Mining Management Plan Exploration Activities

Northern Territory of Australia – *Mining Management Act*

It is recommended that the Mining Management Plan is completed in conjunction with the user guide, available on the Northern Territory Government website.

Section 1 – Project Details

Project Name Provide new or existing project name	**Annie Project**

Authorisation Number Insert existing authorisation number, where applicable	1075

Operator Name Use ASIC-ABR registered name (if a company), or name of the applicant	Core Lithium Ltd

Location and Access Details Include brief description of the location, access details, and distance to nearest town or community	The Annie Project comprises 3 granted MLs located approximately 40 km southwest of Darwin in the Bynoe Harbour area. Access into the area is excellent from Darwin via the Stuart Highway and sealed Cox Peninsula Rd (through Berry Springs) then south via the Litchfield Park Road. From this main sealed road, access is then by dirt roads and tracks which traverse the Project areas. Some of the proposed work areas need to be accessed via new tracks. Berry Springs is the closest community, 30km by road to the northeast.

Target Commodity Details Include target commodities (i.e. gold, copper etc)	Lithium

Mining Activities Summarise the mining activities (exploration) to be the subject of the proposed Authorisation or Variation	Exploration is typically carried out in a step-wise fashion, commencing with assessment of historical exploration data, geophysics (e.g. airborne magnetics) and remote sensed data (e.g. GoogleEarth). On-ground exploration starts with mapping and prospecting, using a 4WD or ATV. Soil samples are the next step, collected either via a shovel or a shallow auger. Prospects defined by this baseline data then need to be tested by ground disturbing work, which is the subject of this authorisation. The first step is usually shallow scout drilling via rotary air-blast ("RAB") and aircore ("AC") methods. Mapping can be assisted by motorised augering. Drilling of subsequent targets is via deeper reverse circulation ("RC") and diamond core ("DDH") methods. Core is seeking approval to drill 130 RAB holes, 40 RC holes, 6 DDH holes and 9 km of tracks. It also seeks approval for 250 auger holes.

Proposed Schedule Include start and finish dates of ground disturbing work	Commencing in May 2021 and extending through to December 2021, or while-ever access permits within the wet season.

Mining Interest and Land Ownership

List the mining interests (titles), the title holder name/s, the title expiry date and the Property name/Land holder (e.g. pastoralist or Aboriginal land trust) for each title.

Title Number	Title Holder	Expiry Date	Property Name or Land Holder
MLN813	Outback Metals Pty Ltd	31/12/2022	Charlotte, NT Portion 3283 – Crown Lease Perpetual 862
ML29912	Outback Metals Pty Ltd	21/04/2023	Charlotte, NT Portion 3283 – Crown Lease Perpetual 862
ML31654	Victory Polymetallic Pty Ltd	16/07/2022	Charlotte, NT Portion 3283 – Crown Lease Perpetual 862

Delete or add rows as required

Organisational Structure

Position Title	Name
Managing Director	Mr Steven Biggins
General Manager	Mr Blair Duncan
Exploration Manager	Dr David Rawlings
Senior Geologist	Ms Andrea Hodgson
Environmental Manager	Ms Andrea Hodgson
Radiation Safety Officer	NA

Delete or add rows for various position titles as required

Section 2 – Operator Self-Assessment of the Environmental Risk

The purpose of this self-assessment is to ensure Operators complete a project risk assessment of potential environmental impacts and are aware of other legislative obligations from various Agencies. As a result of this self-assessment, further information may be required in the form of a management plan to enable full assessment of the MMP. If you have any queries please contact a Mining Officer prior to submitting the MMP. Useful resources to assist with this self-assessment are provided in the User Guide.

Environmental considerations

ASSESSMENT ASPECT	YES or NO	ACTIONS REQUIRED (if answered YES)	APPENDED INFORMATION (Evidence of consultation with DENR and/or management plan)
Step 1: Are there any threatened flora and fauna species or habitats of significance that may occur in the proposed work area?	YES	It is likely a threatened species will show up in most reports. Therefore, the Operator must undertake a likelihood analysis, which looks at the likelihood of the species or its habitat occurring at or near the site. If the analysis results in a high likelihood, then a "Significant Impact Assessment" should be undertaken, which may require consultation with the DEPWS – Flora and Fauna Division. The DEPWS may recommend a Biodiversity Management Plan – this must be developed and attached to the MMP.	Environmental group SLR Consulting undertook an assessment of data and a likelihood analysis for the region including the MLs subject of this MMP. The advice provided to Core was that the endangered species risk is low and manageable. Results and management strategies are outlined in Attachment 1 and Attachment 2.
Step 2: Are there any known declared weeds within the proposed work area?	YES	Under the *Weeds Management Act* declared weeds are required to be eliminated or controlled by the owner and occupier of land. Seek advice from DEPWS – Weeds Management to ensure management measures are appropriate for the level of activity proposed and attach a Weed Management Plan (if required).	Analysis of available data indicates a number of invasive weeds are likely in the Bynoe area including the MLs subject of this MMP. Results and management strategies are outlined in Attachment 1 and Attachment 2.
Step 3: Will you be using water from bores or other sources for the operation?	YES	*Note the Government is proposing to amend the exemption of water licencing under the Water Act for mining activities, including exploration. This section will be updated in light of any changes in the future.*	Water is sourced from a number of existing man-made dams and historic pits in the area. These are not expected to be the subject of the future Water Act.

Environmental assessment and cultural considerations

ASSESSMENT ASPECT	YES or NO	MANAGEMENT REQUIREMENTS
Step 4: Is your project likely to have a significant impact on the environment?	NO	Refer to the NTEPA Environmental Factors and Objectives Guideline.
Step 5: Are there Aboriginal sacred sites in the Project area?	NO	Sacred Sites are protected under the NT *Aboriginal Sacred Sites Act* and administered by the Aboriginal Areas Protection Authority (AAPA). It is recommended that advice be sought from AAPA in relation to sacred site protection. (Appendix 5)
Step 6: Are there archaeological and heritage sites in the Project area?	NO	Heritage and archaeology sites are protected in the NT. NT Heritage Branch of the Department of Natural Resources and Environment (DENR) administers the *Heritage Act*. Seek advice in relation to protection of heritage and archaeological sites. No archaeological sites or heritage sites were found within the MLs following a search of the Heritage Register (Appendix 5).

Section 3 – Amendments

As per Section 41(3) of the *Mining Management Act*, an MMP reviewed and amended under Section 41(1)(a) is to clearly identify amendments made.

Section	Amendment

Delete or add rows as required

Section 4 – Activities Proposed

Mining Interests (i.e. titles)	**MLN813 (Bilatos)**	**ML29912 (Saffums)**	**ML31654 (Annie)**
Number and type of proposed drill holes **(beyond those currently Authorised)**	DDH: 2 RC: 12 RAB: 20 Auger: 50	DDH: 2 RC: 12 RAB: 40 Auger: 100	DDH: 2 RC: 16 RAB: 70 Auger: 100
Maximum depth of proposed holes (m)	DDH: 350m RC: 250m RAB: 40m Auger: 2m	DDH: 350m RC: 250m RAB: 40m Auger: 2m	DDH: 350m RC: 250m RAB: 40m Auger: 2m
Number and size of drill pads to be cleared (Length: 25 m x Width: 20 m)	DDH: 2 RC: 12 RAB: nil Auger: nil	DDH: 2 RC: 12 RAB: nil Auger: nil	DDH: 2 RC: 16 RAB: nil Auger: nil
Total area of drill pads to be cleared (ha)	0.7	0.7	0.9
Is drilling likely to encounter groundwater? (Y, N, unsure)	Y, sporadic	Y, sporadic	Y, sporadic
Number of costeans/**sumps** (Length: 3m x Width: 2m x Depth: 1.2m)	20	21	27
Number of bulk sample pits	Nil	Nil	Nil
Total bulk sample (tonnes) (Length: m x Width: m x Depth: m)	Nil	Nil	Nil
Bulk sample pits approved under *Mineral Titles Act*? (Y or N)	Nil	Nil	Nil
Length of line/track clearing (km: x Width: 2.5 m)	2 km x 2.5m (0.5 Ha)	2 km x 2.5m (0.5 Ha)	5 km x 2.5m (1.25 Ha)

Mining Interests (i.e. titles)	MLN813 (Bilatos)	ML29912 (Saffums)	ML31654 (Annie)
Camp area to be cleared (ha)	NA	NA	NA
Camp Infrastructure (i.e. demountable, tents)	NA	NA	NA
Previous disturbance yet to be remediated on title (ha) if known	0	0	0
Other	NA	NA	NA
Total area disturbed proposed (ha)	1.2	1.2	2.15

Section 5 – Previous Disturbance (for existing Authorisations only)

Mining Interests (i.e. titles)	MLN813	ML29912	ML31654
Number/type of holes drilled (**that have not been closed out)**	Nil	Nil	Nil
Maximum depth of holes drilled (m)	Nil	Nil	Nil
Number of holes remediated (i.e. plugged/capped)	Nil	Nil	Nil
Number and size of drill pads cleared (Length: 20m x Width: 25m)	Nil	Nil	Nil
Total area of drill pads cleared (ha)	Nil	Nil	Nil
Total area of drill pads remediated (ha)	Nil	Nil	Nil
Was groundwater encountered? (Y or N)	Nil	Nil	Nil
Length of line/track cleared (Length: km x Width: 2.5 m)	Nil	Nil	Nil
Length of line/track remediated (Length: km x Width: 2.5 m)	Nil	Nil	Nil
Number of costeans/sumps excavated (Length: 3m x Width: 2m x Depth: 1.2m)	Nil	Nil	Nil

Mining Interests (i.e. titles)	MLN813	ML29912	ML31654
Number of costeans/sumps remediated	Nil	Nil	Nil
Total bulk sample pits excavated (Length: 6m x Width: 1.2m x Depth: 5m)	Nil	Nil	Nil
Total bulk sample pits remediated	Nil	Nil	Nil
Camp area/s cleared (ha)	Nil	Nil	Nil
Camp area/s remediated	Nil	Nil	Nil
Total area disturbed (ha)	Nil	Nil	Nil
Total area remediated	Nil	Nil	Nil

Section 6 – Environmental Management

By checking these boxes, you are agreeing to implement the following minimum environmental management standards on the project area. Where boxes have been left unchecked, justification is required.

6.1	X	Blade-up approach for clearing will be used (i.e. no windrows, leave root stock and topsoil)
6.2	X	Significant vegetation will be avoided during clearing (i.e. large trees, specimens providing habitat or food sources, riparian vegetation, and threatened species)
6.3	X	Vegetation clearing during, and immediately after rainfall events, will be avoided
6.4	X	Vegetation clearing will be kept to the minimum required to safely traverse vehicles and drill rigs along tracks and drill pads
6.5	X	Where blade-up techniques cannot be employed, topsoil and vegetation will be stockpiled appropriately for remediation purposes
6.6	X	All employees and contractors will be trained and inducted in relation to the management of environmental risks in the work area, including weeds, waterways, threatened species, soil erosion, sacred sites and heritage areas
6.7		Sumps will be lined or tanks of appropriate size to contain water, sediment and drilling fluids encountered during drilling, will be used
6.8	X	Sumps, drill holes, and fuel stores will be located away from environmentally significant areas and water courses
6.9	X	Excavations (sumps, costeans and pits) will be appropriately ramped to allow fauna egress
6.10	X	Drill holes will be securely capped immediately after drilling
6.11	X	Vehicle hygiene measures will be employed to prevent the introduction and spread of invasive species and pathogens when mobilising vehicles and equipment from one location to another
6.12	X	Hydrocarbon spills will be minimised using liners and drip trays under machinery, and appropriately sized spill-kits available in the event of a spill

6.13	X	Hazardous substances (including hydrocarbons) will be stored and handled in accordance with relevant Australian Standards
6.14	X	Hydrocarbons will be stored in lined and bunded areas
6.15	X	Waste will be stored securely while on-site to minimise windblown rubbish and access by feral animals
6.16	X	Waste will be removed off-site and disposed of at an appropriate waste management facility
6.17	X	All environmental incidents will be reported to the Department in accordance with Section 29 of the *Mining Management Act*.

Justification and alternative management measures:

6.7 Sumps not lined because the plastic liner is considered to be a much greater environmental hazard than the groundwater in the sump. All drilling additives used now are biodegradable. Liners are used in arid areas to conserve water, not protect the groundwater system. They subsequently need to be dug out prior to backfill of sump. This is a challenging exercise. In the tropics or where drilling water is plentiful or where there are natural barriers to sump seepage (eg clays), liners are not used.

Section 7 – Remediation and Closure

By checking these boxes, you are agreeing to implement the following minimum remediation standards on the project area. Where boxes have been left unchecked, justification is required.

7.1		Drill holes plugged below ground level at a minimum depth of 0.4 metres and soil mounded to prevent subsidence, within 6 months of completion of drilling
7.2	X	Drill samples/spoil returned down drill holes, buried in sumps, or removed from site
7.3	X	All drill hole and access markers including flagging tape, wooden markers and star pickets will be removed from site
7.4	X	Re-contouring of cut and fill drill pads will be consistent with the surrounding terrain
7.5		Ripping/scarifying of drill pads, and compacted areas along the contour (on sloping ground) and cross-ripping (zig-zag) along tracks
7.6	X	Tracks will be remediated, including pushing in all windrows
7.7	X	Appropriate erosion and sediment controls will be installed where erosion is evident or likely to occur
7.8		All tracks will be remediated unless otherwise agreed in writing by the land holder or appropriate third party
7.9	X	Access through watercourses will be removed and banks restored
7.10	X	No erosion is occurring in disturbed areas, on tracks and in remediated areas
7.11	X	All excavations backfilled within 6 months of completion of drilling
7.12	X	All water bores decommissioned unless otherwise agreed in writing by the land holder or appropriate third party. The bore must comply with the Minimum Construction Requirements for Water Bores in Australia and may require permits or licenses under the *Water Act*
7.13	X	All rubbish and infrastructure will be removed from site
7.14	X	Replacement of topsoil and vegetation
7.15	X	Contaminated soils (e.g. hydrocarbon or hazardous chemicals) will be remediated or removed from site
7.16	X	Monitoring will be undertaken following the wet season or a significant rainfall event

Justification and alternative management measures:

7.1 The majority of holes are fully rehabilitated within 6 months of drilling, but in prospect areas that are subject to on-going downhole assessment, the holes are kept open, but securely plugged or capped. If the site proceeds to mining, the holes may be grouted to depth. CXO maintains a register of drill sites that retain a PVC collar at surface. The various other aspects of these drill sites have been remediated, however, they are NOT closed out with respect to this Authorisation until the collars are remediated.

7.5 Ripping of drill pads and access tracks is restricted only to those that have identifiable signs of compaction. Generally, these have received only minimal traffic compared to the main access tracks. Experience at the Finniss Lithium Project indicates that natural rehabilitation of tracks and pads is sufficient. CXO block tracks as soon as practical to minimise the opportunity for them to become a thoroughfare for hunters and adventurers. Refer to Attachment 2, Section 4 for remediation practices.

7.8 Existing tracks won't be remediated. These have been identified prior to works. These were formed at various times, largely by hunters and adventurers. CXO has no control over any infrastructure that was created prior to the EL being granted, as the Vacant Crown Land is readily accessible to the public.

Management measures – ATV Auger Mapping
Since introducing and trialing shallow auger mapping in 2018, CXO is fully satisfied this method has consistently demonstrated minimal immediate disturbance with no ongoing impact. The company is of the belief that this method is of the same level of disturbance as a soil sample collected by shovel and pick and therefore requests that DPIR ceases to view these as substantial disturbance and carry security against them. Note that CXO has included 250 auger holes in the attached security calculation but they do not have security costs associated with them.

Section 8 – Required Attachments

8.1	X	Security Calculation Spreadsheet
8.2	X	Nomination of Operator Form
8.3	X	Spreadsheet with coordinates of proposed drill holes or polygons of target areas (GIS files of tenure and buffers)
8.4	X	Google Earth KML/shape files/track logs of proposed tracks and camp sites (GIS files of proposed access tracks)
8.5	X	A map of the work area(s) showing: 1. title boundaries and title numbers 2. current and proposed drill holes, or polygons of target areas 3. current and proposed tracks 4. remediated areas/ holes (n/a) 5. camp sites (n/a) 6. sacred/heritage sites 7. environmental constraints (buffers)
8.6		Remediation Register (for existing Authorisations) – Not applicable
8.7		Photographs of remediation work – Not applicable
8.8		Radiation Management Plan (if applicable) – Not applicable

Section 9 – Declaration

The Mining Management Plan must be endorsed by a senior representative of the company who has the appropriate level of authority to do so.

	Author	Reviewed by	Approved by
Date	25/03/2021	30/03/2021	1/04/2021
Name	D Rawlings	A Hodgson	S Biggins
Signature			

I, *Steven Biggins*, *Managing Director*, declare that I have the authority to make the commitments contained in this mining management plan on behalf of the company. To the best of my knowledge the information contained in this plan is true and correct and commit to undertake the works in accordance with the agreed minimum standards and all relevant Northern Territory and Commonwealth Government legislation.

SIGNATURE: ……

DATE: ……1/04/2021

TERRESTRIAL FLORA AND FAUNA DESKTOP ASSESSMENT

Annie exploration area: MLN813, ML29912, ML31654

Prepared for:

Core Lithium
Level 1, 366 King William Street
Adelaide
South Australia 5000

SLR Ref: 68030068-R01
Version No: -v2.0
April 2021

PREPARED BY

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
Unit 5, 21 Parap Road
Parap NT 0820 Australia
(PO Box 1300 Parap NT 0804)
T: +61 8 8998 0100
E: darwin@slrconsulting.com www.slrconsulting.com

BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Core Lithium (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
68030068-R01-v2.0	1 April 2021	Janani Rajakaruna, Sarah Smith	Loren Yallop	Sarah Smith
68030068-R01-v1.0	25 March 2021	Janani Rajakaruna, Sarah Smith	Loren Yallop	Sarah Smith

EXECUTIVE SUMMARY

SLR Consulting Australia Pty Ltd (SLR) was commissioned by Core Lithium to undertake a terrestrial flora and fauna desktop assessment within mineral leases (MLs) comprising the Annie project: MLN813, ML29912 and ML31654 to support the development of a mining management plan (MMP). A key focus of this desktop assessment was to identify the potential presence of Commonwealth and Territory listed threatened fauna and flora species within the study area. A desktop assessment identified one vegetation community considered significant/sensitive under the NT planning scheme, and several listed threatened species as having a potential to occur within the study area. The desktop surveys also identified several weed and pest species having a potential to occur in the study sites causing threat to biodiversity.

CONTENTS

DOCUMENT REFERENCES

TABLES

FIGURES

CONTENTS

ABBREVIATIONS

DAWE	Department of the Agriculture Water and the Environment
DEPWS	Department of Environment, Parks and Water Security
DITT	Department of Department of Industry, Tourism and Trade
ML	Mineral lease
MMP	Mining management plan
NVIS	National Vegetation Information System
SLR	SLR Consulting Australia Pty Ltd
SOCS	Site of Conservation Significance
WM Act	*Weed Management Act*

1 Introduction

SLR was engaged by Core Lithium to undertake a terrestrial flora and fauna desktop assessment of the Annie project area, which comprises MLN813, ML29912 and ML31654.

2 Methods

The site was described, and terrestrial biodiversity values and threats were identified including:

- Vegetation communities regarded as sensitive or significant under the Northern Territory Planning Scheme
- Flora species listed as threatened under the *Territory Parks and Wildlife Conservation Act* (TPWC Act) or the *Environment Protection and Biodiversity Conservation Act* (EPBC Act)
- Fauna species listed as threatened under the TPWC Act or EPBC Act
- Weeds
- Pest fauna species

The following data sources were used to identify the threats and values of the area:

- NT Flora threatened species records (Department of Environment, Parks and Water Security (DEPWS)) – 7 km buffer applied
- NT Fauna threatened species records (DEPWS) – 7 km buffer applied
- NT National Vegetation Information System (NVIS) level 4 community descriptions (DEPWS)
- NT weeds dataset (DEPWS) – 7 km buffer applied
- EPBC Act Protected Matters Search Tool (Department of the Agriculture Water and the Environment) - 10km buffer applied

The likelihood of occurrence of any threatened species occurring within the area to be disturbed by the project was then assessed based on their known distributions, ecology and habitat use.

3 Results

3.1 Site description

The Annie exploration area is in the Pine Creek Bioregion. The underlying landform of MLN813 and ML29912 has been classified as ‘Steep rocky hills, frequent rock outcrops, shallow sandy loams, loams with high gravel content’ and that of ML31654 has been classified as ‘Steep rocky hills, frequent rock outcrops, shallow sandy loams, loams with high gravel content, open-forest, riparian/springs’. The exploration area is located > 5 km from the ‘Finnis River coastal floodplain’ SOCS, and the conservation values of SOCS are not found within the area.

3.2 Vegetation communities

Three vegetation communities occur within the area (**Figure 1** and **Table 1**), including a riparian community (*Melaleuca* mid open forest) that is considered sensitive or significant under the Northern Territory Planning Scheme. Much of the exploration area has been previously disturbed (46%).

Table 1 Mapped vegetation communities in the project area

Mineral lease	Vegetation communities present	Area (ha)
MLN813	*Eucalyptus* mid woodland*Gardenia* tall open shrubland*Heteropogon* mid tussock grassland	2.79
	Previously disturbed	6.28
ML29912	*Eucalyptus* mid woodland*Gardenia* tall open shrubland*Heteropogon* mid tussock grassland	6.21
	Previously disturbed	13.79
ML31654	*Eucalyptus* mid woodland*Gardenia* tall open shrubland*Heteropogon* mid tussock grassland	43.60
	Melaleuca mid open forest*Pandanus* low sparse palmland*Germainia* mid open tussock grassland	6.19
	Previously disturbed	30.23

3.3 Threatened flora and fauna

No threatened species have been recorded with the project area, however, database searches identified 9 birds, 9 mammals, two terrestrial reptiles and one plant threatened species that could potentially occur[1] (**Table 2**).

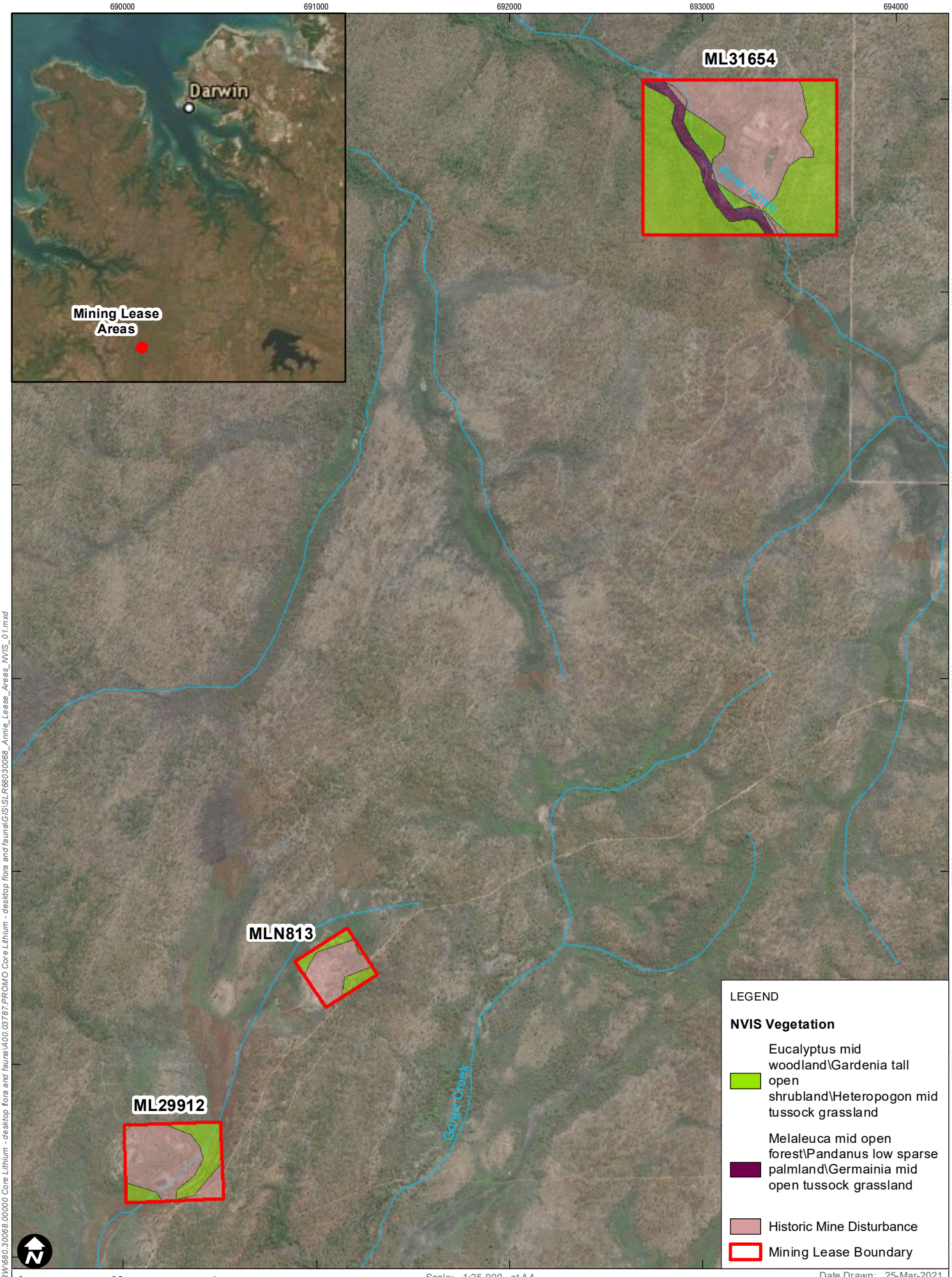
[1] Six marine turtle species were identified, however the project area is highly unlikely to cause any direct or indirect impacts on marine systems and these species were not considered further.

Table 2 Likelihood of occurrence of identified threatened

Species	TPWC Status	EPBC Status	Record Type	Habitat	Likelihood
FAUNA					
Birds					
Red Knot *Calidris canutus*	Vulnerable	Endangered	Species or species habitat may occur within area	Intertidal mudflats, sandflats and sandy beaches of sheltered coasts	**Unlikely** – No suitable habitat occurs in the project area
Curlew Sandpiper *Calidris ferruginea*	Vulnerable	Critically Endangered	Species or species habitat may occur within area	Fresh and brackish water, can include ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand	**Unlikely** – No suitable habitat occurs in the project area
Red Goshawk *Erythrotriorchis radiatus*	Vulnerable	Vulnerable	Species or species habitat likely to occur within area	Forest and woodland with a mosaic of vegetation types, including eucalypt woodland, open forest, gallery rainforest, swamp sclerophyll forest and rainforest margins	**Possible –** May be suitable habitat in the project area
Gouldian Finch *Erythrura gouldiae*	Vulnerable	Endangered	Species or species habitat known to occur within area	Open woodland with groundcover of *Sorghum* and other grasses	**Unlikely** – No suitable habitat occurs in the project area
Grey Falcon *Falco hypoleucos*	Vulnerable	Vulnerable	Species or species habitat likely to occur within area	Lightly timbered lowland plains on inland drainage systems	**Possible –** There is suitable habitat in the project area
Partridge Pigeon (eastern) *Geophaps smithii smithii*	Vulnerable	Vulnerable	Species or species habitat known to occur within area	Lowland eucalypt open forests and woodlands, with grassy understoreys	**Likely –** There is suitable habitat in the project area

Species	TPWC Status	EPBC Status	Record Type	Habitat	Likelihood
Eastern Curlew, Far Eastern Curlew *Numenius madagascariensis*	Vulnerable	Critically Endangered	Species or species habitat known to occur within area	Intertidal mudflats, rarely far from coast	**Unlikely –** No suitable habitat occurs in the project area
Australian Painted Snipe *Rostratula australis*	Vulnerable	Endangered	Species or species habitat may occur within area	Shallow, vegetated, freshwater swamps, claypans or inundated grassland	**Unlikely** – No suitable habitat occurs in the project area
Masked Owl (northern) *Tyto novaehollandiae kimberli*	Endangered	Vulnerable	Species or species habitat likely to occur within area	Tall open *Eucalyptus miniata, E. tetrodonta* woodland, roosts in monsoon rainforests and forages in open habitats including grasslands	**Possible –** May be suitable foraging habitat in the project area
Mammals					
Fawn Antechinus *Antechinus bellus*	Endangered	Vulnerable	Species or species habitat likely to occur within area	Eucalypt tall open forest	**Likely –** There is suitable habitat in the project area
Brush-tailed Rabbit-rat, Bush-tailed Tree-rat, Pakooma *Conilurus penicillatus*	Endangered	Vulnerable	Species or species habitat may occur within area	Eucalypt tall open forest	**Unlikely -** There is suitable habitat in the project area, but the current distribution is identified to be restricted to other known areas
Northern Quoll *Dasyurus hallucatus*	Critically Endangered	Endangered	Species or species habitat likely to occur within area	Open woodland	**Possible –** May be suitable habitat in the project area
Ghost Bat *Macroderma gigas*	Not listed	Vulnerable	Species or species habitat likely to occur within area	Varied – from arid Pilbara to tropical savanna woodlands and rainforests	**Possible** – May be suitable foraging habitat in the project area
Black-footed Tree-rat *Mesembriomys gouldii gouldii*	Vulnerable	Endangered	Species or species habitat likely to occur within area	Eucalypt woodlands	**Likely –** There is suitable habitat in the project area

Species	TPWC Status	EPBC Status	Record Type	Habitat	Likelihood
Nabarlek *Petrogale concinna canescens*	Vulnerable	Endangered	Species or species habitat likely to occur within area	Rocky areas (sandstone or granite), especially on steep slopes, with large boulders, caves and crevices	**Unlikely –** No suitable habitat occurs in the project area
Northern Brush-tailed Phascogale *Phascogale pirata*	Endangered	Vulnerable	Species or species habitat likely to occur within area	Tall open *Eucalyptus miniata, E. tetrodonta* forest	**Possible –** There is suitable habitat in the project area, however the current distribution of the species is highly restricted
Bare-rumped Sheath-tailed Bat *Saccolaimus saccolaimus nudicluniatus*	Near threatened	Vulnerable	Species or species habitat likely to occur within area	Poorly understood, may include caves or dense vegetation	**Unlikely –** No suitable habitat occurs in the project area
Water Mouse *Xeromys myoides*	Not listed	Vulnerable	Species or species habitat likely to occur within area	Mangrove forests, freshwater swamps and floodplain saline grasslands	**Unlikely** – No suitable habitat occurs in the project area
Reptiles					
Plains Death Adder *Acanthophis hawkei*	Vulnerable	Vulnerable	Species or species habitat known to occur within the area	Flat treeless cracking – soil plains	**Unlikely –** No suitable habitat occurs in the project area
Mertens' Water Monitor *Varanus mertensi*	Vulnerable	Not listed	Species or species habitat likely to occur within area	Semi aquatic, seldom seen far from water	**Likely** – There is suitable habitat in the project area
FLORA					
Cycas armstrongii	Vulnerable	Not listed	Species or species habitat likely to occur within area	Open grassy woodland on yellow and red earths	**Likely** (at low density) **–** it is likely that suitable habitat in the project area, which is at the western edge of the species' distribution.


690000
691000
692000
693000
694000
8583000
8582000
8581000
8580000
8579000
8578000
8577000
Darwin
Mining Lease Areas
ML31654
River Annie
MLN813
ML29912
Gorge Creek
LEGEND
NVIS Vegetation
Eucalyptus mid woodland\Gardenia tall open shrubland\Heteropogon mid tussock grassland
Melaleuca mid open forest\Pandanus low sparse palmland\Germainia mid open tussock grassland
Historic Mine Disturbance
Mining Lease Boundary
0
0.5
1
km
Scale: 1:25,000 at A4
Coordinate System: GDA 1994 MGA Zone 52
Date Drawn: 25-Mar-2021
Project Number: 680.30068
Data Source:
ESRI Basemaps
SITE MAP
FIGURE 1
H:\DRW\Projects-SLR\680-DRW\680.30068.00000 Core Lithium - desktop flora and fauna\400.03787.PROMO Core Lithium - desktop flora and fauna\GIS\SLR680300068_Annie_Lease_Areas_NVIS_01.mxd

3.4 Weeds

Weeds classified under the NT *Weeds Management Act 2001* (WM Act) are to be managed in accordance with this Act. All owners, managers and occupiers of land as well as any other land user within the NT must comply with the WM Act. Once a weed is declared in accordance with Section 7 of the WM Act, there is a requirement for all land holders, land managers and land users to comply with the declaration classification.

In the NT, there are three classification types, these being:

- Class A - To be eradicated
- Class B - Growth and spread to be controlled
- Class C - Not to be introduced into the NT.

Both Class A and Class B weeds are also considered Class C. Where a statutory management plan is available, it is an offence not to comply.

National classifications or statuses of weeds must also be considered in the ongoing management of an area. The Australian Government has compiled a list of 32 Weeds of National Significance (WoNS) based on an assessment process which categorise these weeds based on their invasiveness, potential for spread, and environmental, social and economic impacts.

Weeds that occur within the area and could impact the project site are provided in **Table 3**. These weeds should be subject to a management plan.

Table 3 Weed species that potentially occur within the project area

Weed species	Weed class		
	Weeds Management Act	Statutory plan?	WoNS
Bellyache Bush (*Jatropha gossypiifolia*)	Class A	Yes	Yes
Cabomba (*Cabomba caroliniana*)	Class A	Yes	Yes
Gamba Grass (*Andropogon gayanus*)	Class B	Yes	Yes
Hymenachne (*Hymenachne amplexicaulis*)	Class B	No	Yes
Hyptis (*Hyptis suaveolens*)	Class B	No	No
Lantana (*Lantana camara*)	Class B	No	Yes
Mimosa (*Mimosa pigra*)	Class B	No	Yes
Mission grass, annual (*Cenchrus pedicellatus*)	Not declared	No	No
Mission grass, perennial (*C. polystachios*)	Class B	No	No
Para Grass (*Urochloa mutica*)	Not declared	No	No
Parkinsonia (*Parkinsonia aculeata*)	Class B	No	Yes
Salvinia (*Salvinia molesta*)	Class B	No	Yes

3.5 Pests

Eleven introduced fauna species that may occur in the project area were identified, most of these species are relatively environmentally benign, however management of problematic species (including pigs and buffalo) may be required.

- Asian House Gecko (*Hemidactylus frenatus*)
- Black rat (*Rattus rattus*)
- Domestic Cat (*Felis catus*)
- Domestic Cattle (*Bos taurus*)
- Domestic Dog (*Canis lupus familiaris*)
- Domestic Pigeon (*Columba livia*)
- Flowerpot Blind Snake (*Ramphotyphlops braminus*)
- Horse (*Equus caballus*)
- House Mouse (*Mus musculus*)
- Pig (*Sus scrofa*)
- Swamp Buffalo (*Bubalus bubalis*)

4 Recommendations

4.1 Sensitive/ significant vegetation

Riparian vegetation occurs along the River Annie in ML31654, as this is a second order stream, a 50 m buffer is recommended in the *Land clearing guidelines* associated with the Northern Territory Planning Scheme (**Table 4**).

Table 4 Recommended widths for riparian buffers

Riparian class	Stream order	Minimum buffer width (m)	Measured from
Intermittent streams	First	25	The outer edge of the riparian vegetation or levee (whichever is the greater). If braided channels are present, the edge of the outer most stream channel.
Intermittent streams	**Second**	**50**	
Creeks	Third and fourth	100	
Rivers	Fifth or higher	250	

4.2 Threatened species management

Core Lithium staff inductions include identification and avoidance measures for threatened and endangered flora and fauna in the area. The threatened species identification information pack used in these inductions is provided in the MMP. In addition, suitably skilled Core Lithium personnel will walk new access tracks and drill pads prior to construction to avoid specific threatened fauna occurrences.

Armstrong's Cycad is the only threatened plant species that potentially occurs in the project area and management recommendations are provided below.

4.2.1 Armstrong's Cycad

Armstrong's Cycad occurs around the Darwin area south to near Hayes Creek, and to the north-western corner of Kakadu National Park in the east, as well as on the Tiwi Islands, Cobourg Peninsula, and Cox Peninsula. It occurs mainly in open grassy woodland on yellow and red earths.

Armstrong's Cycad, like all cycads, is a long-lived, slow-growing, woody plant, with male and female individuals. Reproductive age is unknown, but can be 15 years under cultivation. Seeding may be annual or sporadic. Pollination appears to be mainly through insects, in particular beetles in the family Boganiidae. Seeds are dispersed through gravity, water and animals. Cycads live in symbiosis with cyanobacteria which provide the plant with nitrogen. The species is relatively resilient to low intensity fires, and can regenerate from crown damage, apical growing shoot damage, and even from destruction of the entire above ground stem, through regrowth from the stem base or root stock. However, populations decline when subjected to high intensity fires (Liddle, 2009).

The species is threatened by:

- Conversion of its habitat for residential and rural pursuits
- Through changes in prevailing fire regimes, facilitated by the influx of weeds into the species' habitat, resulting in enhanced fuel loads and higher intensity fires.

The performance criterion and indicator for this issue includes the following:

- Number of Armstrong's Cycad individuals to be impacted and where relevant, the number successfully translocated.
- Number of seed collected, number of seed successfully grown into plants, number of seedlings successfully planted.
- Majority (>80 %) of translocated Amstrong's Cycad individuals survive two years after translocation.

Recognition

Armstrong's Cycad grows to a height of 6 m, with a slender trunk 6-12 cm in diameter. Branching occurs, with occasional offsets and basal suckers. The crown is obliquely erect to spreading, with 84-156 leaflets. Leaflet have a prominent midrib on the upper surface, and are attached to the rachis at an angle of about 56-70 degrees. Additional description is available in Hill (1996), Hill and Osborne (2001), Jones (2002) and Dixon (2004).

Management Measures

The following management measures have been formulated specifically for Armstrong's Cycad. Procedures for propagation and translocation are summarised from Origin Energy (2014).

Pre-Clearing Survey

The following measures should be employed prior to disturbance activities commencing:

- Proposed new tracks and drill sites should be surveyed by personnel suitably skilled in the recognition of Armstrong's Cycad. Should any individuals of Armstrong's Cycad be encountered within these areas, plants should be avoided as much as practically possible. Where it is anticipated that a substantial number of individuals (>10) cannot be avoided, the plants should be clearly marked for appropriate removal during clearing operations with the aim of translocation.

- The northern side of the plant should be marked with marker paint or fluorescent dye to facilitate re-planting with the same orientation.
- Seed encountered on the forest floor surrounding the plants should be collected for propagation and rehabilitation purposes either elsewhere on the site or at the collection location once mining operations have ceased.

Operational Phase

The following measures should be employed during drilling operations, where a substantial number of plants (>10) cannot be avoided:

- During clearing operations, Armstrong's Cycad individuals marked during pre-clearing surveys must be removed for relocation in rehabilitation areas elsewhere on the site or for temporary storage for rehabilitation at a later date.
- Prior to removal, the area around plants must be cleaned by hand or with machinery (e.g. front end loader) and foliage removed to where the rhachis is attached to the stem. Using a spade, excavator or backhoe, soils surrounding the root ball is loosened prior to excavation ensuring that as much of the rootball around the plant roots remains intact. Damaged roots are to be trimmed and treated with Banrot® and/or Formula20®. To initiate root growth, Vitamin B or Seaweed can be sprayed on the roots. Roots are bagged in breathing material, such as hessian, and moistened with water prior to transport to a temporary holding location or to a prepared rehabilitation location elsewhere on the site. Care should be taken not to bruise plant stems during transport, using soft materials such as hessian to stabilise the plant.
- Upon arrival, plants are to be immediately potted or put into woven fibre planter bags for temporary holding or, if used for rehabilitation elsewhere on the site, in a prepared hole of a size suitable for the inserted root ball. Plants should be positioned in their original orientation. Washed sand or sandy loam should be used to for packing around the roots, to provide a suitable medium for root growth. The crown of each cycad must be sprayed with an insecticide (either Confidor® at a rate of application of 10 millilitres (mL) per 9 litres (L) of water or application of Crown® at a rate of application of 5 mL per 9 L of water). Translocated plants must also be watered with 5-9 L of water around each root ball with a systemic fungicide (Banrot® at the recommended rate). Rocks can be placed around the base of plants to assist in the stability of plants and to provide protection from fires and hot weather.
- Seed collected from the cleared areas must be propagated in pots using standard horticultural methods or direct seeded in areas to be rehabilitated.
- Translocation and propagation operations must be supervised by a suitably trained horticulturalist or arborist.

Post-Operation

The following measures should be employed following mining operations:

- Translocation of individuals held in the temporary storage area back to the original area of extraction must follow similar procedures as outlined above. Each plant must be watered about once a month (10-20 L) depending on rainfall for six months after replanting or as appropriate and any new expanding leaves must be sprayed with insecticide.
- Plants must be monitored for new growth, death, insect attack, reproduction, gender etc. for a period of at least two years after planting in the ground.

Monitoring and Reporting

Monitoring will be the responsibility of Core Lithium's Exploration Manager to ensure the health of translocated individuals in accordance with the performance indicators outlined above. This person will be responsible for reporting the number of individuals found on areas to be cleared (if any) to the DITT upon completion of the pre-clearing search. Further reports will be submitted on completion of the initial translocation and once again on completion of replanting of the translocated stock on completion of mining and revegetation operations.

4.3 Weed management

There are many weed species known to occur in the local area. Site inductions will include discussion on weed management and cover identification of main weed species declared under the *Weeds Management Act* or as WoNS (**Section 3.4**).

Exploration activities may result in introduction or spread of weed species if appropriate planning and weed control measures are not implemented. The following mitigations will be adopted (at a minimum) by Core Lithium to reduce weed impact on the site as a result of the exploration drilling operations.

All machinery and vehicles will be cleaned in suitable facility in Darwin (or site of origin) prior to mobilisation to site. Likewise if moving between areas and at the completion of the program prior to demobilisation all vehicles and equipment will be washed / blown-down at site at the nominated weed washdown and inspection site.

No vehicles will go off-road on transit to site and approved access routes will be strictly adhered to.

Follow up weed monitoring activities will occur as part of site inspections conducted by Core Lithium, and will target weed blow down points, drill pads, and access tracks. Any suspected weeds will be photographed and supplied to an ecologist for identification. If weeds are identified, Core Lithium will inform DITT and initiate relevant controls for the species.

References

Dixon D., (2004). The Gymnosperms of the Northern Territory. The Beagle, Records of the Museum and Art Galleries of the Northern Territory. 20: 1-24.

Hill, K. and Osborne R. (2001). Cycads of Australia. Kangaroo Press, Sydney.

Hill, K.D. (1996). A taxonomic revision of the genus *Cycas* (Cycadaceae) in Australia. Telopea 7: 1-63.

Jones, D.L. (2002). Cycads of the World. 2nd Edition. Reed. Sydney, NSW.

Liddle, D.T. (2009). Management Program for Cycads in the Northern Territory of Australia 2009-2014. Northern Territory Department of Natural Resources, Environment, the Arts and Sport, Darwin.

Origin Energy (2014). *Cycas megacarpa* Management and Translocation Plan. Origin Energy.

ASIA PACIFIC OFFICES

BRISBANE
Level 2, 15 Astor Terrace
Spring Hill QLD 4000
Australia
T: +61 7 3858 4800
F: +61 7 3858 4801

CANBERRA
GPO 410
Canberra ACT 2600
Australia
T: +61 2 6287 0800
F: +61 2 9427 8200

DARWIN
Unit 5, 21 Parap Road
Parap NT 0820
Australia
T: +61 8 8998 0100
F: +61 8 9370 0101

GOLD COAST
Level 2, 194 Varsity Parade
Varsity Lakes QLD 4227
Australia
M: +61 438 763 516

MACKAY
21 River Street
Mackay QLD 4740
Australia
T: +61 7 3181 3300

MELBOURNE
Level 11, 176 Wellington Parade
East Melbourne VIC 3002
Australia
T: +61 3 9249 9400
F: +61 3 9249 9499

NEWCASTLE
10 Kings Road
New Lambton NSW 2305
Australia
T: +61 2 4037 3200
F: +61 2 4037 3201

PERTH
Ground Floor, 503 Murray Street
Perth WA 6000
Australia
T: +61 8 9422 5900
F: +61 8 9422 5901

SYDNEY
Tenancy 202 Submarine School
Sub Base Platypus
120 High Street
North Sydney NSW 2060
Australia
T: +61 2 9427 8100
F: +61 2 9427 8200

TOWNSVILLE
12 Cannan Street
South Townsville QLD 4810
Australia
T: +61 7 4722 8000
F: +61 7 4722 8001

WOLLONGONG
Level 1, The Central Building
UoW Innovation Campus
North Wollongong NSW 2500
Australia
T: +61 404 939 922

AUCKLAND
68 Beach Road
Auckland 1010
New Zealand
T: 0800 757 695

NELSON
6/A Cambridge Street
Richmond, Nelson 7020
New Zealand
T: +64 274 898 628

CORE LITHIUM LTD

April 2021

MINING MANAGEMENT PLAN

and PUBLIC REPORT

LEVIATHAN, ANNIE AND LABELLE PROJECTS

Authorisations TBA

MLs 29912, 29914, 29985, 31654 & MLNs 813, 1184

ATTACHMENT 2 – ENVIRONMENTAL and HERITAGE MANAGEMENT

TABLE OF CONTENTS

FIGURES

TABLES

PARENT DOCUMENT, APPENDICIES & ATTACHMENTS

Parent Document	**Mine Management Plans for Leviathan, Annie and Labelle Projects (NT DITT Form)**
Attachment 1	Desktop Ecology Reports for Leviathan, Annie and Labelle Projects (prepared by SLR Consulting)
Attachment 2	This document (Environmental and Heritage Management Report) jointly prepared by SLR Consulting and Core Lithium Ltd
Appendix 4	Biodiversity Reports
Appendix 5	Heritage and Sacred Sites Reports
Attachment 8.1	DITT Security Calculation Spreadsheet
Attachment 8.2	Nomination of Operator of a Mining Site
Attachment 8.3 & 8.4	Spatial data
Attachment 8.5	Location Maps of Proposed Activities and CXO's environmental buffers
Attachment 8.6	Remediation Register and Reports (N/A)
Attachment 8.7	Rehabilitation Photos – Digital Files (N/A)

ABBREVIATIONS

Acronym	Description
AAPA	Aboriginal Areas Protection Authority
ASX	Australian Stock Exchange
CE	Critically Endangered
CXO	Core Lithium Ltd
DDH	Diamond Drill Hole
DEE	Commonwealth Department of Environment and Energy
DENR	Former NT Department of the Environment and Natural Resources
DEPWS	NT Department of Environment, Parks and Water Security
DITT	NT Department of Industry Tourism and Trade
DLPE	Former NT Department of Lands Planning and Environment
DME	Former NT Department of Mines and Energy
DoE	Former Commonwealth Department of the Environment
DPIR	Former NT Department of Primary Industries and Resources
EL	Exploration Lease/Tenement (Number)
EN	Endangered
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
GBH	Geotechnical Bore Hole
HSE	Health, Safety and Environment
MLN	Mine Lease (Number)
MMP	Mining Management Plan
MNES	Matters of National Environmental Significance
MODAT	Mineral Occurrence Database
NEPM	National Environment Protection Measures
NLC	Northern Land Council
NRETAS	Former NT Department of Natural Resources, Environment, the Arts and Sport
NRM	Natural Resource Management
NT	Northern Territory
NTEC	Northern Territory Environment Centre
NTGS	Northern Territory Geological Survey
NVIS	National Vegetation Information System
PWC	Power and Water Corporation
PPE	Personal Protective Equipment
RAB	Rotary Air Blast
RC	Reverse Circulation
SLR	SLR Consulting Australia Pty Ltd
SOCS	Site of Conservation Significance
TBA	To be advised
VU	Vulnerable
WM Act	*Weeds Management Act 2001*
WoNS	Weeds of National Significance

1. PROJECT LOCATION PLANS

Project location plans for the Annie, Leviathan, and Labelle projects can be found in Figure 1, Figure 2, Figure 3 & Figure 4. The location of proposed work areas is the full extent of the tenements, excluding the environmental buffer zones from CXO mapping also depicted on the maps. Higher resolution maps with imagery base can be found in **Attachment 8.5**.

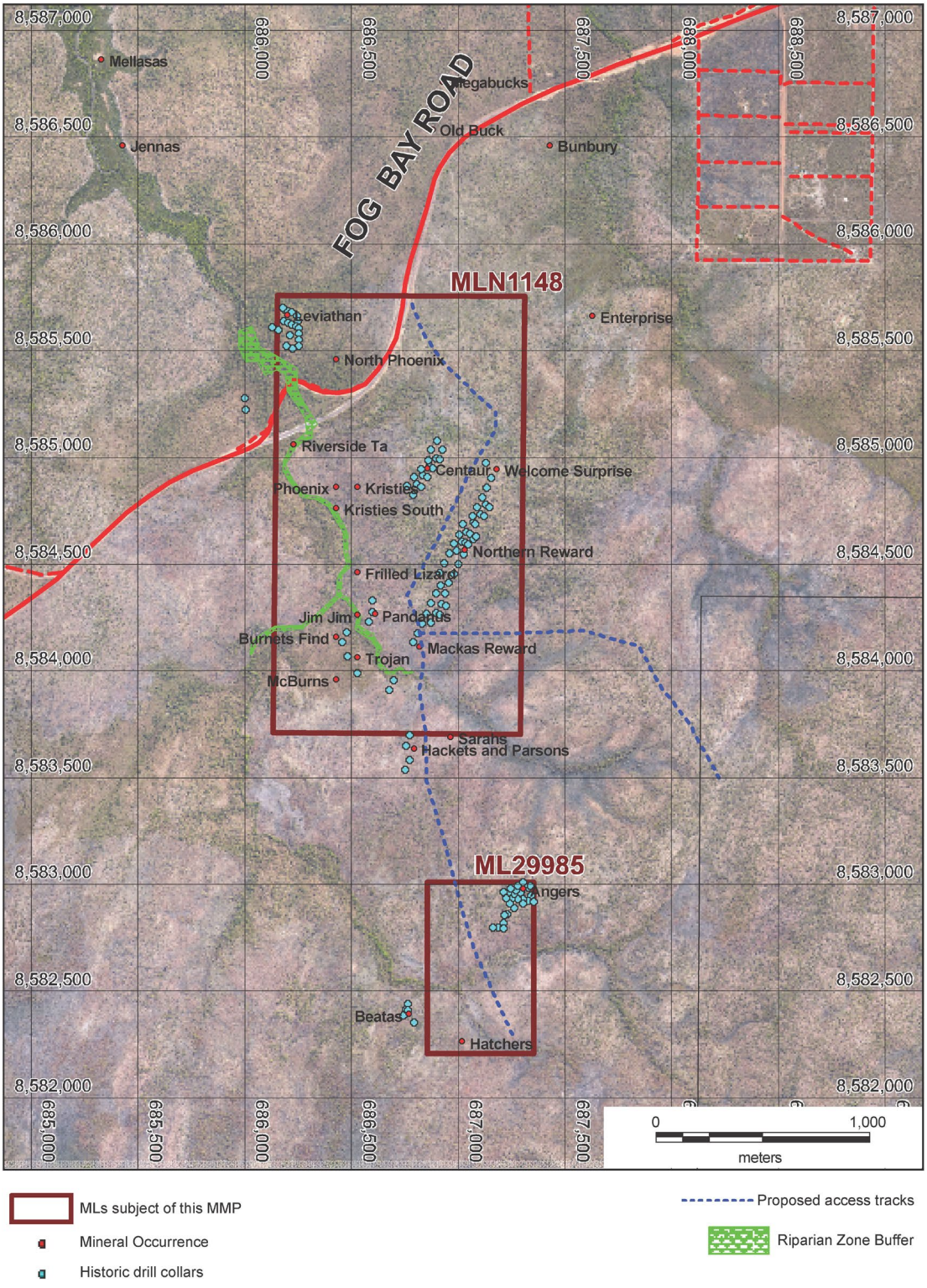


Figure 1 Leviathan Project location map including environmental buffers

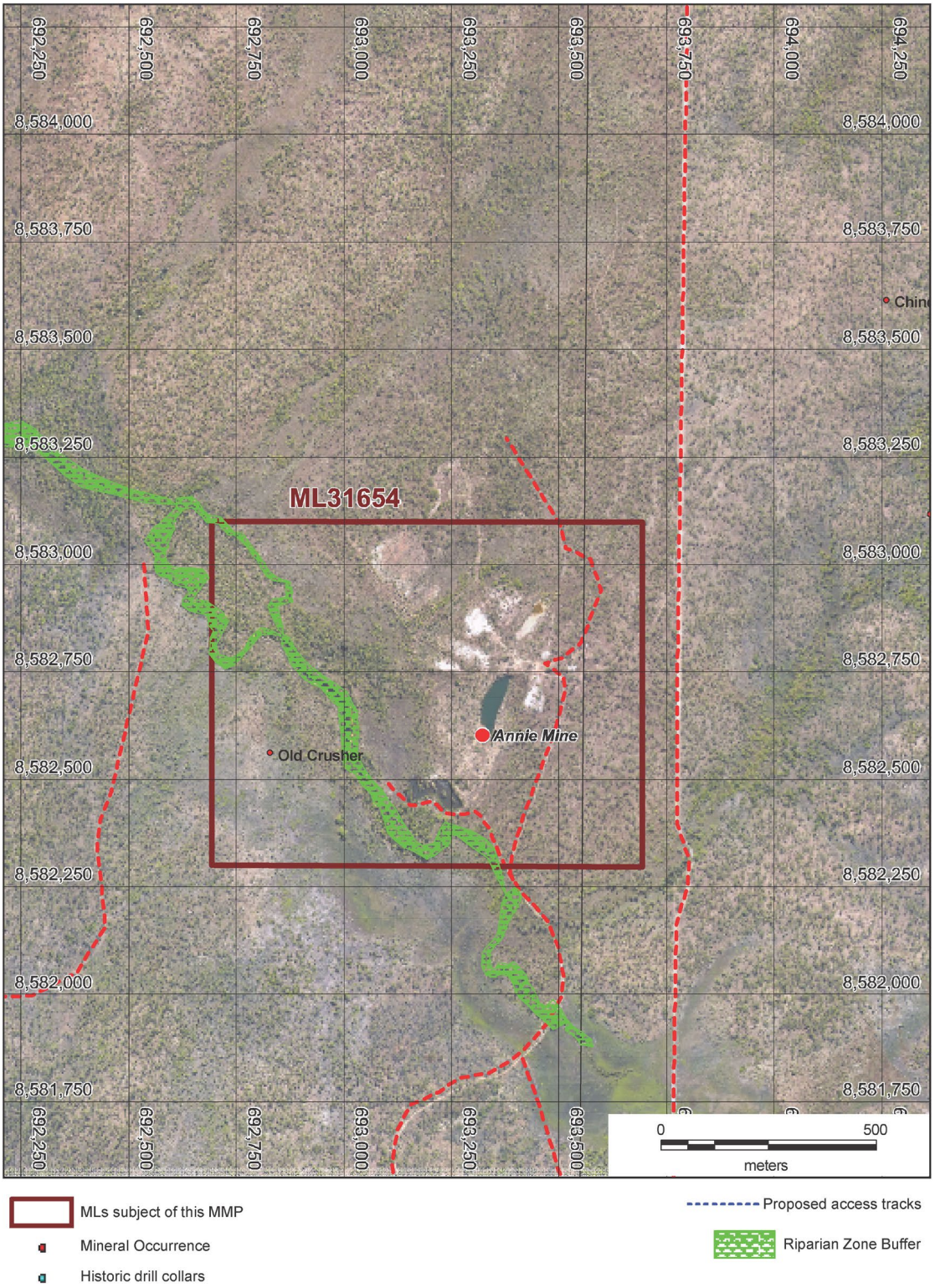


Figure 2 Annie Project location map (north) including environmental buffers

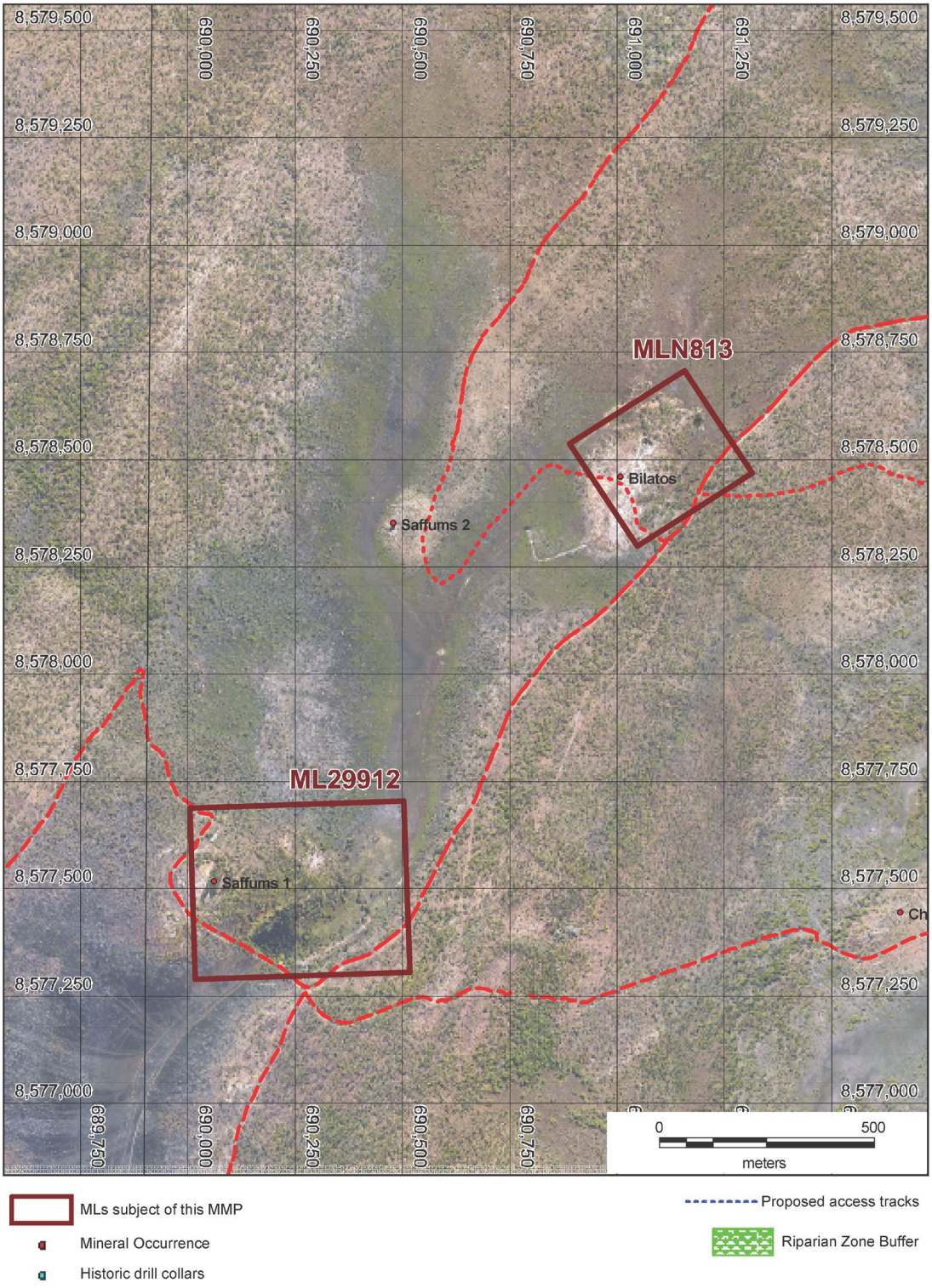


Figure 3 Annie Project location map (south) including environmental buffers

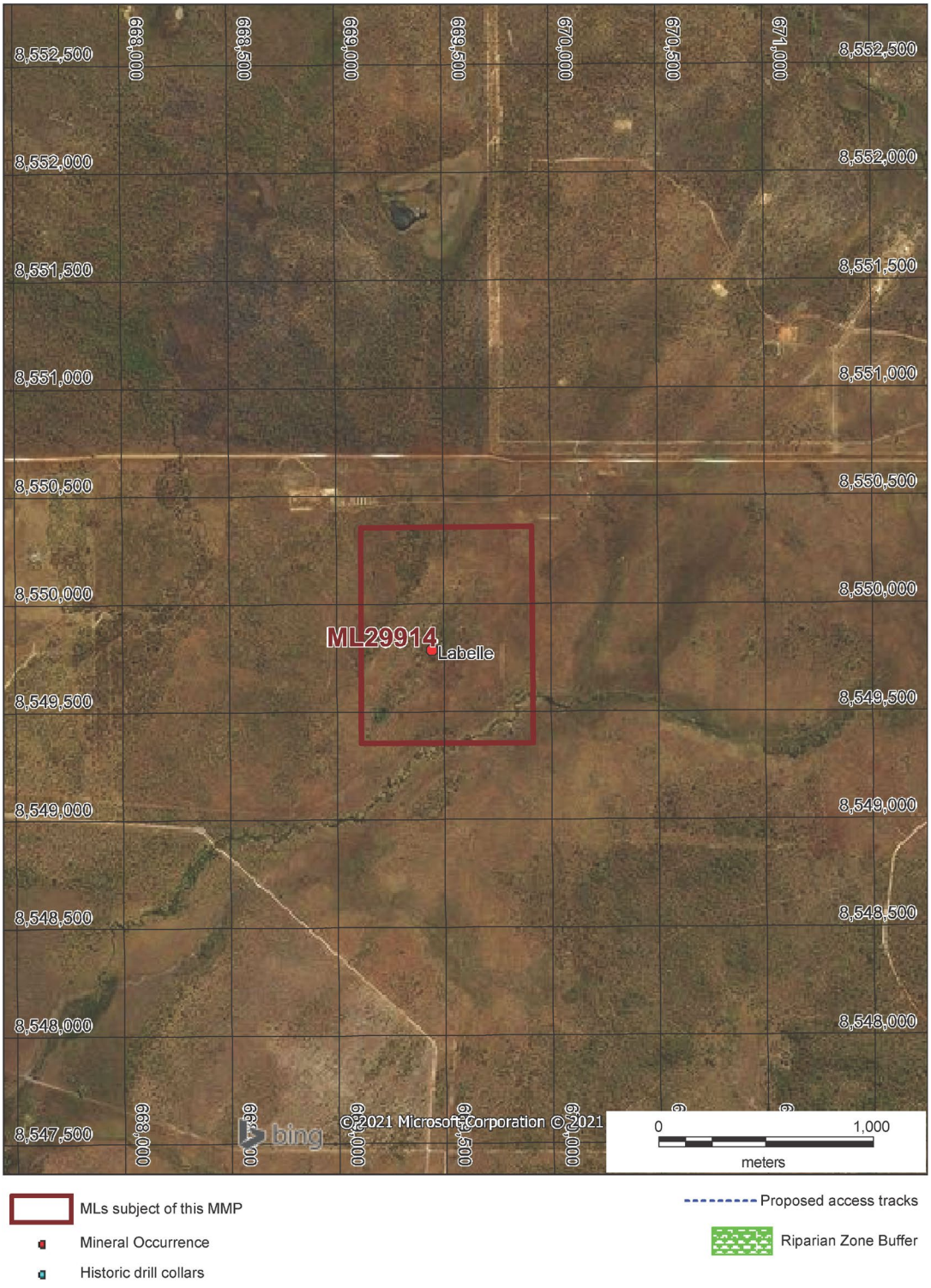


Figure 4 Labelle Project location map including environmental buffers

2. FLORA AND FAUNA ASSESSMENT RESULTS

SLR consulting was commissioned by Core to undertake desktop assessments of environmental values across the Annie (SLR, 2021a), Leviathan (2021b), and Labelle (SLR, 2021c) project areas and to provide advice on how those activities should proceed (Desktop ecology reports - **Attachment 1**). Key results from these assessments of sensitive or significant vegetation types and threatened and pest flora and fauna species for the project areas are provided below. For threatened species, these results focus on those that were known to be present within the exploration areas, or those that were considered to have a possible or likely likelihood of occurrence based on the presence of suitable habitat. Methodologies and data sources for undertaking these assessments, along with a complete overview of results, are described in the source documents.

Flora

Sensitive or significant vegetation

Three vegetation communities (and previously disturbed area) occur within the project area, including one sensitive/ significant vegetation community listed under the Northern Territory (NT) Planning Scheme, which occurred within the Annie exploration area (**Table 1**). This included the *Melaleuca* mid open forest riparian community.

Table 1 Mapped vegetation communities in the CXO project areas

Vegetation community	Project area		
	Annie	Leviathan	Labelle
Eucalyptus mid woodland*Gardenia* tall open shrubland*Heteropogon* mid tussock grassland	MLN813, ML29912, ML31654	MLN1148, ML29985	No
Livistona low open palmland*Wrightia* mid sparse shrubland*Heteropogon* mid tussock grassland	No	No	ML29914
Melaleuca mid open forest*Pandanus* low sparse palmland*Germainia* mid open tussock grassland	ML31654	No	No
Previously disturbed	MLN813, ML29912, ML31654	MLN1148	ML29914

Threatened species

The only threatened plant species that would potentially be impacted by the project is Armstrong's Cycad (*Cycas armstrongii*), which has been recorded within the Leviathan area and is considered and likely to occur within the Annie exploration area.

Weeds

Weeds classified under the NT *Weeds Management Act 2001* (WM Act) are to be managed in accordance with this Act. All owners, managers and occupiers of land as well as any other land user within the NT must comply with the WM Act.

Once a weed is declared in accordance with Section 7 of the WM Act, there is a requirement for all land holders, land managers and land users to comply with the declaration classification.

In the NT, there are three classification types, these being:

- Class A - To be eradicated
- Class B - Growth and spread to be controlled
- Class C - Not to be introduced into the NT.

Both Class A and Class B weeds are also considered Class C.

National classifications or statuses of weeds must also be considered in the ongoing management of an area. The Australian Government has compiled a list of 32 Weeds of National Significance (WoNS) based on an assessment process which categorise these weeds based on their invasiveness, potential for spread, and environmental, social and economic impacts (DEE, 2018). In conjunction with the WoNS, there is a National Environmental Alert List (the Alert List). The Alert List identifies plant species that are in the early stages of establishment and have the potential to become a significant threat to biodiversity if they are not managed (DEE, 2018). It is up to the relevant state or territory government to take responsibility for this within their own jurisdiction.

A combined list of weed species identified as potentially occurring within the project areas is provided in **Table 2** (SLR, 2021a; SLR, 2021b; SLR, 2021b), which includes the WM Act class and WoNS status of these species. Weed management controls and measures are detailed in **Section 4.**

Table 2 Weed species in proximity of the Annie, Leviathan and Labelle exploration areas (projects)

Scientific Name	Common Name	WM Act class	WoNS	Project area		
				Annie	Leviathan	Labelle
Andropogon gayanus	Gamba Grass	B	Yes	Yes	Yes	Yes
Cabomba caroliniana	Cabomba	A	Yes	Yes	Yes	No
Cenchrus ciliaris	Buffel Grass	No	No	No	No	Yes
Cenchrus pedicellatus	Mission grass – annual	No	No	Yes	Yes	No
Cenchrus polystachios	Mission grass – perennial	B	No	Yes	Yes	Yes
Hymenachne amplexicaulis	Hymenachne	B	Yes	Yes	Yes	No
Jatropha gossypiifolia	Bellyache Bush	A	Yes	Yes	Yes	Yes
Lantana camara	Lantana	B	Yes	Yes	Yes	No
Hyptis suaveolens	Hyptis	B	No	Yes	Yes	No
Mimosa pigra	Mimosa	B	Yes	Yes	Yes	Yes
Parkinsonia aculeata	Parkinsonia	B	Yes	Yes	Yes	Yes
Salvinia molesta	Salvinia	B	Yes	Yes	Yes	Yes
Senna obtusifolia	Senna	No	No	No	No	Yes
Urochloa mutica	Para Grass	No	No	Yes	Yes	Yes

Fauna

Threatened species

A combined list of threatened fauna species determined to have a possible or likely likelihood of occurrence within each respective project area (SLR, 2021a; SLR, 2021b, SLR, 2021c) is outlined in **Table 3**.

Table 3 Likelihood of occurrence of threatened fauna species within the Annie, Leviathan, and Labelle exploration areas (projects).

Species		Status		Project area likelihood of occurrence		
Scientific name	**Common name**	**TPWC Act**	**EPBC Act**	**Annie**	**Leviathan**	**Labelle**
Birds						
Erythrotriorchis radiatus	Red Goshawk	VU	VU	Possible	Possible	Possible
Falco hypoleucos	Grey Falcon	VU	VU	Possible	Likely	Likely
Geophaps smithii smithii	Partridge Pigeon (eastern)	VU	VU	Likely	Likely	Likely
Tyto novaehollandiae kimberli	Masked Owl (northern)	EN	VU	Possible	Possible	Likely
Mammals						
Antechinus bellus	Fawn Antechinus	EN	VU	Likely	Likely	Likely
Conilurus penicillatus	Brush-tailed Rabbit-rat	EN	VU	Unlikely	Unlikely	Likely
Dasyurus hallucatus	Northern Quoll	CE	EN	Possible	Possible	Likely
Macroderma gigas	Ghost Bat	-	VU	Possible	Possible	Possible
Mesembriomys gouldii gouldii	Black-footed Tree-rat	VU	EN	Likely	Likely	Likely
Phascogale pirata	Northern Brush-tailed Phascogale	EN	VU	Possible	Likely	Likely
Reptiles						
Varanus mertensi	Merten's Water Monitor	VU	-	Likely	Likely	N/A

Pest species

A variety of introduced pest fauna were identified as potentially occurring within the project areas (**Table 4**).

Table 4 Pest fauna species with the potential to occur within the project areas

Scientific name	Common name	Project area		
		Annie	**Leviathan**	**Labelle**
Bos taurus	Domestic Cattle	Yes	Yes	Yes
Bubalus bubalis	Swamp Buffalo	Yes	Yes	Yes
Canis lupus familiaris	Domestic Dog	Yes	Yes	Yes
Columba livia	Domestic Pigeon	Yes	Yes	No
Equus caballus	Horse	Yes	Yes	Yes
Felis catus	Domestic Cat	Yes	Yes	Yes
Hemidactylus frenatus	Asian House Gecko	Yes	Yes	Yes
Indotyphlops braminus	Flowerpot Blind Snake	Yes	Yes	Yes
Mus musculus	House Mouse	Yes	Yes	No
Rattus rattus	Black Rat	Yes	Yes	Yes
Sus scrofa	Pig	Yes	Yes	Yes

3. ENVIRONMENTAL RISK ASSESSMENT

Environmental Aspects and Potential Impacts

Environmental Aspects

CXO has identified a number of aspects of any given program that have the potential to have an environmental impact. CXO has identified the activities with the greatest risk of an environmental impact as:

1. Implementing new tracks;
2. Drillhole sites;
3. The camp site;
4. Intersection of groundwater in drilling and potential for spillage;
5. Drilling sample bags and waste;
6. Rubbish;
7. Weed management;
8. Hydrocarbon storage & management.

Potential Impacts

Unregulated drilling and mining have the potential to impact vegetation, soil, air, and water. Drilling operations present a range of environmental issues that need to be managed at every step of the process. Identified impacts, along with a range of measures to avoid and mitigate these impacts, have been described below.

Risk Assessment by CXO

A qualitative risk assessment has been applied to the environmental risks associated with CXO's Annie, Leviathan, and Labelle projects (**Table 7**). It has been applied in accordance with *AS/NZS ISO 31000:2009 Risk management – Principles and guidelines* (Standards Australia, 2009). Each environmental risk has been given a rating in terms of likelihood and consequence using the criteria in **Table 5** and **Table 6**. These ratings were then combined to generate a risk rating in the absence of mitigation measures (i.e. inherent risk) as well as following the application of the mitigation measures identified above (i.e. residual risk). The objective of the risk assessment process is to ensure that significant risks are identified and evaluated in order to ensure an appropriate level of risk treatment is applied to mitigate such risks.

Table 5: Environmental Risk Assessment – Risk Matrix

		Consequence		
		Low (little to no impact)	**Medium** (medium term negative impact)	**High** (irreversible or long-term impact)
Likelihood	**High** (>75% chance event will occur in life of plan)	**4**	**7**	**9**
	Medium (25-75% chance event will occur in life of plan)	**2**	**5**	**8**
	Low (<25% chance event will occur in life of plan)	**1**	**3**	**6**

Table 6: Environmental Risk Rating Definitions

Risk Level	Risk Treatment Criteria
Low	No significant action or further assessments required Managed under existing operational controls Some mitigation may be required - no detailed assessment of factors and aspects required but addressed in management measures as routine controls
Moderate	Substantial mitigation required - assessment required of factors and aspects
High	Major mitigation action required - assessment required of factors and aspects
Critical	Potentially unacceptable - Urgent management and mitigation action required

Table 7: Results of the Environmental Risk Assessment

Aspect	Impact	Inherent Risk Rating	Management Measures (prevention)	Management Measures (remediation)	Residual Risk Rating
Native vegetation disturbance	Potential for damage to native vegetation	M	The Finniss Project tenement has limited established access tracks, and these variably over-grown since last used intensively. These will be used where possible, but not all of the target areas are serviced by existing tracks and will require new access track construction. New tracks or drill pads at will need to be "cleared" along at least part of their length because the vegetation is thick, particularly with sandpalms. Naturally clear pathways between large trees will be utilised, but shrubs and grass will need to be driven over using a loader with blade-up techniques, thereby reducing the disturbance to the topsoil, and allowing for a greater chance of quick regeneration from in-situ root systems. Large trees will be avoided by not drilling near them and directing tracks around them. Difficult sandpalms will either be removed by the rootball or will be cut off at ground level with a chainsaw. The extent of this sandpalm problem can only be gauged once the access is being created. It is likely that the area will be burnt by the time access is being put in place, so the "clearing" process will be minimised further.	Where continued use of vehicle pathways results in the development of a firm track the site will be scarified after use to even the ground surface and encourage the regeneration of native vegetation. If vegetation is physically removed from the track route, it will be placed back over the track upon rehabilitation.	L
Soil disturbance	Potential for erosion of soil due to exploration activities	M	The drill sites/pads for this program will preferably be located in naturally clear areas and as such will not require clearing. Drill sites/pads will not be located within riparian zones. This greatly reduces the potential impact of the drilling in terms of soil disturbance, vegetation disturbance, and fauna habitat disturbance. This should be the case for many of the already-disturbed historic mine sites. However, at least some "clearing" will be required for drill pads, as described above. Regardless, allowance has been made in this MMP for all drill pads to be cleared. As discussed, new access tracks are locally required to undertake this drill program. The tracks are planned to begin at existing tracks and/or public roads. The new tracks are located along routes designed to have the minimum impact on the natural environment, as determined from imagery and from field reconnaissance. The tracks are designed to avoid, when possible, steep topography and large or significant vegetation. The tracks will largely be simple flattened paths clear of upright vegetation, however, if vegetation is thick and not responding to flattening techniques, it may be necessary to physically remove specific vegetation (e.g., sandpalms) off the track route, as described above. The tracks will not be graded or have topsoil cleared/removed. Vehicle speeds will be restricted (variant on style and condition of track). CXO believes that by utilising these techniques the program will have only minor disturbance to the soil profile from its proposed new tracks and drill pads. Where soil is disturbed due to earthworks activities, where possible the topsoil will be separately stockpiled and restored in its correct position in the soil profile during rehabilitation. In the event of heavy rain, works will cease to prevent damage to tracks, soils and vegetation.	By utilising natural clear paths and avoiding soil disturbance constructing the new tracks, it is planned that little to no scarification will be necessary during rehabilitation. However, if it is deemed necessary and beneficial, tracks and drill pads will be scarified. Tracks will be blocked by vegetation (where available) to discourage future use by the general public. The speed restrictions on tracks will reduce the potential for tracks to degrade or "bull dust". In the event that this occurs CXO will endeavour to rehabilitate the problem area before continuing use.	L
Scientific & cultural sites	Disturbance of sites of cultural or scientific interest	M	There are no recorded specific scientific or cultural sites within the confines of the proposed work program. Where work areas or access tracks exist nearby to sites of significance, a sufficient buffer is put in place to minimise the chances of encroachment on the site. In addition, staff are alerted of the nearby existence of the site prior to works via the induction process. Disturbance of un-recorded sites will be avoided through fact sheets provided to field staff with feed-back as determined by the AAPA and the DEPWS Heritage Branch.	Any un-recorded culturally significant site that is encountered during reconnoitre will be avoided during clearing. If CXO earthworks, by accident, encroach on a site, work will be suspended in that area while the AAPA is consulted.	L
Fauna disturbance	Disturbance of vulnerable or endangered fauna	L	A desktop study undertaken by environmental consultants SLR and has shown that the potential disturbance to fauna, especially threatened species, from this program is low. They did not recommend a specific on-ground survey of the work area. Regardless, suitably skilled CXO personnel will walk new access tracks and drill pads prior to construction to avoid specific threatened fauna occurrences (see **Section 4**). All Employees will be inducted using the materials provided by SLR, including a threatened species identification information pack.	Any habitat that is damaged through CXO works will be re-established. Recognition of NTG INFONET listed species or significant damage to fauna or fauna habitat will be reported to NT DEPWS by calling (08) 8995 5000.	L
Flora disturbance	Disturbance of vulnerable or endangered flora	L	One threatened species possibly or likely occur within the proposed work areas – Armstrong's Cycad. All Employees will be inducted to be able to recognise the species. Disturbance of vegetation will be minimised by careful management of all earthworks. Individuals of Armstrong's Cycad will be avoided, or where disturbance is unavoidable, managed in accordance with the process described in **Section 4**. Suitably skilled personnel will walk new access tracks and drill pads prior to construction to identify any species of conservation significance. To minimise direct and indirect impact on the potential habitat, diversions of tracks and/or avoiding the removal of ground cover on that portion of the track may also be implemented.	Recognition of species or damaged flora of significance will be reported to NT DEPWS by calling (08) 8995 5000. Individuals of Armstrong's Cycad will be avoided, or where disturbance is unavoidable, managed in accordance with the process described in **Section 4.** Whilst several individuals of Armstrong's Cycad may exist in the areas proposed for drilling activities (including new tracks), the avoidance and/or translocation measures detailed in **Section 4** are likely to reduce the residual level of potential impact sufficiently. For example, all individuals of the species will be avoided as much as possible and even where there may be impacts to a small number of individuals (<10), given that the species is locally abundant (Clugston and Nagalingum, 2016; Kerrigan et al, 2006), it is expected that such impacts are unlikely to be significant. Where there is a higher number of individuals (>10) that may be unavoidably impacted, they should be translocated as per the guidelines in **Section 4**. The implementation of the above measures (as detailed in **Section 4**) is likely to ensure: • Minimal impact on local population numbers	L

Aspect	Impact	Inherent Risk Rating	Management Measures (prevention)	Management Measures (remediation)	Residual Risk Rating
				• Area affected negligible compared to total population Minimal or acceptable impact on population size.	
Visual impact	Evidence of increased vehicle activity in the area.	L	Through implementing the land use techniques discussed in this document CXO is reducing the impact of the program on the environment and therefore having a lesser effect on the visual impact on the area. All works are well off the main roads and won't be visible or audible to passers-by in vehicles. There are no residences within 10 km of the work area.	It is expected that once the program is completed and rehabilitation has taken place the evidence of the work program on the area will be restricted to increased tyre tracks due to increased traffic in an otherwise rarely used area, it will be evident that vehicles have used the new proposed tracks and the drillhole locations will be visible due to the lack of grasses and other small vegetation in the immediate radius of the hole. Over time natural regeneration will remediate the visual impacts of this program to their pre-disturbance state.	L
Fire	Ignition of a fire from hot exhausts/ equipment Threat to safety of people or equipment by wild fire	L	CXO believes fire risk from this program is likely to be minimal, as it will have been burnt by the regular burning regime of the Bushfires NT (Government). However, if work areas have not been burnt, there is a high risk of a wild fire starting in the area (generally by members of the public) and resulting in a threat to CXO people and equipment. Drilling operations will cease on total fire ban days, unless the area has previously been burnt and no grass fire risk exists. No vehicles with petrol engines which can have hot exhausts will be allowed on site, except for ATV's and quadbikes with sufficient fire control measures in place. This should drastically reduce the chances of CXO starting a fire. All vehicles will carry fire extinguishers and shovels. Vehicles and equipment will be parked on open ground.	For non-emergency situations call NT Emergency Services 24-hour call 131 444 For information on controlled burns call Bushfires NT: • Batchelor office (08) 8976 0098 • Darwin office (08) 8922 0844	L
Groundwater contamination	Cross contamination of fresh aquifers with saline aquifers	L	There is little or no cross contamination of aquifers expected during this program, as all groundwater is in tight fracture-controlled situations.	If significant aquifers are encountered cement plugs will be placed between and above aquifers to preserve the integrity of the seals. Water Resources will be consulted first by calling (08) 8999 4455.	L
Surface drainage interference	Disturbance of natural drainage systems and erosion	L	The proposed work area has only minor low-order surface drainage with no significant or steeply banked drainage systems. No clearing will occur within 25m of any significant drainage features and will follow the guidelines discussed in **Section 4.**	Any works will be removed/cleared at the completion of the program back to as close to its original state as possible.	L
Introduced weeds	Introduction and spread of weeds from vehicles and equipment	M	CXO anticipates that the risk from introduced species is low for this work program. Induction processes will inform all Employees of potential weed species and their management to prevent weed propagation. As a precautionary measure CXO will ensure that all CXO staff and contractors vehicles are cleaned before entering the site and when moving between sites, to reduce the risk of contamination. Fact sheets and/or weed-decks will be distributed to CXO staff during the program.	Weed monitoring will be periodically ongoing to ensure any blow down areas do not become infested. Weeds Hotline number is 1800 084 881 Weeds Management Branch (08) 8999 4567	L
Feral Animals	Increased potential for disturbance by introduced animals such as horses or feral pigs.	L	Monitoring. Manage impacts.	Treatment of disturbed areas.	L
Rubbish and waste	Contamination of drill sites and tracks with rubbish and waste	H	CXO will induct all staff and contractors on the appropriate actions when dealing with rubbish and waste.	As per **Section 4**, all rubbish at the drill sites will be collected and removed from site.	L
Soil contamination exposure	Exposure of contaminants such as hazardous materials or ASS	L	Monitoring during drilling and appropriate control if suspected contaminated materials located	Appropriate remediation, if required. All contaminated material will be disposed of in accordance with relevant legislation	L
Landowner activities/interests	Disturbance of landowner activities/assets	H	As the land is freehold land owned by the NT Government there are no landowner activities or interests present on the site.	The exploration manager will be responsible for managing any unforeseen conflicts with the wishes of the stakeholders.	L
Fuel Storage	Hydrocarbon leak / spill – contamination of soil, surface and ground water	H	No refuelling od vehicles or large equipment is to take place within 50m of any water source. Spill Kits and absorbent matting will be available at all areas where there is potential to spill hydrocarbons (ie drill sites). Where possible, full or partial bunding will be deployed to storage tanks/drums to contain any leaks (exceptions include fitted vehicle fuel tanks). Water based dust suppression, where required.	Any contaminated soil will be removed, bagged and disposed of at an appropriately licenced facility with contaminated areas replaced with clean topsoil. All leaks of hydrocarbons over 20L will be recorded as an environmental incident and will thus be fully investigated and reported to the Department with the rehabilitation report.	L
Air Quality	Potential for excessive dust	L	Dust suppression of access roads and mining areas, where required.	Water based dust suppression, where required.	L
Public or third party activities	Disturbance of public activities. Access by unauthorized parties to drill sites.	H	The area is frequented by pig hunters and ATV enthusiasts, and as such there is potential for Core's programs to come into contact with these people. Signs will be placed at all public entrances stating no unauthorised access to the immediate drill work area. Core have no authority to deny access to the work area more generally, but the new access tracks will need to be made impassable as soon as possible after drilling.	Any unauthorized access to drill sites will be managed by the supervising geologist who will be on site at all times while drilling.	L

Potential Impact significance: - = Not applicable, L = low/negligible, M = medium, H = high

Risk Assessment by SLR Consulting

In addition to the Risk Assessment carried out by CXO, a qualitative risk assessment has also been carried out by Environmental consultants SLR Consulting, based on the desktop biodiversity assessments. Based on the results of likelihood of occurrence assessments in undertaken previous SLR documents for the three project areas (2021a; 2021b; 2021c), an additional assessment of potential (inherent) impacts to species determined to have a possible or likely occurrence, or known to occur in the project area, was undertaken. The ratings used to define the levels of potential residual impacts to the species are shown in **Table 8.** The results of the assessment are provided in **Table 9**. Note that these assessments relate to inherent potential impacts, that is, prior to the application of recommended impact avoidance and mitigation measures.

Assessment of Residual Impacts to Species of Concern

The previous sections have assessed the likelihood of occurrence of a range of threatened species, the inherent and residual potential impacts to species which possibly occur within the drilling areas and tracks, and their recommended avoidance and mitigation measures. Provided that the measures in **Section 4** of this MMP are implemented to avoid or mitigation impacts to species of concern, it is expected that the residual potential impact to each threatened species assessed is insignificant.

Table 8 Definitions of Levels of Potential Impact (TSSC, 2015)

Consequence	Insignificant 1	Minor 2	Moderate 3	Major 4	Critical 5
Impact on population[1]	Minimal impact on local population numbers; area affected negligible compared to total population; minimal or acceptable impact on population size	Minor impact on local population numbers. Population in other locations not impacted	Moderate impact on local population numbers. Some impacts on populations in other locations; moderate and/or short-term effects	Major population reduction or loss of local population; recovery measured in years to decades; serious and significant impact on species	Population reduction which may results in species extinction; recovery period is greater than decades; very significant and serious impact on high value species
Fragmentation of habitat/loss of habitat connectivity/reduce the areas of occupancy[2]	Minimal losses of local habitat only, recovery likely in a relatively short period of time; threats are covered by current management or legislation	Minor losses of local habitat requiring recovery over short term	Moderate loss of local habitat requiring recovery over a short to medium term and resulting in loss of connectivity between habitats at a local scale	Loss of local habitat with no potential for recovery, or partial loss of habitat across large areas and/or with limited potential for recovery in the medium to long term. Results in a net reduction in connectivity over a large area	Complete loss of local habitat with no potential for recovery and loss of habitat in other locations with limited potential for recovery in the long term resulting in a significant impact on habitat connectivity over a large area
Impact on the habitat critical to the survival of the species[3]	Minimal modification, destruction, removal or decrease of local habitat only, recovery likely in a relatively short period of time; insignificant impact to habitat or threat activity only occurs in a very small areas of habitat; limited damage to minimal area of low significance; minor effects on physical environment	Minor modification, destruction, removal or decrease of local habitat requiring recovery over short term	Moderate modification, destruction, removal ore decrease of local habitat requiring recovery over a short to medium term and resulting in loss of connectivity between habitats at a local scale	Modification, destruction, removal or loss of local habitat with no potential for recovery, or partial loss of habitat across large areas and/or with limited potential for recovery in the medium to long term. Results in a net reduction in connectivity over a large area; habitat is affected which may endanger the species and habitat long term survival – 70-90% habitat affected or removed; 30% fragile habitat affected or removed; 10-20% critical habitat affected or removed;	Significant impact resulting in the removal, destruction, fragmentation and degradation of habitat; the entire habitat is in danger of being affected or removed, that >90% habitat, >50% fragile habitat, and >30% critical habitat
Disruption to breeding cycle[4]	Minimal impact on any aspect of the breeding cycle;	Minor disruption to the breeding cycle	Moderate disruption to breeding cycle resulting in modification of behaviour both within the direct impact zone and at nearby locations; long term recruitment and/or population dynamics are not adversely impacted	Direct impacts on breeding cycle resulting in a net decline in size of the population; the is limited information to judge the impact	Complete disruption of breeding cycles over several seasons with significant population decline and possible extinction
Impact of invasive species and/or disease[5]	Minimal impact on local population numbers or habitat quality	Minor impact on local population numbers or habitat quality. Population in other locations not impacted	Moderate impact on local population numbers or habitat quality. Some impacts on populations in other locations	Major population reduction or loss of local population or loss of habitat quality	Population reduction which may results in species extinction loss of critical habitat extent or quality
Interaction with species migration	Minimal impact on species migratory patterns	Results in minor behavioural modification on a local scale or impacts to physical conditions of animal interfering with migration for the short term only. Unlikely to negatively impact on the overall success of migration	Results in modification of behaviour or animal conditions such that there is potential for medium term impacts, with some possibility of individuals failing to complete migration	Results in modification of behaviour or animal condition such that there is potential for medium to long term impacts, both locally and in nearby locations, with some individuals failing to complete migration	Significant impact resulting in either complete failure, or failure of majority of individuals, to complete migration in that cycle

[1] Refers to the proportional changes to the numbers of individuals; change in the size of the population

[2] Refers to the physical destruction of the species habitat and/or chemical or physical barriers

[3] Refers to species habitat resource includes modify, destroy, isolate or decrease the availability or quality of habitat

[4] Breeding cycle including activities associated with breeding (mating, gestation, nesting). Assessment assumes that the species is present in the affected area during the breeding cycle

[5] Refers to the invasive species that is harmful to the species becoming established in the species habitat and introduced disease that may cause the species to decline

Table 9 Level of Potential Inherent and Residual Impacts to Threatened Species Possible or Likely to Occur within Annie, Leviathan, and Labelle exploration areas

Scientific Name	Common Name	Exploration area	Level of Potential Impact - Inherent[6]	Level of Potential Impact - Residual[7]
FLORA				
Cycad armstrongii	Armstrong's Cycad	Annie	**Insignificant** - any disturbances to the species from the proposed exploration activities are not considered to be significant given the occurrence of the project area on the periphery of the distribution of this species and the minimal modification/ destruction/ removal of potential habitat.	**Insignificant**
		Leviathan	**Minor** – several individuals of the species may occur within areas proposed for development of access tracks or drill pads and may be damaged as a result of unmanaged activities. This could have a minor impact on local population numbers (as per the definition in **Table 6**).	**Insignificant** – whilst several individuals may exist in the areas proposed for drilling activities (including new tracks), the avoidance and/or translocation measures detailed in **Section 4** are likely to reduce the residual level of potential impact sufficiently. For example, all individuals of the species will be avoided as much as possible and even where there may be impacts to a small number of individuals (<10), given that the project area occurs on the periphery of the species distribution (Clugston and Nagalingum, 2016; Kerrigan *et al*, 2006), it is expected that such impacts are unlikely to be significant. Where there is a higher number of individuals (>10) that may be unavoidably impacted, they should be translocated as per the guidelines in **Section 4.** The implementation of the above measures (as detailed in **Section 4**) is likely to ensure that the definition for an 'insignificant' impact (as per **Table 6**) is achieved, as follows: • Minimal impact on local population numbers • Area affected negligible compared to total population Minimal or acceptable impact on population size.
FAUNA				
Birds				
Erythrotriorchis radiatus	Red Goshawk	Annie	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
		Leviathan	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
		Labelle	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
Falco hypoleucus	Grey Falcon	Annie	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
		Leviathan	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**

[6] Level of potential impact prior to the application of impact avoidance or mitigation measures

[7] Level of potential impact following the application of impact avoidance and mitigation measures (detailed in **Section 4**)

Scientific Name	Common Name	Exploration area	Level of Potential Impact - Inherent[6]	Level of Potential Impact - Residual[7]
		Labelle	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
Geophaps smithii smithii	Partridge Pigeon (eastern)	Annie	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle (cf. Fraser, 2001).	**Insignificant**
		Leviathan	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle (cf. Fraser, 2001).	**Insignificant**
		Labelle	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle (cf. Fraser, 2001).	**Insignificant**
Tyto novaehollandiae kimberli	Masked Owl (northern)	Annie	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
		Leviathan	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
		Labelle	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
Mammals				
Antechinus bellus	Fawn Antechinus	Annie	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
		Leviathan	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
		Labelle	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
Conilurus penicillatus	Brush-tailed Rabbit-rat	Labelle	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
Dasyurus hallucatus	Northern Quoll	Annie	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**

Scientific Name	Common Name	Exploration area	Level of Potential Impact - Inherent[6]	Level of Potential Impact - Residual[7]
		Leviathan	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
		Labelle	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
Macroderma gigas	Ghost Bat	Annie	**Insignificant** – any disturbances to the species from the exploration activities are not considered to be significant given the small area of habitat to be modified, no caves will be disturbed, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
		Leviathan	**Insignificant** – any disturbances to the species from the exploration activities are not considered to be significant given the small area of habitat to be modified, no caves will be disturbed, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
		Labelle	**Insignificant** – any disturbances to the species from the exploration activities are not considered to be significant given the small area of habitat to be modified, no caves will be disturbed, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
Mesembriomys gouldii gouldii	Black-footed Tree-rat	Annie	**Minor** – Mapped areas of *Melaleuca* mid open forest/*Pandanus* low sparse palmland/*Germainia* mid open tussock grassland may provide important habitat for any potentially occurring local populations of this species. Therefore, impacts to these areas may impact habitat for any local population of this species, particularly as this species is noted to roost in *Pandanus* (Hill, 2012).	**Insignificant –** implementation of recommended buffers for riparian vegetation within the Land Clearing Guidelines are likely to avoid impacting potential habitat for this species within the project area. Therefore, any potential impacts to a local population will be avoided/minimised and important habitat will be retained. Recommended riparian vegetation buffer widths within the Land Clearing Guidelines (DENR, 2020) are provided in **Section 4**.
		Leviathan	**Insignificant** – any disturbances to the species from the exploration activities are not considered to be significant given the small area of habitat to be modified, no caves will be disturbed, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
		Labelle	**Insignificant** – any disturbances to the species from the exploration activities are not considered to be significant given the small area of habitat to be modified, no caves will be disturbed, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
Phascogale pirata	Northern Brush-tailed Phascogale	Annie	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
		Leviathan	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**
		Labelle	**Insignificant** – any disturbances to the species from the proposed exploration activities are not considered to be significant given the minimal modification/ destruction/ removal of potential habitat, the mobile nature of the species and the minimal impact to its breeding cycle.	**Insignificant**

Scientific Name	Common Name	Exploration area	Level of Potential Impact - Inherent[6]	Level of Potential Impact - Residual[7]
Reptiles				
Varanus mertensi	Mertens` Water Monitor	Annie	**Minor** – Mapped areas of *Melaleuca* mid open forest/*Pandanus* low sparse palmland/*Germainia* mid open tussock grassland may provide important habitat for any potentially occurring local populations of this species. This is suggested as this vegetation community is mapped to occur along River Annie, which likely provides suitable aquatic habitat for this species. Therefore, impacts to these areas may impact habitat for any local population of this species, particularly as this species is noted to roost in *Pandanus* (Hill, 2012).	**Insignificant –** implementation of recommended buffers for riparian vegetation within the Land Clearing Guidelines will avoid impacting potential habitat for this species within the project area. Therefore, any potential impacts to a local population will be avoided/minimised and important habitat will be retained. Recommended riparian vegetation buffer widths within the Land Clearing Guidelines (DENR, 2020) are provided in **Section 4**.
		Leviathan	**Minor** – Watercourses dissecting the project area may provide habitat for any locally occurring individuals or populations of this species. Therefore, impacts to these areas may reduce and/or remove local habitat for this species.	**Insignificant –** implementation of recommended buffers for riparian vegetation within the Land Clearing Guidelines will avoid impacting potential habitat for this species within the project area. Therefore, any potential impacts to a local population will be avoided/minimised and important habitat will be retained. Recommended riparian vegetation buffer widths within the Land Clearing Guidelines (DENR, 2020) are provided in **Section 4**.

4. ENVIRONMENTAL MANAGEMENT PLANS AND THREATENED SPECIES AND VEGETATION COMMUNITY MANAGEMENT

Proposed Impact Reduction, Mitigation and Rehabilitation Methods

CXO proposes to undertake exploration drilling within the Annie, Leviathan, and Labelle Project areas, excluding environmental and heritage buffer zones (**Figure 1, Figure 2, Figure 3, Figure 4**). Activities to enable the drilling to take place will include clearing vegetation for drill pads and some new access tracks. These activities have the potential to impact on threatened species occurring or potentially occurring on the site through removal of habitat, habitat fragmentation, erosion and sedimentation, introduction of weeds and pests, and death or injury of wildlife through contact with machinery and vehicles.

In all fieldwork and field operations it is CXO's policy and intention to cause minimal impact on the environment. CXO endeavours to leave all areas visited in the same state as they were before visiting that area.

CXO proposes to minimise the potential impacts of the field activities have an environmental impact as follows:

Implementing new tracks and refurbishing existing tracks

Tracks will be prepared and cleared with a minimum of disturbance to the environment and will be rehabilitated in such a way as to promote rapid revegetation and prevent the initiation of erosion. Whilst existing tracks will be used wherever possible, new tracks will be required to access areas with no previous tracks. Locally, there may be refurbishment of existing access track, depending on their condition. These various track types are shown in the Track Status Register and Maps in **Attachment 8.5**. Security calculations (**Attachment 8.1**) are based estimates derived from the **Proposed Activities Table**, with some contingency built in more unforeseen (but otherwise immaterial) modifications to the current drill plan.

Access tracks

- Where possible, tracks will be located in flat areas with low slopes, naturally clear routes and will avoid areas of sensitive habitat such as vine thickets, monsoon rainforest and riparian habitat (except to cross creeks). No specific sensitive habitat areas were identified in the Desktop study undertaken by environmental group SLR Consulting (**Attachment 1 and Section 2 of this report**). Potential habitat areas are managed in accordance with the guidelines below.
- New tracks that will receive regular travel to and from work areas will need to be cleared such that vehicle access is facilitated and safety is not compromised.
- Existing tracks will be utilised where available and the use of earthworks will be minimised. The existing/historic access tracks are in various physical conditions, which may change from year to year, especially during the recent large wet season. Experience suggests that when planning to utilise existing historic access for the first time with heavy equipment such as drill rigs, it is prudent to assume 10% of the total length of these tracks will need refurbishment in terms of vegetation clearing or pruning.
- Deep wheel ruts will be mitigated by avoiding driving in the same wheel ruts every time a road is used (i.e. spread the load), as wheel ruts quickly channel water, increasing erosion potential.
- No windrows will be created.
- Land clearing will only be undertaken for the establishment of drill sites or access tracks where it is deemed necessary. Wherever possible, vegetation will only be flattened by vehicle/loader tyres to retain root structure and surface soil stability. Sandpalms that are extensively developed in the area pose a significant problem for access, as they tend to be elastic and spring back into an upright or inclined position after they have been run over. In this position they are a significant safety risk to vehicles. In the worst-case scenario, a sandpalm impacting on the front of an oncoming vehicle has the capacity to overturn the vehicle. Most incidents involving sandpalms are the rupturing of the vehicle cooling system. To alleviate this problem, CXO will utilise two runs of back-blade techniques with a front-end loader that is able to flatten most sandpalms. If this proves ineffective, particularly difficult sandpalms will be either dug out by the root ball or will be cut off at ground level with a chainsaw.

- Notwithstanding the above, for the Security calculation it is assumed that the lines will be cleared in full. Hence there is sufficient contingency in the calculations.
- Where large trees overhang existing access tracks and pose a safety issue they will be pruned using a chainsaw or loader bucket. In worst case scenario a tree may need to be felled, however, on most occasions these trees can be avoided.
- Microhabitat features such as rocks and fallen logs should be removed from areas to be disturbed and stockpiled at the edge of the site for re-use in rehabilitated areas.
- Any fauna that is injured should be taken to an appropriate animal care organization (e.g. ArkAid Inc Palmerston 89329738).
- Portions of routinely-used tracks may be sheeted to enable access at the start of the wet season, so as to avoid equipment and vehicles getting bogged and causing damage. Gravel materials will be sought from local gravel pits and bought in by tipper truck, then levelled by loader. It is worth noting that there are already some sheeted tracks in the area dating back to the operational times of the tin-tantalum mining/processing, for example, the majority of the tracks into Grants, BP33, Sandra's, Lees and Carlton.

Ephemeral creek crossings

- Existing creek crossings are used in most instances and will be maintained in good condition.
- Ephemeral drainage will be kept clear of soil and debris to allow water to cross roads.
- Ephemeral creek crossings will be located where the bank edge is lowest.
- Tracks will be designed to intersect creeks at a right angle to the direction of flow.
- If/where creek banks are too steep for vehicles; ramps will be constructed to a suitable approach angle. Material will be moved away from the drainage line (i.e. no sand to be deposited within drainage). Material from scraping will be used to make a low bank at the top of the ramp to direct water away from the track. This will reduce risk of gully erosion, as in the event of rainwater will be directed into stable soils.

Implementing new tracks will be done in accordance with the DITT advisory note AA7-005 "Clearing and Rehabilitation of Lines and Tracks Guide".

Measures relating to the avoidance and mitigation of impacts on Armstrong's Cycad and other threatened species are outlined further below in this Section.

Regular locations along access tracks are assigned an EMS (Environmental Monitoring Site), usually being representative or high-risk sites, such as corners or intersections, and creek crossings.

Drillhole sites

Rotary Air Blast (RAB) drillholes will not require a specific pad. They are simply drilled in the centre of the access line. Reverse circulation (RC) pads will be constructed on an as-needs basis along the drill lines or as off-shoots from the lines. These need to large enough to accommodate the drill rig and support vehicles safely. Where possible, holes will be designed to occur on relatively flat areas of ground that are naturally clear of trees and rocky outcrops. If the drill site is vegetated, CXO will need to clear grass and shrubs from an area of 25x20m (500 m2) for RC and diamond drill core (DDH) to allow the drill rig and geological crew to operate safely. This is particularly critical where the work area has not been burnt by the regular fires that pass through the area – fire safety is a significant issue in this area. This 500m2 includes the sump area.

For DDH holes, two sumps are dug for each drill hole. If groundwater becomes an issue, sumps will be dug at each RC drill site for containment of excess ground water that is encountered. The nominal size of the sumps will be 3m x 2m x 1.2m, which will be dug using a front-end loader or excavator. If there is reason to believe that the hole will produce more groundwater, then the sump will be dug deeper and longer. Sufficient tolerance is built into the Security Calculation for this scenario. There is no need to use a liner as water is not recirculated, and the groundwater will not pose a problem to the sub-soil environment.

For the RC drill holes and DDH, the hole diameter is ~150 mm at the top of hole and ~130 mm at depth. Aircore/RAB holes will be ~85 mm along their length.

Depending on the competence of the thin soil profile, PVC collars may need to be used in the top 1 to 3 metres but will be removed or cut down below surface during rehabilitation. Drill hole depths are expected to be between 50 and 250 m for RC, 100 and 300m for DDH, and 1 to 30 m for aircore/RAB, depending on purpose of hole and lithology intersected at depth.

Sample materials are collected in green plastic bags and placed in rows of 20. A subsample is taken from each bag and used for analysis. A chip tray is kept for each metre drilled. For DDH, core is laid out in plastic core trays.

The rehabilitation process for all of the drill sites will be to back-fill the sample spoils/cuttings down the hole and/or sump as much as possible. Experience thus far at the adjacent CXO-operated Finniss Project indicates that holes collapse soon after drilling and that negligible backfilling is possible. Excess spoils are spread on the work site and raked into the soil, unless they are substantially different in colour to the surface. In this case the excess spoils are buried in a nearby sump or a pit dug immediately next to the samples. The top section of the hole is plugged >40 cm below surface, using a recommended hole plug. Soil is heaped over the collar to allow for natural subsidence. Rehabilitation of sumps will ensure correct reconstruction of natural soil profiles. Topsoil is stored separately so it can be spread over the top of the sump.

All waste, including the plastic bags, will be removed from site and disposed as detailed below.

All drill holes will be rehabilitated according to the DITT's advisory note AA7-008 "Drill Hole Capping and Plugging Guide" and AA7-029 "Construction and Rehabilitation of Exploration Drill Sites" (or the superseding guidelines published by DITT).

Measures relating to the avoidance and mitigation of impacts on Armstrong's Cycad are described in the next section.

A proportion of RC, DDH and RAB/Aircore holes will be nominated for ongoing environmental monitoring as designated EMS. This figure is typically 10% or more.

Camp site

CXO will locate its drill camp at the Sand-Palms Roadhouse, Tumbling Waters or other commercial site, which are located outside the Project tenement. Exploration crew will drive or helicopter in to site each day.

Groundwater in drilling

CXO's targets during this program are all hard-rock targets. As such no aquifer bearing cover sequences are expected to be intersected. Ground water is not expected to be intersected given the paucity of bores in the area, however, there is a small chance that existing structures could act as a zone of weakness in the rock and therefore be a conduit or trap for groundwater. If this is the case CXO will trap the water in the drill sump and isolate it from the surrounding environment. Should groundwater flows be significant the hole will be grouted to reseal the aquifer. The significance of groundwater flow will be determined by consultation with the Water Resources Branch.

Waste

CXO anticipates the only waste produced during the drilling to be green plastic cuttings bags, empty additive (for drilling fluids) containers and miscellaneous rubbish. All hydrocarbon waste, any contaminated soil and other waste aside from plastic bags will be transported to an appropriately licenced waste disposal facility such as Shoal Bay. The remaining "household" type waste will be disposed of in the Berry Springs waste transfer station.

Rubbish

All rubbish will be removed from around the drill holes.

Weed Management

It is the requirement and responsibility of the owner and occupier of land to adhere to the following measures under the NT Weeds Management Act:

- Take all reasonable measures to prevent the land being infested with a declared weed.
- Take all reasonable measures to prevent a declared weed or potential weed on the land spreading to other land.
- Within 14 days after first becoming aware of a declared weed that has not previously been, or known to have been, present on the land, notify an officer of the presence of the declared weed.

There are many weed species known to occur in the local area. Site inductions will include discussion on weed management and cover identification of main weed species (largely Mission and Gamba Grass, Mimosa).

Exploration activities may result in introduction or spread of weed species if appropriate planning and weed control measures are not implemented. The following mitigations will be adopted (at a minimum) by CXO to reduce weed impact on the site as a result of the exploration drilling operations.

All machinery and vehicles will be cleaned in suitable facility in Darwin (or site of origin) prior to mobilisation to site. Likewise, if moving between areas and at the completion of the program prior to demobilisation all vehicles and equipment will be washed / blown-down at site at the nominated weed washdown and inspection site. The nominated site for this program is the Observation Hill Government borrow pit at waterbore RN023177 (695400e, 8595800n). This site has substantial existing disturbance and weeds are already prevalent. Most drilling contractors, however, have their own facilities for washdowns at their point of hire.

No vehicles will go off-road on transit to site and approved access routes will be strictly adhered to.

Follow up weed monitoring activities will occur as part of site inspections conducted by CXO, and will target weed blow down points, drill pads, and access tracks. Any suspected weeds will be photographed and supplied to an ecologist for identification. If weeds are identified, CXO will inform DITT and initiate relevant controls for the species.

Hydrocarbon Storage & Management

Diesel fuel and oils (including: engine oil, gear oil, hammer oil, grease, penetrating oils, hydraulic oils/fluids) will be required to operate the drilling equipment. The drilling contractor will be responsible for providing and safely storing both fuel and other hydrocarbon products. CXO requires all hydrocarbons brought to CXO's worksites be appropriately bunded and stored as part of our HSE contractor management. A full list of MSDS sheets of all chemical products brought to site is available at request and maintained onsite.

Several spill kits and absorbent matting are readily available should an incident occur (located close to all hydrocarbon / chemical storage and work areas), which will be fully documented and investigated. Should any soil be contaminated it will be bagged and disposed at a licensed waste disposal facility.

ATV-based Augering

CXO is also planning to undertake ATV-based engine-assisted augering as part of geological mapping throughout the tenement area.

Holes associated with this augering are very shallow, less than 1.8m deep, and narrow compared to RAB/AC. They are effectively a soil sample, assisted by a narrow-diameter rotating auger "flight" that is motorised and portable enough to move around on the rear of an All-Terrain vehicle ("ATV" 4x4 Buggy). The hole will be back-

filled “on-the-fly” with a shovel, but as they are so shallow and prone to natural collapse, they will not be routinely plugged. Introducing a plastic plug into the environment is considered unnecessary given the minimal footprint, unless the hole is augered in a setting that makes backfilling impossible, such as laterite at surface. It is unlikely that augering in this situation would be successful in any case, given how hard the surface material is. No discolouration at surface likely as holes are in the soil profile. The overall footprint of this exploration method is no different to soil sampling and is considered by CXO to have minor immediate impact and have no on-going impact. No access tracks or pads are required and the footprint of the ATV is no different to low-impact work currently carried out routinely by CXO, such as mapping, soil sampling and prospecting.

Currently, hand-augering is not considered “substantial disturbance” under the NT *Mining Management Act* and is not subject to regulation via a Mine Management Plan. Anecdotally, the introduction of a small engine to undertake this task is sufficient to move this exploration method into the category of substantial disturbance. Note that in most other jurisdictions, such as Western Australia, small engine-assisted augering is exempt from regulation. The logic is that the end-result is the same, whether it be a hand-made or engine-assisted hole. The key difference between engine-assisted and hand-powered augering is the productivity rate – the former enables the explorer to auger up to 50 holes per day. On this basis it has the capacity to be ground disturbing if used intensively. However, the shallow nature means the disturbance is only short term.

CXO is committed to minimising disturbance associated with the proposed small engine-assisted augering. As such, no augering will be conducted within riparian zones in order to minimise erosion and sedimentation risks and avoid disrupting important flora and fauna habitat. CXO staff undertook training on the identification and avoidance of riparian zones in May 2018 (conducted by SLR Consulting).

Individual auger holes are not assigned an EMS, owing to the shallow nature and minimal impact. However, as part of Core’s environmental monitoring, Core undertakes an annual Audit of the condition of auger sites.

Geotechnical Boreholes

After consulting with local drilling contractors, holes are to be drilled using hollow flight Auger with a truck mounted rig. Holes will be 180mm in diameter and a maximum of 25m deep. Sampling will be performed every 1.5 – 2.5m, with samples being extracted in clear plastic tubes which are then removed from site. Once logging, in-situ testing and sampling have been carried out holes will be capped unless groundwater in encountered, in which case a PVC standpipe will be installed to monitor groundwater levels. Borehole reinstatement can be performed using gravel pack or bentonite slurry.

Access to borehole locations does not require any clearing activities. Pads will require clearing, up to 20m x 25m, which is within the current size nominated for RC and DDH drilling to be performed safely. The same procedure as with other pad clearing will be followed, including topsoil and vegetation being retained for rehabilitation purposes. No sumps are expected to be required for drilling, with any muds being retained within a mud baffle tank. The security calculation however will include the usual two sumps associated with DDH pads as a precaution to allow for the control and containment of groundwater if necessary.

As with the other drilling methods the rehabilitation process of drill sites will be to reinstate the borehole either by back filling with drill spoils or with gravel pack/ bentonite slurry. Excess spoils will be spread on the work site and raked into the soil, unless they are substantially different in colour to the surface. In this case they will be buried in a purpose dug sump. The top section of the hole will be plugged, using a recommended hole plug. Soil will be heaped over the collar to allow for natural subsidence. As mentioned, topsoil and vegetation will be retained so it can be spread over the top of the pad. All waste, including plastic mining bags, will be removed from site and disposed as detailed below.

Drill holes and sites will be rehabilitated in accordance with the Department of Primary Industry and Resources’ advisory note AA7-008 “Drill Hole Capping and Plugging Guide” and AA7-029 “Construction and Rehabilitation of Exploration Drill Sites” (or the superseding guidelines published by DITT). CXO’s specific management methods for Threatened species are outlined below**.**

A proportion of geotechnical boreholes will be nominated for ongoing environmental monitoring as designated EMS. This figure is typically 10% or more.

Test Pits

Test pits will be dug using up to a 30T excavator, to refusal or the reach of the excavator, to a maximum depth of 5m. A 1.2m wide, toothed bucket will be utilized, with the length of pits at surface being up to 10m, this is far greater than the base will be due to method of excavation. CXO is advised the volume of pits will be up to 36m^3.

Logging, observations, photographs and sampling of material for laboratory analysis will be performed immediately after excavation.

Adequate access tracks are already in place and pits will be filled in immediately upon sampling being completed. GHD commit to having each test pit filled in before moving on to the next. Material removed during excavation will be stored alongside the pit and replaced in such a manner as to preserve the rock/ soil profile, with topsoil and the minimally cleared vegetation being replaced last.

A proportion of geotechnical boreholes will be nominated for ongoing environmental monitoring as designated EMS. This figure is typically 10% or more.

Riparian Vegetation Management

Where a drainage depression or watercourse is mapped to occur within a project area it is recommended that a clearing buffer is implemented around these features. Riparian zones have been mapped by CXO using high-resolution imagery and ground controls and are shown on the locations maps (**Figure 1**, **Figure 2**, **Figure 3**, **Figure 4**). These CXO-mapped buffers exceed those buffers in SLR's Desktop ecology report maps (**Attachment 1**), with the exception of ML31654 (historic Annie Mine area) where a wider buffer will be implemented by CXO that reflects the vegetation community mapping under the NT Planning Scheme. Recommended widths of riparian vegetation buffers within the Land Clearing Guidelines (DENR, 2020) are provided in **Table 10**. The implementation of these buffers will protect sensitive or significant vegetation within the project areas and also preserve habitat values for a variety of local fauna and flora. Additionally, potential impacts to water quality from erosion will also be reduced by the implementation of these buffers. Exceptions to this will be subject to approval of separate amendments to the Authorisation.

Table 10 Recommended widths of riparian buffers within the Land clearing Guidelines (DENR, 2020).

Riparian class	Stream order	Minimum buffer width (m)	Measured from
Drainage depression	N/A	25	The outer edge of the drainage depression, which is the extent of the associated poorly drained soils and associated vegetation.
Intermittent streams	First	25	The outer edge of the riparian vegetation or levee (whichever is the greater). If braided channels are present, the edge of the outer most stream channel
Intermittent streams	Second	50	
Creeks	Third and fourth	100	
Rivers	Fifth or higher	250	

Threatened Species Management

Impacts to most threatened species were considered to be insignificant due to the high proportion of remnant vegetation that is likely to remain outside of the project areas post-disturbance and/or the level of previous disturbance to vegetation communities within the project areas. However, there is still the potential for small scale impacts to occur to any locally occurring individuals or populations of the abovementioned threatened species, particularly small mammal species. Therefore, several strategies are recommended to be implemented during clearing activities in high-risk areas to reduce potential impacts to these species as a best practice method. These strategies include:

- The use of spotter catchers prior to and during clearing activities, particularly in areas where there are hollow bearing trees.

- Clear in a sequential manner from areas of prior disturbance outwards. This will reduce the potential for any fauna to become isolated from stands of surrounding remnant vegetation and allow escape pathways during clearing activities.

- Ensure that any piles of large woody debris back onto remnant stands of vegetation as these piles may provide habitat for local fauna. In the event that these piles require to be moved or cleared, the placement of these piles adjacent to remnant vegetation patches can allow escape pathways for any fauna inhabiting these areas.

Armstrong's Cycad

Armstrong's Cycad occurs around the Darwin area south to near Hayes Creek, and to the north-western corner of Kakadu National Park in the east, as well as on the Tiwi Islands, Cobourg Peninsula, and Cox Peninsula. It occurs mainly in open grassy woodland on yellow and red earths.

Armstrong's Cycad, like all cycads, is a long-lived, slow-growing, woody plant, with male and female individuals. Reproductive age is unknown but can be 15 years under cultivation. Seeding may be annual or sporadic. Pollination appears to be mainly through insects, in particular beetles in the family Boganiidae. Seeds are dispersed through gravity, water and animals. Cycads live in symbiosis with cyanobacteria which provide the plant with nitrogen. The species is relatively resilient to low intensity fires, and can regenerate from crown damage, apical growing shoot damage, and even from destruction of the entire above ground stem, through regrowth from the stem base or root stock. However, populations decline when subjected to high intensity fires (Liddle, 2004; Liddle, 2009).

A species profile is provided in **Appendix 4.** The species is threatened by:

- Conversion of its habitat for residential and rural pursuits
- Through changes in prevailing fire regimes, facilitated by the influx of weeds into the species' habitat, resulting in enhanced fuel loads and higher intensity fires.

The performance criterion and indicator for this issue includes the following:

- Number of Armstrong's Cycad individuals to be impacted and where relevant, the number successfully translocated.
- Number of seed collected, number of seed successfully grown into plants, number of seedlings successfully planted.
- Majority (>80 %) of translocated Amstrong's Cycad individuals survive two years after translocation.

Recognition

Armstrong's Cycad grows to a height of 6 m, with a slender trunk 6-12 cm in diameter. Branching occurs, with occasional offsets and basal suckers. The crown is obliquely erect to spreading, with 84-156 leaflets. Leaflet

have a prominent midrib on the upper surface and are attached to the rachis at an angle of about 56-70 degrees. Additional description is available in Hill (1996), Hill and Osborne (2001), Jones (2002) and Dixon (2004).

Management Measures

The following management measures have been formulated specifically for Armstrong's Cycad. Procedures for propagation and translocation are summarised from Origin Energy (2014).

Pre-Clearing Survey

The following measures should be employed prior to disturbance activities commencing:

- Proposed new tracks and drill sites should be surveyed by personnel suitably skilled in the recognition of Armstrong's Cycad. Should any individuals of Armstrong's Cycad be encountered within these areas, plants should be avoided as much as practically possible. Where it is anticipated that a substantial number of individuals (>10) cannot be avoided, the plants should be clearly marked for appropriate removal during clearing operations with the aim of translocation.
- The northern side of the plant should be marked with marker paint or fluorescent dye to facilitate re-planting with the same orientation.
- Seed encountered on the forest floor surrounding the plants should be collected for propagation and rehabilitation purposes either elsewhere on the site or at the collection location once mining operations have ceased.

Operational Phase

The following measures should be employed during drilling operations, where a substantial number of plants (>10) cannot be avoided:

- During clearing operations, Armstrong's Cycad individuals marked during pre-clearing surveys must be removed for relocation in rehabilitation areas elsewhere on the site or for temporary storage for rehabilitation at a later date.
- Prior to removal, the area around plants must be cleaned by hand or with machinery (e.g. front-end loader) and foliage removed to where the rhachis is attached to the stem. Using a spade, excavator or backhoe, soils surrounding the root ball is loosened prior to excavation ensuring that as much of the rootball around the plant roots remains intact. Damaged roots are to be trimmed and treated with Banrot® and/or Formula20®. To initiate root growth, Vitamin B or Seaweed can be sprayed on the roots. Roots are bagged in breathing material, such as hessian, and moistened with water prior to transport to a temporary holding location or to a prepared rehabilitation location elsewhere on the site. Care should be taken not to bruise plant stems during transport, using soft materials such as hessian to stabilise the plant.
- Upon arrival, plants are to be immediately potted or put into woven fibre planter bags for temporary holding or, if used for rehabilitation elsewhere on the site, in a prepared hole of a size suitable for the inserted root ball. Plants should be positioned in their original orientation. Washed sand or sandy loam should be used to for packing around the roots, to provide a suitable medium for root growth. The crown of each cycad must be sprayed with an insecticide (either Confidor® at a rate of application of 10 millilitres (mL) per 9 litres (L) of water or application of Crown® at a rate of application of 5 mL per 9 L of water). Translocated plants must also be watered with 5-9 L of water around each root ball with a systemic fungicide (Banrot® at the recommended rate). Rocks can be placed around the base of plants to assist in the stability of plants and to provide protection from fires and hot weather.
- Seed collected from the cleared areas must be propagated in pots using standard horticultural methods or direct seeded in areas to be rehabilitated.
- Translocation and propagation operations must be supervised by a suitably trained horticulturalist or arborist.

Post-Operation

The following measures should be employed following mining operations:

- Translocation of individuals held in the temporary storage area back to the original area of extraction must follow similar procedures as outlined above. Each plant must be watered about once a month (10-20 L) depending on rainfall for six months after replanting or as appropriate and any new expanding leaves must be sprayed with insecticide.
- Plants must be monitored for new growth, death, insect attack, reproduction, gender etc. for a period of at least two years after planting in the ground.

Monitoring and Reporting

Monitoring will be the responsibility of CXO's Exploration Manager to ensure the health of translocated individuals in accordance with the performance indicators outlined above. This person will be responsible for reporting the number of individuals found on areas to be cleared (if any) to the DITT upon completion of the pre-clearing search. Further reports will be submitted on completion of the initial translocation and once again on completion of replanting of the translocated stock on completion of mining and revegetation operations.

5. REFERENCES

Clugston, J.A.R. and Nagalingum, N.S., 2016. Conservation genetics of wild populations and botanic garden collections of Australian cycads. Conservation genetics of Australian cycads. Progress Report 19 Apr 2016.

DEE, 2018. Weeds of National Significance. http://environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons. Accessed 20 September 2018. Department of the Environment and Energy, Australian Government, Canberra.

DENR, 2019. Lists and links to Threatened Species profiles. https://nt.gov.au/environment/animals/threatened-animals and https://nt.gov.au/environment/native-plants/threatened-plants Department of Natural Resources and Environment, Northern Territory, Darwin.

DENR, 2020. Land Clearing Guidelines, Northern Territory Planning Scheme.

Dixon D., 2004. The Gymnosperms of the Northern Territory. The Beagle, Records of the Museum and Art Galleries of the Northern Territory. 20: 1-24.

Hill, B., 2012. Threatened Species of the Northern Territory. Black-footed Tree-rat (*Mesembriomys gouldii*). NT Government.

Hill, K. and Osborne R., 2001. Cycads of Australia. Kangaroo Press, Sydney.

Hill, K.D., 1996. A taxonomic revision of the genus Cycas (Cycadaceae) in Australia. Telopea 7: 1-63.

Jones, D.L., 2002. Cycads of the World. 2nd Edition. Reed. Sydney, NSW.

Kerrigan, R., Cowie, I. and Liddle, D., 2006. Threatened Species of the Northern Territory – Cycas armstrongii. Department of Natural Resources, Environment and the Arts.

Liddle, D.T., 2004. The ecology of Cycas armstrongii and management of fire in Australia's tropical savannas. Unpublished PhD Thesis, Charles Darwin University, Darwin, Northern Territory.

Liddle, D.T., 2009. Management Program for Cycads in the Northern Territory of Australia 2009-2014. Northern Territory Department of Natural Resources, Environment, the Arts and Sport, Darwin.

Origin Energy, 2014. *Cycas megacarpa* Management and Translocation Plan. Origin Energy.

SLR, 2021a. Terrestrial flora and fauna desktop assessment – Annie exploration area: MLN813, ML29912, ML31654. Report prepared for

SLR, 2021b. Terrestrial flora and fauna desktop assessment – Leviathan exploration area: MLN1148 and ML29985.

SLR, 2021c. Terrestrial flora and fauna desktop assessment – Labelle exploration area: ML29914.

Threatened Species Scientific Committee (TSSC), 2015. *Threatened Species Status Assessment Manual*, Department of the Environment, online (28 July 2015).