to commencing rehabilitation earthworks project work sites will be tidied. Unless otherwise approved, rubbish, concrete and contaminated soil will be removed from the site and appropriately disposed of.
		RC drill holes will be capped below surface and topsoil replaced.

Issue	Objective	Management Actions
		Water will be allowed to evaporate before sumps are backfilled as seasonal weather conditions and plant scheduling permit.
		Stockpiled substrates will be returned in the reverse order to that of removal (subsoil first followed by topsoil) and sump sites will be scarified and rehabilitated in accordance with EMP-24EMP-19 Rehabilitation.
		Disturbed areas will be reshaped to be compatible with the adjacent landscape, and formed so that it is inherently stable, adequately drained and suitable for the desired long-term use.
		Disturbed areas will be reshaped to be compatible with the adjacent landscape, and formed so that it is inherently stable, adequately drained and suitable for the desired long-term use.
		Management of noxious or environmental weeds in rehabilitated areas will be in accordance with EMP-06 Weed and Pest Management.
		Management of noxious or environmental weeds in rehabilitated areas will be in accordance with EMP-06 Weed and Pest Management. Where practicable, natural drainage patterns will be reinstated.

6.0 References

Minerals Council of Australia (1989). *Mine Rehabilitation Handbook*. Australian Mining Industry Council, Braddon, ACT.

ANZMEC (2000). *Strategic Framework for Mine Closure*. Australian and New Zealand Minerals and Energy Council and Minerals Council of Australia. Canberra, ACT.

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Department of Environment (2000). *Water Quality Protection Guidelines No. 5 Mining and Mineral Processing – Minesite Water Quality Monitoring*, Water and Rivers Commission, Perth, Western Australia.

Department of Environment (2001). *Reporting of known of Suspected Contaminated Sites,* Department of Environmental Protection, Perth Western Australia.

Department of Industry and Resources (various). *Guidelines - Dangerous Goods Transport and Storage.* Department of Minerals and Energy, Perth, Western Australia.

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Joint Ore Reserves Committee of The Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia (JORC), September 1999. *Australasian Code for Reporting of Mineral Resources and Ore Reserves (The JORC Code).*

Appendix 1 POZ Minerals Limited Environmental Policy

POZ Minerals Limited
Environmental Policy

POZ Minerals Limited is committed to fulfilling its social and regulatory environmental responsibility. The company acknowledges that exploration is a temporary land use and will strive to plan, implement and monitor activities so as to prevent or minimize potentially adverse environmental impacts.

POZ Minerals Limited will:

- Strive for continual improvement in environmental performance,
- Recognise and protect areas of special environmental and social value,
- Comply with state and national legislation,
- Identify, assess and mange risks to the environment,
- Establish environmental objectives and targets, implement environmental management plans and monitor effects of all relevant activities,
- Ensure that project personnel maintain a practical knowledge of good environmental procedures and practices relevant to their activities,
- Communicate with employees, government and the wider community in relation to environmental performance.

POZ Minerals Limited will regularly review and report on the environmental performance of the company and will ensure that this policy remains relevant to achieving its target of minimal impact to the environment.

Signed

Jim Richards
Managing Director
December 2016

Appendix 2 Mobilisation Hygiene Certificate

MOBILISATION HYGIENE CERTIFICATE

Date ..... **Contractor** .....

Contract # ..... **Address** .....

Purchase Order # ..... **Phone** ..... **Facsimile** ..... **Site Contact** .....

Location of Equipment Usage .....

UNIT NO.	**EQUIPMENT DESCRIPTION** (Please complete as comprehensively as possible for each unit)	**Registration No.**	**Location of last works undertaken by equipment**	**Date Cleaned**
Certified				
Signature				
Position				
DATE				

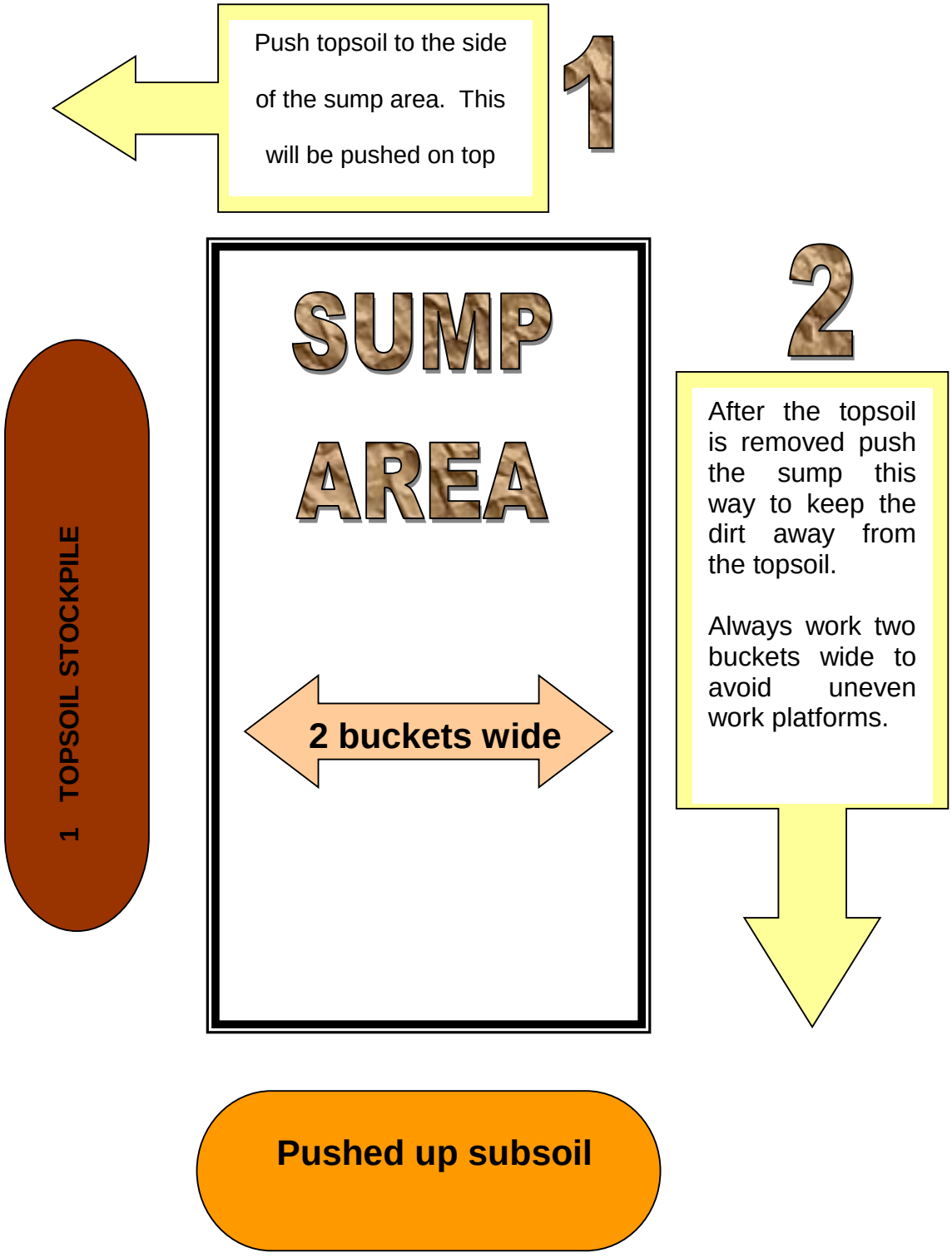
Appendix 3 Drill Water Sampling Form

Sampling performed by (name)		**Phone**	
Contracting Company (if applicable)		**Facsimile**	
Site Contact (name)		**Date**	

Drill Water Sampling Form

DATE OF SAMPLE.	**LOCATION OF SAMPLE**	**SAMPLE NO**	**EC (uS/cm)**	**Other Measured Parameters**						
Reviewed by										
Signature										
Position										
DATE										

Appendix 4 Layout of Sumps for Drill Holes


Push topsoil to the side of the sump area. This will be pushed on top
1
SUMP AREA
2
After the topsoil is removed push the sump this way to keep the dirt away from the topsoil.
Always work two buckets wide to avoid uneven work platforms.
1 TOPSOIL STOCKPILE
2 buckets wide
Pushed up subsoil

Appendix 5 Induction and Training Record

Date:	**Type of Training:** ☐ **Awareness** ☐ **Induction** ☐ **Competency (Testing Required)**
Training Topic:	
Learning Outcomes:	
Reason for training: ☐ **Scheduled Training** ☐ **Other**	
Trainer/Presenter:	**Venue:**

Attendees	**Company**	**Employee #**	**Achieved Competency**		
			Yes	**No**	**N/A**

Appendix 6 Environmental Inspection Report

Environmental Inspection Report

Note: Bring along previous inspection record for verification of corrective actions

Site		**Inspection Date**	
Location		**Inspector/s**	

ASPECT	Action required (Yes or No)	Comments/Actions Required	Related non conformance
Landscape			
Geological Features			
Topsoil			
Erosion / Erosion control berms			
Vegetation			
Rehabilitated areas			
Weeds			
Flora			
Fauna			
Water / Drainage structures			
Aboriginal Heritage			
Hazard Prevention			
Saline Water			
Sumps			
Borrow Pits			
Groundwater extraction			
Chemical storage and waste			
Hydrocarbon storage and waste			
Slimes Dam			
Spillage of hazardous materials			
Drill Rig Condition			
Solid Waste / Waste Recycling			
Drill Holes			
Process Plant			
General housekeeping / Litter			
Environmental Management Systems			
Procedures			
Incident Reports			
Inspections/Audits			
Records			
Awareness			
Training			
Other			
Firefighting equipment/Machinery			
Signs and Barriers			
Safety Bunds / fences			
Created landforms			
Disturbed areas for rehabilitation			

Actions from previous inspections have been addressed ☐ **Yes** ☐ **No**

Non-conformance has been raised (Complete Incident and Non Conformance Form) ☐

Appendix 7 Environmental Incident/Non-conformance Report

Sections 1-5: To be completed by initiator of this report

Section 1: Details of person reporting Incident / Non-conformance			
Name		**Date of report**	
Company		**UI Supervisor**	
Report type	☐ Env. Incident/'Near Miss' (Fill in **Section 2**)	☐ Non-conformance (**Fill in Section 3**)	
	☐ External communication (Fill in **Section 4**)	☐ Other (Fill in **Section 5**)	

Section 2: Details of Environmental Incident			
Date of event		**Location of event**	
Contractor involved		**Was risk of incident previously known? Yes** ☐ **No** ☐	
Description of incident:			
Immediate Actions taken			
Go to Section 6			

Section 3: Details of Environmental Non-conformance		
Source of Non-conformance	☐ Inspection on Contractor	☐ Inspection on Self
	☐ EMS Audit on Contractor	☐ Internal Audit on Self
	☐ Contractual Audit	☐ External Audit on Self
Description of non-conformance:		
Go to Section 6		

Section 4: Details of External Communication		
Source of Communication	☐ Public	☐ Interest Groups
	☐ Government Agency	☐ Other (Specify):
Communication was raised in	☐ Phone call ☐ Letter	☐ Meeting ☐ Other (Specify):
Date of communication		**Received by:**
Details of Stakeholder / Communication:		
Name of Person / Organisation:		**Address:**
Telephone Number:		**Fax Number:**

Description of issue / concern:
Go to Section 6
Section 5: Other
Details:
Go to Section 6

Section 6: To be completed by Area Supervisor / Project Manager or Delegate

Section 6: Investigation			
Date of completion		**Lead Investigator**	
Contributing factors for incident / non-conformance			
☐ Breach of existing procedures		☐ Lack of awareness , competence , skill	
☐ No existing procedure		☐ Task risk not assessed prior to task commencing	
☐ Procedure / equipment not fit for purpose		☐ Miscommunication	
Root Causes:			

Section 7: Corrective / Preventive Actions		
Required changes include:	☐ Risk Register Update	☐ Documentation Revision / Development
	☐ Training of Personnel	☐ Business Objectives Review
	☐ Review of Contract Agreements	☐ Communication with Employees/contractor
	☐ Additional resource	☐ Communication with External Stakeholders

Corrective / Preventive Actions Required	Responsible Person	Due Date

Section 8: Incident / Non-conformance Close Out (To be completed only after all actions are completed)		
I confirm that all actions from this incident / non-conformance have been adequately addressed.		
Project Manager (Name)	**Signature**	**Date**

Appendix 8 Flora and Fauna Desktop Survey

Appendix 9 Flora and Fauna Field Survey

Appendix D: Phosphate Australia Environmental Induction

PHOSPHATE AUSTRALIA LIMITED

Environmental Induction

Updated

July 2015

Restrictions on Use

This report has been prepared specifically for Phosphate Australia Limited. Neither the report nor its contents may be referred to or quoted in any statement, study, report, application, prospectus, loan, or other agreement document, without the express approval of Phosphate Australia Limited.

TABLE OF CONTENTS

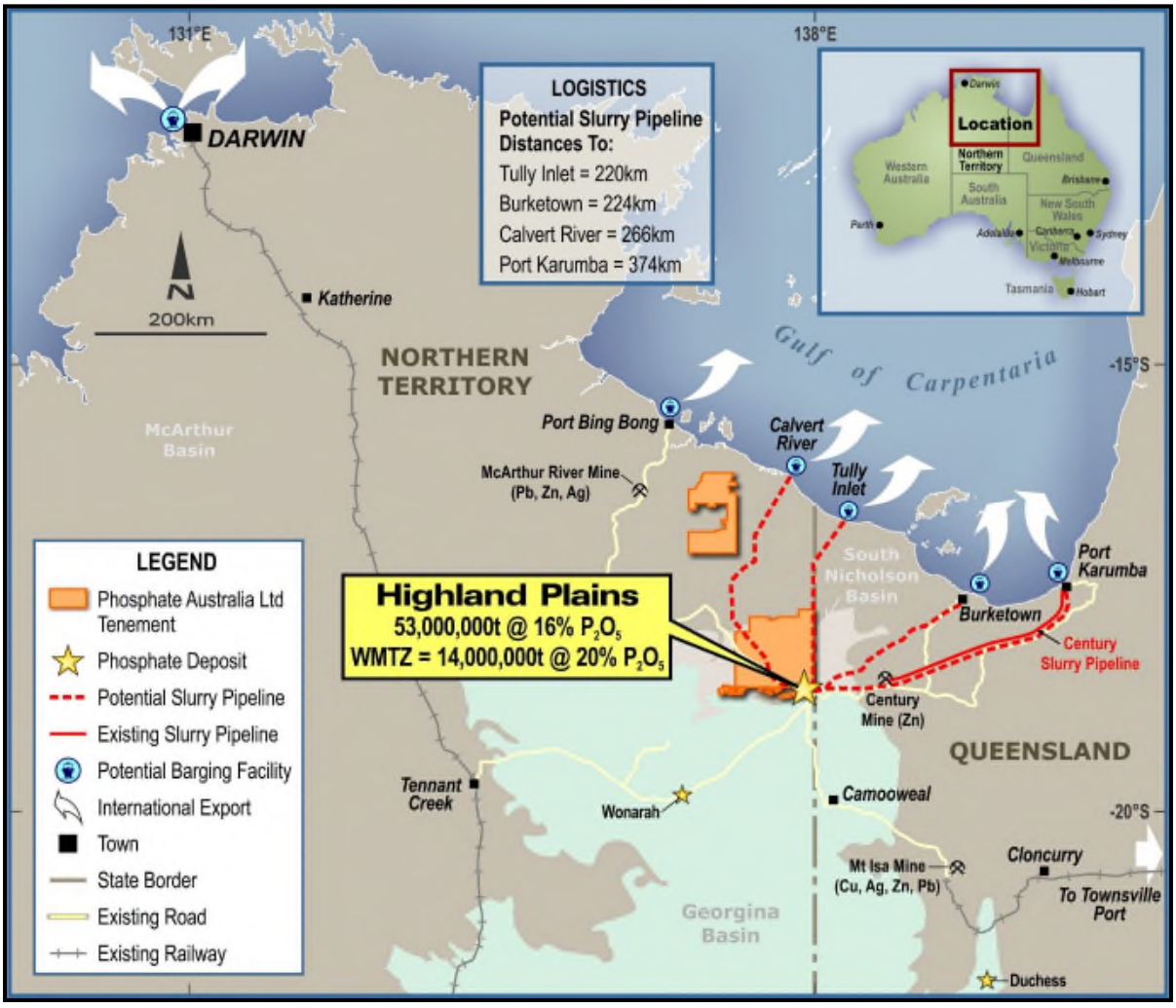
1.0 INTRODUCTION

1.1 Purpose

This document represents the Phosphate Australia Limited ("POZ") Environmental Induction and is aimed at addressing the potential environmental impacts that may be encountered during exploration activities and to inform staff how to undertake sound environmental practice.

1.2 Project Overview

The Highland Plains Project consists of one granted tenement, EL25068 which occurs around 220km north northwest along unsealed gazetted roads and station tracks, from the town of Camooweal in Queensland. The tenement is prospective for phosphate mineralization in the Cambrian units of the Georgina Basin, host to numerous phosphate occurrences including Wonarah and the Duchess Mine over the border in Queensland.



Initial work was carried out by Australian Geophysical in 1968. A total of 36 drillholes were drilled over a 6km^2 that generated a historical estimate.

Phosphate Australia has recently conducted exploration drilling during 2008 and early 2009 in order to bring the historical drilling up to JORC compliance of today's standards. A JORC compliant inferred resource of 56 Million Tonnes @ 16% P2O5 has been delineated at Highland Plains as a result. Within this the Western Mine Target Zone has a grade of 14 Million Tonnes @ 20% P2O5.

Key features of the project have included to date:

Exploration work conducted from September 2008 to September 2010 has included the following:

1) 94 RC holes at 100 metre spacing
2) 28 RC holes at random spacing on the 200 metre proposed grid
3) 2 RC holes for attempted water bores
4) 6 HQ diameter diamond drill holes
5) 10 PQ diameter diamond drill holes
6) Geophysical Electromagnetic Survey
7) Topographic airborne "LIDAR" Survey
8) Ground Surveying – 2 base station points
9) Development of a sea container camp for up to 15 people. This includes ensuited accommodation which has full plumbing and electrics.
10) Hydrogeological studies involving drilling of four bores.
11) Environmental flora fauna survey.
12) Extraction of 1 tonne bulk sample of material.
13) Closure and rehabilitation of Highland Plains exploration camp and infrastructure.

Total Drilling Activity:

RC Drilling – 122 holes for 3749 metres
Diamond Drilling – 16 holes for 316 metres

Exploration by Phosphate Australia is conducted in an environmentally responsible fashion at all times by staff and inspected by management. To date the following have been undertaken at the Highland Plains site:

- Access to drill site areas using existing pastoral tracks;
- Access to drill site areas using open ground as the area consists of sparse grasses and scattered vegetation;
- Access to the drill sites for Landcruiser vehicles, Multipurpose Drill rigs and Water Truck;
- Reconnaissance drilling with full rehabilitation of 2008 drillholes which means spreading drill spoil and plugging and covering drillholes.
- Drillhole capping of 2009 drilling. These will be kept securely capped until a decision about the future of the project is made such as whether the project will go to mine.
- Clearing of sumps of 15 diamond drillholes. One sump will be left open. This is no threat to fauna as it is only 1 metre deep. It will be kept open because it has mineralisation at surface and is valuable for visible inspection.
- Establishment of a sea container camp within tenement EL25068 that accommodate up to 18 people. This is kept close together and rubbish management is taken into account to ensure no rubbish goes into the surrounding bush land.
- All drillholes and sumps have been rehabilitated fully in September 2010.

Phosphate Australia has conducted a flora and fauna study as well as wet and dry season field surveys which were carried out by EcOZ Environmental Consultants. This work confirmed that the

style of exploration that the company conducts would have negligible impact on the few fauna species that may occur within the project area.

Phosphate Australia makes it a policy to conduct exploration activities in an environmentally conscious way, informing staff of the sensitivities and avoiding areas of environmental importance.

2.0 PROJECT DESCRIPTION

Phosphate Australia's granted tenement, EL25068, is known as the Highland Plains Phosphate Project. The tenement is situated 235km from the coast in a line from the eastern edge of the tenement, which abuts the border, to the coast.

The project area comprises a typical embayment "C-shaped" geomorphology with the outer bounding edge consisting of rocks of the Proterozoic Nicholson Basin. Cambrian sediments of the Georgina Basin have onlapped this unit and have been the host unit for phosphorite deposition, the target of Phosphate Australia's exploration.

3.0 ROLES AND RESPONSIBILITIES

3.1 STATUTORY REGULATIONS

Environmental Protection & Biodiversity Act 1999

According to Commonwealth Law, species that are: Extinct, Critically endangered, Endangered species, Vulnerable species, Critically endangered communities or Endangered communities in the wild

(1) A person must not take an action that:

(a) has or will have a significant impact on a listed threatened species included in the Extinct, Critically endangered, Endangered species, Vulnerable species, Critically endangered communities or Endangered communities in the wild category; or

(b) is likely to have a significant impact on a listed threatened species included in the Extinct, Critically endangered, Endangered species, Vulnerable species, Critically endangered communities or Endangered communities in the wild category

3.2 Flora and Fauna Survey Findings

Studies using the EPBC Database have indicated no World Heritage properties, National Heritage places, Wetlands of International Significance, nor Threatened Ecological Communities are listed within the project area, or in the immediate vicinity of the project area.

Exotic Species that are preferred to be controlled if found may be seen in Table 1 below. Phosphate Australia will take measures to limit the spread where possible and not traverse ground where it is found.

Table 1: List of Exotic Species

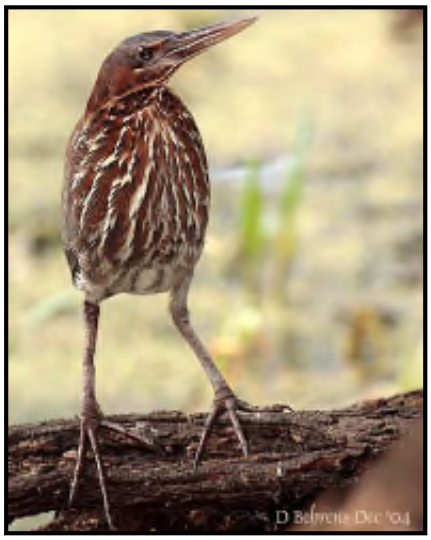
Common Name	Scientific Name	Description	
Buffel Grass	*Cenchrus ciliaris*	An erect, deep-rooted perennial grass. This grass forms dense tussocks up to 1m tall. Seed heads are white to pale purple in a fluffy, spike-like raceme up to 15cm long. The seeds drop off when ripe (January to July) as burrs about 5mm in diameter. This species is found in disturbed areas, and is carried in the fur of animals or in vehicle tyres. The burrs also float and are thus further dispersed by floodwaters.	

Common Name	Scientific Name	Description	
Coffee Senna	*Senna occidentalis*	Annual or short lived perennial shrubs to 2m high, leaves divided into opposite pairs of leaflets. Flowers yellow with 5 petals. Pods slender, sickle shaped, slightly indented around the seeds. Seeds dark brown, flattened. Grows in dense stands in disturbed areas.	
Khaki Weed	*Alternanthera pungens*	Khaki weed grows in dense patches and "flat on the ground". It is easily distinguishable by its many white/yellow prickly burrs. When mature, these burrs stick to bare feet, shoes, motor tyres etc. Source: http://www.northwestweeds.nsw.gov.au/khaki_weed.htm	

Common Name	Scientific Name	Description	
Noogoora Burr	*Xanthium strumarium*	Annual, much-branched woody herb to 60cm tall. Stems and base of each leaf covered with 3-pronged spines. Leaves divided into irregular lobes, green above, paler below. Fruits hard woody burrs, brown, covered with yellowish hairs and numerous hooked spines. Grows in disturbed areas.	
Sicklepod	*Senna obtusifolia*	Very similar to *Senna occidentalis*, but does not generally occur in such dense stands.	

Fauna species of current or potential conservation significance have been recorded within the project area, or within a 10 km radius with potential to occur within the project area according to the EPBC database. All of these species of current or potential conservation significance that may occur, or have been previously recorded within the area are listed in Table 2.

Table 2: List of Fauna of Conservation Significance

Species Name	Common Name	Listing	
Varanus mertensi	Merten's Water Monitor	**Vulnerable** (TPWC Act)	
Elseya lavarackorum	Gulf Snapping Turtle	**Endangered** (EPBC Act 1999)	
Ctenotus lateralis	Gravelly Soil Ctenotus	Data Deficient (TPWC Act)	
Ixobrychus flavicollis	Black Bittern	Data Deficient (TPWC Act)	

Species Name	Common Name	Listing	
Erythrura gouldiae	Gouldian Finch	**Endangered** (EPBC Act 1999 and TPWC Act 2000) and Migratory (EPBC Act 1999)	
Rostratula australis	Australian Painted Snipe	**Vulnerable** (EPBC Act 1999 and TPWC Act 2000)	
Haliaeetus leucogaster	White-bellied Sea-Eagle	Migratory (EPBC Act 1999)	
Merops ornatus	Rainbow Bee-eater	Migratory (EPBC Act 1999)	

Rhipidura rufifrons	Rufous Fantail	Migratory (EPBC Act 1999)	
Ardeotis australis	Australian Bustard	**Vulnerable** (TPWC Act 2000)	
Pezoporus occidentalis	Night Parrot	**Critically Endangered** (TPWC Act 2000) and Endangered (EPBC Act 1999)	
Rattus villosissimus	Long-haired Rat	Near Threatened (TPWC Act)	
Heteromunia pectoralis	Pectoral Finch	Near Threatened (TPWC AND EPBC Act)	

Phosphate Australia carries out low impact, responsible exploration activities which is unlikely to impact on the habitat of these fauna. The Highland Plains project area does not have a watercourse so therefore the monitor and turtle should have no impact. The birds can fly away readily and thus the only possible species anticipated to occur on land within the project are the long haired rat and the ctenotus.

If any species detailed in Table 1 or 2 are seen within the project area at Highland Plains, the site manager must be notified and an environmental report filed.

As a result the study has concluded that exploration work will have little impact on the environment.

4.0 SUMMARY OF ENVIRONMENTAL MANAGEMENT PROCEDURES

The following table summarises the objectives and management measures that will apply to the Project. This information will be provided to the nominated contractors with a contractual requirement to demonstrate that the management measures have been included in the relevant scope of works, such as through the preparation of specific management procedures, and that an adequate budget has been allowed for to implement the procedures. For more information, refer to the Phosphate Australia Environmental Management Plan.

Table 5.1 Summary of Environmental Management Procedures

Issue	Objective	Management Actions
1. Environmental Training	To have a workforce that understands and is committed to meeting the environmental expectations and requirements of POZ.	Staff and contractors will be trained in environmental management procedures prior to start of work.
2. Inspections	To reinforce environmental responsibility and detect potential risk situations and practices To verify that the EMP procedures are being implemented, are effective and to provide opportunities for improvement.	Regular inspections will be completed by the Project Manager or delegate at appropriate intervals to ensure compliance with EMP, legal commitments, and relevant regulations. Non conformances will be addressed with appropriate corrective actions.
3. Incident Reporting	To minimise the impacts of environmental incidents. To track and record remedial measures and reduce the risk of re-occurrence.	Staff and contractors are required to immediately report environmental incidents and potential hazards via their supervisor, and complete an **Environmental Incident/Non-conformance Report** (See EMP Appendix 7).
		Incidents that may result in prolonged and detrimental environmental impacts and emergency events shall be reported in accordance with relevant Government regulation requirements.
4. Aboriginal Heritage	Avoid disturbance to Aboriginal Heritage sites unless approval has been given under Section 18 of the *Aboriginal Heritage Act (1972*). Ensure protection of known heritage sites.	Identified Aboriginal Heritage sites within exploration impact areas will be appropriately demarcated and avoided.
		Environmental inductions will provide information on Aboriginal Heritage sites in the project area, and the importance of avoiding these sites.
		Prior to conducting exploration, Aboriginal Heritage Surveys will be conducted by qualified Anthropologist(s)/Archaeologist(s) and Traditional Owners to identify any Aboriginal Heritage sites not currently included on the Aboriginal Sites Register.
		Any Aboriginal site or suspected sites, which have not previously been identified, must be reported to the Project Manager or delegate immediately upon discovery and the *Aboriginal Heritage Act 1972* complied with if the site(s) is to be disturbed.
5. Fauna	Undertake construction and project activities in a manner	A handbook of fauna of conservation significance will be made available to all employees for identification purposes.

Issue	Objective	Management Actions
	which minimises the adverse impact to fauna. To ensure that any adverse impacts to threatened species is avoided.	Sightings of both fauna of conservation significance and feral species will be reported to the Project Manager or delegate and recorded.
		Areas found to contain Rare or Endangered species will be avoided and advice sought upon immediate notification of Government Authority.
		Introduction of feral animals will be prohibited. This will be communicated during the letting of contracts and reiterated during site inductions.
6. Weed and Pest Management	To prevent the transfer of weed and pest species between project area and surrounding areas. To minimise the risk of outbreaks and to control/reduce any existing infestation of target weed species in construction and earthwork areas.	No plants to be brought into the project area. .
		Putrescible waste will be appropriately stored to prevent pest and health issues prior to burial in accordance with EMP-17 Putrescible and Intractable waste.
		Disturbance to natural vegetation will be minimised to limit invasion by introduced species.
		Environmental induction training of all employees/contractors will include identification of weed species/reporting of infestations and hygiene procedures to prevent introduction and spread of weeds.
		Vehicles and earthmoving/mobile construction equipment will be washed down and cleaned of all vegetative, soil and rock material if weeds are suspected: • prior to entry to the project area; • prior to departure from the project area; and
		A weed control programme will be implemented if declared weeds are found.
7. Vegetation Clearing	Undertake clearing and earthwork activities in a manner which minimises adverse impact to vegetation communities. Undertake activities in a manner which minimises adverse impact to Rare and Priority flora. Control the spread of weeds into new areas.	Before clearing activities commence in previously undisturbed areas, approval for clearing will be sought from the Project Manager or delegate.
		Areas to be cleared will be clearly to define the extent of authorised clearing, and mature trees avoided where practicable.
		Any significant flora identified during surveys will be clearly demarcated and avoided. Any Declared Rare Flora (DRF) that will be impacted requires Ministerial approval prior to disturbance. The Project Manager or delegate will consult with CALM regarding any threatened/significant flora which may be impacted.
		Topsoil will be stripped and stockpiled, and vegetation debris, logs and leaf litter will be retained for reuse during rehabilitation. Topsoil to be managed in accordance with Topsoil EMP-08.
		Cleared vegetation will be stockpiled away from streams/creeks and erosion and sedimentation minimised.
8. Topsoil	To undertake activities in a manner that maximises the retention and viability of topsoil resources for future rehabilitation.	Once vegetation is cleared, the top 150mm of the soil profile (Topsoil) will be stripped and stockpiled no higher than 1.5 metres in height.
		Topsoil and cleared vegetation will be 'direct returned' to areas being rehabilitated.
		Topsoil and subsoil are to be stockpiled separately and replaced in the correct order during rehabilitation.

Issue	Objective	Management Actions
	To prevent the spread of weeds by limiting the relocation of soil material from contaminated areas.	
9. Access Tracks and Drill Pads.	To minimise direct and indirect adverse impacts on the flora, fauna, vegetation and surface water drainage systems from the development and maintenance of access tracks	Where practicable existing roads and tracks will be used in preference to developing new infrastructure. Tracks are only proposed for safety purposes .
		Erosion will be prevented by breaking windrows to allow drainage, and runoff will be directed to the surrounding vegetation rather than into drainage lines.
		Significant flora and threatened fauna species will be avoided – areas associated with these species will be demarcated by the Project Manager or delegate prior to the commencement of any work.
		Drill pads will not be used for the reconnaissance drilling operations.
		Sumps will be constructed where necessary in accordance with EMP10 RC Drilling Operations.
10. RC Drilling Operations	To ensure that the RC drilling operation is planned and conducted in a responsible manner that minimises impact on the environment. To ensure that drill sites are left in a clean and safe state, and progressively rehabilitated.	Frequent preventative maintenance checks will be undertaken on equipment to minimise the chance of hydrocarbon leaks (eg. from hydraulic lines), leaks will be recorded as part of maintenance procedures. Drilling will be suspended until uncontrolled/uncontained leaks have been repaired.
		Drilling contractors must have available hydrocarbon containment and clean up materials (eg. drip trays, absorbent matting) and be familiar with their proper use.
		No litter or waste will be disposed down drill holes and only non-hazardous drilling additives will be used.
		Water generated during drilling operations will be contained and reused in the drilling process wherever possible.
		Drilling will be suspended if the groundwater is highly saline or in significant amounts, until appropriate and approved containment sumps have been constructed.
		Before drilling commences, suitably sited sumps will be constructed to collect drilling muds and fluids.
		RC Drill samples will be transported directly to designated material stockpile areas away from the creek bed.
		All holes will be capped below surface and covered with topsoil.
11. Surface Water	Undertake project activities in a manner which minimises adverse impacts to surface water quality and hydrology.	Design of sites will be done in a manner to minimise interference to natural drainage.
		Washing vehicles and equipment (including cookware and camp utensils) will occur only in appropriate and designated locations.

Issue	Objective	Management Actions
		Cleared vegetation and topsoil will be stockpiled away from watercourses.
		Water quality samples will be taken if potential contaminants are believed to have reached natural drainage channels. Water sampling will be undertaken in a manner which ensures sample integrity.
		Management of chemicals and hydrocarbons will be in accordance with EMP-14 Hydrocarbon and Chemical Management and EMP-16 Hydrocarbon and Chemical Spills and servicing of equipment will be undertaken in accordance with EMP-13 Vehicle and Equipment Servicing.
		Water from drilling will be contained as detailed in EMP10 RC Drilling Operations.
12. Groundwater	To minimise the adverse impact of project works on local and regional groundwater resource and quality.	Extraction of groundwater will be in compliance with Department Groundwater Licences and the amount of water extracted measured.
		Water used for drilling and ore processing shall be reused where possible to minimise wastage.
		Management of chemicals and hydrocarbons will be in accordance with EMP-14 Hydrocarbon and Chemical Management and EMP-16 Hydrocarbon and Chemical Spills and equipment servicing will be undertaken in accordance with EMP-13 Vehicle and Equipment Servicing.
		Groundwater management will be undertaken consistent with the permitting requirements.
13. Vehicle and Equipment Servicing	To minimise impact to the environment arising from the servicing and maintenance of vehicles and equipment. To dispose of waste associated with the servicing and maintenance of vehicles and equipment in an environmentally acceptable way.	Refuelling and servicing of vehicles will be in a designated area with all relevant precautions taken to minimise the probability of hydrocarbon spills.
		Vehicles and equipment within the project area will only be cleaned in designated wash down areas using biodegradable or quick break degreaser or detergents.
		Used oil filters, batteries and other waste resulting from minor servicing and maintenance activities will be retained in the appropriate waste receptacles and disposed of in accordance with EMP-17 Putrescible and Non-putrescible Waste.
		Waste oils/liquids, spills and soil contaminated from servicing and maintenance activities will be managed in accordance with EMP-16 Hydrocarbon and Chemical Spills.
14. Hydrocarbon and Chemical Management	To minimise the impact of hydrocarbons/chemicals (solvents, cleaning fluids etc) on the local and regional environment through the appropriate use, storage and transport of hydrocarbons and chemicals.	All chemicals will be approved for use by the Project Manager prior to being transported to the project area and Material Safety Data Sheets (MSDS) will be available for all chemicals used on site. Handling, use and storage of chemicals will be compliant with the relevant MSDS.
		Hydrocarbons and chemicals will be stored, used, transported and disposed in accordance with Dangerous Goods Regulations, and Australian Standards for the Storage and Handling of Flammable and Combustible Liquids (AS 1940 – 1993).
		Hydrocarbons and oily wastes shall be secondarily contained.
		Secondary containment areas will be cleaned and free of spills.
		Storage facilities will be equipped with adequate fire control equipment and spill response material/equipment.
		Refuelling and servicing of vehicles will be in accordance with EMP-17EMP-13 Vehicle and Equipment Servicing.

Issue	Objective	Management Actions
		Service Vehicle will be equipped with a spill kit and, drums and containers to be transported will be properly secured to restrict movement and spillage.
		Empty drums, containers, hydrocarbons and oily wastes (e.g. fuels, greases, de-greaser, emulsified oils and oily waste water) generated on site, will be labelled and stored for removal from the project area for safe disposal or recycling.
		Contaminated soil will be collected and removed from the project area for disposal and treatment at a licensed Land farm facility.
		Contractor Emergency Response Plans will be in place and suitable training will be undertaken to ensure swift and effective clean up in the event of contamination of surface and groundwater.
		Regular reviews of waste management practices and storage of hydrocarbons and chemicals will be undertaken.
15. Bulk Hydrocarbon Transfer	To reduce the risks of spills resulting from bulk fuel transfer.	The fuel transfer system will be designed to prevent backflow into the surrounding environment in the event of a pipe breach. The transfer and storage of bulk fuel will comply with NT guidelines.
		Transfer of fuel shall be supervised by operator or a spotter at all times during the transfer process.
		Spill kits will be located in the fuel tanker and at the project area.
16. Hydrocarbon and Chemical Spills	To ensure that hydrocarbon and chemical spills are appropriately managed to prevent long term or widespread impacts on the environment.	Major spills that may result in long term or widespread detrimental environmental impact will be reported immediately to the Project Manager, managed according to the recommendations in the manufacturer's Material Safety Data Sheets (MSDS) and reported in accordance with EMP 03 Incident Reporting.
		Emergency Services will be contacted in the event of a large spill or if hazardous chemicals are involved.
		The spill will be contained and the leak stopped as soon as possible. This will include blocking the source of the spill, blocking access to waterways, building dams/dykes around the spill and if safe to do so, cleaning up as directed in the MSDS.
		Contaminated soils and material will be disposed of in prescribed lay down areas for removal from the project area and the likelihood of the spill recurring will be investigated and steps taken to prevent its recurrence.
		Hydrocarbon spill response kits will be provided at all camp and work sites.
17. Putrescible and Non-putrescible Waste	To minimise the impact of putrescible and intractable waste on the local and regional environment and prevent pollution of the air, land and water. Ensure putrescible and intractable waste management practices	Vehicles, worksites and Camp facilities will have secure rubbish containers for the containment of waste to prevent contamination of the site, prevent access by fauna and to deter pests.
		Waste will be removed from individual work sites (drill sites etc), and segregated into putrescible, non-putrescible and hydrocarbon/chemical contaminated**.**
		Putrescible waste will be buried in a designated pit located in hydrologically non-conductive clay, more than 20 m above the water table and immediately covered with 10cm of clean fill on disposal.

Issue	Objective	Management Actions
	comply with current legislation, industry standards and waste disposal guidelines.	
		Littering will not be permitted.
		Oily waste will be managed in accordance with EMP-18EMP-14 Hydrocarbon and Chemical Management.
		Non-putrescible waste will be contained in skips or secure containers at lay down areas for removal from the project area.
18. Bushfire Control	To prevent bushfires resulting from project works.	Fire fighting equipment complying with the relevant Australian standards will be available at the worksites, generator and in all vehicles. Staff will be trained in the use of this equipment. Fires for food preparation and heating will be controlled with appropriate containment and fire breaks.
		Fire safety inspections will be periodically undertaken by the Project Manager or delegate according to EMP-02 Inspections, and fire frequency and causes for any fires started on site will be investigated and recorded by the Project Manager or delegate.
		Diesel powered vehicles will be used on site.
19. Rehabilitation	To ensure that drill sites are left in a clean and safe state, and progressively rehabilitated. To encourage the re-establishment of self-sustaining ecosystems compatible with surrounding undisturbed areas.	All hydrocarbon spills will be cleaned up and all contaminated soil and oil absorbent products collected and removed from the site as per EMP-20EMP-16 Hydrocarbon and Chemical Spills.
		Prior to commencing rehabilitation earthworks project work sites will be tidied. Unless otherwise approved, rubbish, concrete and contaminated soil will be removed from the site and appropriately disposed of.
		RC drill holes will be capped below surface and topsoil replaced.
		Water will be allowed to evaporate before sumps are backfilled as seasonal weather conditions and plant scheduling permit.
		Stockpiled substrates will be returned in the reverse order to that of removal (subsoil first followed by topsoil) and sump sites will be scarified and rehabilitated in accordance with EMP-24EMP-19 Rehabilitation.
		Disturbed areas will be reshaped to be compatible with the adjacent landscape, and formed so that it is inherently stable, adequately drained and suitable for the desired long-term use.
		Disturbed areas will be reshaped to be compatible with the adjacent landscape, and formed so that it is inherently stable, adequately drained and suitable for the desired long-term use.
		Management of noxious or environmental weeds in rehabilitated areas will be in accordance with EMP-06 Weed and Pest Management.
		Management of noxious or environmental weeds in rehabilitated areas will be in accordance with EMP-06 Weed and Pest Management. Where practicable, natural drainage patterns will be reinstated.

END OF INDUCTION

Appendix 1 Induction And Training Record

Date:			**Type of Training:** □ Awareness □ Induction □ Competency (Testing Required)		
Training Topic:					
Learning Outcomes:					
Reason for training: □ Scheduled Training □ Other					
Trainer/Presenter:			**Venue:**		
Attendees	**Company**	**Employee #**	**Achieved Competency**		
			Yes	**No**	**N/A**

Appendix 2 Environmental Inspection Report

Environmental Inspection Report

Note: Bring along previous inspection record for verification of corrective actions

Site		**Inspection Date**	
Location		**Inspector/s**	

ASPECT	Action required (Yes or No)	Comments/Actions Required	Related non conformance
Landscape			
Geological Features			
Topsoil			
Erosion / Erosion control berms			
Vegetation			
Rehabilitated areas			
Weeds			
Flora			
Fauna			
Water / Drainage structures			
Aboriginal Heritage			
Hazard Prevention			
Saline Water			
Sumps			
Borrow Pits			
Groundwater extraction			
Chemical storage and waste			
Hydrocarbon storage and waste			
Slimes Dam			
Spillage of hazardous materials			
Drill Rig Condition			
Solid Waste / Waste Recycling			
Drill Holes			
Process Plant			
General house keeping / Litter			
Environmental Management Systems			
Procedures			
Incident Reports			
Inspections/Audits			
Records			
Awareness			
Training			
Other			
Fire fighting equipment/Machinery			
Signs and Barriers			

Safety Bunds / fences			
Created landforms			
Disturbed areas for rehabilitation			
Actions from previous inspections have been addressed ☐ **Yes** ☐ **No**			
Non-conformance has been raised (Complete Incident and Non Conformance Form) ☐			

Appendix 3 Environmental Incident/Non-conformance Report

Sections 1-5: To be completed by initiator of this report

Section 1: Details of person reporting Incident / Non-conformance			
Name		**Date of report**	
Company		**UI Supervisor**	
Report type	☐ Env. Incident/'Near Miss' (Fill in **Section** ☐	☐ Non-conformance (**Fill in Section 3**) ☐	
	External communication (Fill in **Section 4**)	Other (Fill in **Section 5**)	

Section 2: Details of Environmental Incident			
Date of event		**Location of event**	
Contractor involved		**Was risk of incident previously kno☐? ☐es No**	
Description of incident:			
Immediate Actions taken			
Go to Section 6			

Section 3: Details of Environmental Non-conformance		
Source of Non-conformance	☐ Inspection on Contractor	☐ Inspection on Self
	☐ EMS Audit on Contractor	☐ Internal Audit on Self
	☐ Contractual Audit	☐ External Audit on Self
Description of non-conformance:		
Go to Section 6		

Section 4: Details of External Communication		
Source of Communication	☐ Public	☐ Interest Groups
	☐ Government Agency	☐ Other (Specify):
Communication was raised in	☐ Phone call ☐ Letter	☐ Meeting ☐ Other (Specify):
Date of communication		**Received by:**
Details of Stakeholder / Communication:		
Name of Person / Organisation:		**Address:**
Telephone Number:		**Fax Number:**
Description of issue / concern:		

Go to Section 6
Section 5: Other
Details:
Go to Section 6

Section 6: To be completed by Area Supervisor / Project Manager or Delegate

Section 6: Investigation			
Date of completion		**Lead Investigator**	
Contributing factors for incident / non-conformance			
☐ Breach of existing procedures		☐ Lack of awareness , competence , skill	
☐ No existing procedure ☐		☐ Task risk not assessed prior to commencement of ☐sk	
Procedure / equipment not fit for purpose		Miscommunication	
Root Causes:			
Section 7: Corrective / Preventive Actions			
Required changes include:	☐ Risk Register Update	☐ Documentation Revision / Development	
	☐ Training of Personnel	☐ Business Objectives Review	
	☐ Review of Contract Agreements ☐	☐ Communication with Employees / ☐ntractor	
	Additional resource	Communication with External Stakeholders	

Corrective / Preventive Actions Required	**Responsible Person**	**Due Date**

Section 8: Incident / Non-conformance Close Out (To be completed oPty Ltdy after all actions are completed)		
I confirm that all actions from this incident / non-conformance have been adequately addressed.		
Project Manager (Name)	**Signature**	**Date**

Appendix E: AAPA Clearance for EL25068

Appendix F: Application for Variation of Authorisation Form;

Change of company name from Phosphate Australia Limited to POZ Minerals Limited

MOONEY & PARTNERS PTY LTD
GRANT MOONEY
Suite 4
6 Richardson Street
WEST PERTH WA 6005

Remove this top section if desired before framing

Certificate of Registration on Change of Name

ASIC
Australian Securities & Investments Commission

This is to certify that

PHOSPHATE AUSTRALIA LIMITED

Australian Company Number 129 158 550

did on the twenty-eighth day of October 2016 change its name to

POZ MINERALS LIMITED

Australian Company Number 129 158 550

The company is a public company.

The company is limited by shares.

The company is registered under the Corporations Act 2001 and is taken to be registered in Western Australia and the date of commencement of registration is the tenth day of January, 2008.

Issued by the
Australian Securities and Investments Commission
on this twenty-eighth day of October, 2016.

Greg Medcraft
Chairman

CERTIFICATE

Application for Authorisation
Application for Variation of Authorisation

Section 36 or Section 38 of the *Mining Management Act*

CHECK APPROPRIATE BOX

☐ **NEW AUTHORISATION (for a new mining site or mining activities)**

Section 36(1) - Application must be accompanied by a mining management plan (section 36(2)(a)) and operator appointment notice (section 36(2)(b).

☒ **VARIATION TO CURRENT AUTHORISATION**

Section 38(1) - Application must be accompanied by the current mining management plan or the proposed amendment thereof (section 38(3)) **and** an explanation of the reasons for the application (for example changes in operator name, mining interests (ie titles) and mining activities).

AUTHORISATION NUMBER:	**0445-01**

NAME OF OPERATOR: (as per ASIC-ABR registered name)	POZ Minerals Limited
ACN/ABN:	51 129 158 550
POSTAL ADDRESS:	PO Box 1235
	West Perth
	Postcode: 6872
STREET ADDRESS:	Suite 1, 16 Ord St
	West Perth
	Postcode: 6005
CONTACT PERSON:	Jim Richards
PHONE:	Business: 08 9422 9555 Mobile: 0408 902 314
E-MAIL:	jrichards@phosphateaustralia.com.au

NAME OF MINING SITE:	Highland Plains
MINING INTERESTS: (ie: Title numbers)	EL25068, EL28153, EL30890, EL30891, EL31345, EL31415
MINING ACTIVITIES:	Highland Plains phosphate project: exploration work and resource drilling

Signed (Operator)	**Name (Please Print)**	**Date**
Jim Richards	JIM RICHARDS	9/1/16
Director		
	MARK THOMPSON	9/1/16
Director/Company Secretary		

Signed in accordance with section 126/127* of the *Corporations Act 2001 Cth* (*delete inapplicable section)

Appendix G: Access Agreement with Relevant Landholders