

APPENDIX G ESCP EP154



Erosion & Sediment Control Plan

EP 154

Minerals Australia



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EcOz Pty Ltd.
 ABN: 81 143 989 039
 Level 1, 70 Cavenagh Street
 DARWIN NT 0800
 GPO Box 381, Darwin NT 0800

Telephone: +61 8 8981 1100
 Email: ecoz@ecoz.com.au
 Internet: www.ecoz.com.au



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ACRONYMS

AEP	Average Exceedance Probability
BOM	Bureau of Meteorology
CPESC	Certified Professional in Erosion and Sediment Control
DENR	NT Department of Environment and Natural Resources (Northern Territory)
DPIR	NT Department of Primary Industry and Resources
EHS	Environment Health and Safety
EMP	Environment Management Plan
EP	Exploration Permit
ESC	Erosion and Sediment Control
ESCP	Erosion and Sediment Control Plan
IECA	International Erosion Control Association
NT	Northern Territory
RCD	Rock Check Dam
RFD	Rock Filter Dam
RUSLE	Revised Universal Soil Loss Equation

1 INTRODUCTION

Minerals Australia Pty Ltd (Minerals Australia), a wholly owned subsidiary of Hancock Prospecting, is the operator of Exploration Permit (EP) 154, which is located approximately 100 km east southeast of Mataranka in the Northern Territory (NT). EP154 is situated on Aboriginal land and is the subject of an Exploration and Coexistence Deed between Minerals Australia Pty Ltd, Jacaranda Minerals Ltd (a co-shareholder) and the Northern Land Council (NLC).

Minerals Australia proposes a works programme on EP154 involving a two dimensional (2D) seismic survey (43.6 km), and the drilling of one core drill hole to obtain stratigraphic information. The purpose of these exploration activities is to refine information about known oil and gas deposits.

Minerals Australia have engaged EcOz Environmental Consultants Pty Ltd (EcOz) to develop the Erosion and Sediment Control Plan (ESCP) associated with the above exploration activities as per their Environmental Management Plan (EMP).

1.1 Purpose and Objectives

This ESCP has been prepared to provide a best-practice framework for implementation of effective erosion and sediment control associated with Minerals Australia's work activities within the project area.

The objectives of this ESCP are:

- To take all reasonable and practical measures to minimise actual or potential environmental harm resulting from soil or water movement resulting from work activities
- To maintain, and where practical, enhance the land use capabilities of disturbed areas with respect to land's soil, water and vegetation attributes.
- To prevent soil loss from the site and deposition offsite, and minimisation of associated risks to water quality and air quality.
- To ensure satisfactory stabilisation of the site at completion of works.

1.2 Scope

This ESCP provides the overarching guidance demonstrating general drainage, erosion and sediment control principles, practices and methods to be implemented throughout project. This plan may be used to inform preparation of further Progressive ESCP's (where required), that provide detailed site-specific controls relevant to proposed exploration activities.

This ESCP has been reviewed by an Associate Certified Professional in Erosion and Sediment Control (CPESC) in accordance with the guideline Best Practice Erosion and Sediment Control (IECA 2008). The ESCP:

- Identifies areas vulnerable to erosion and sedimentation (including receiving waters).
- Includes an overarching erosion risk and hazard assessment.
- Details the management strategy and specific measures to be implemented to effectively manage erosion, and potential sediment mobilisation associated with the project activities.
- Includes details of both temporary and permanent erosion and sediment control methods and treatments to be implemented for all stages of the project (pre, during and post works).
- Includes information regarding proposed timing and staging of works, responsibilities, maintenance and monitoring requirements, and reporting procedures.

2 PROJECT AREA

2.1 Project Location

EP154 is located over Aboriginal Freehold lands; Mangarrayi, Alawa and Alawa 1 Aboriginal Land Trusts, and is located 20 – 200km south-east of Mataranka. The work activities are located within NT Portion 671 and 4777, Figure 2-1.

2.1.1 Titleholder's Details

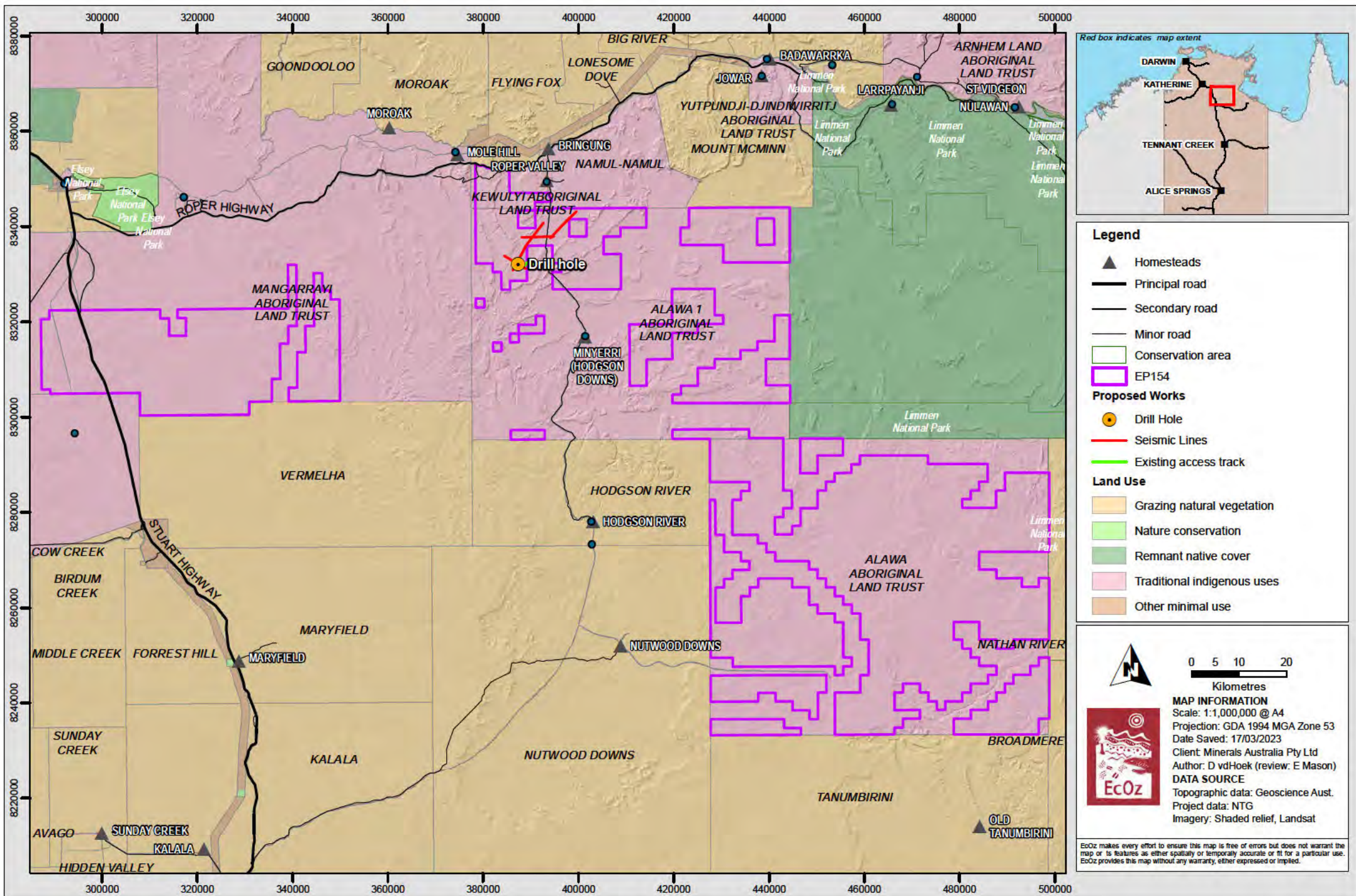
Business name:	Minerals Australia Pty Ltd. And Jacaranda Minerals Pty Ltd.
Contact person:	Peter Collings, Chief Geologist
Postal address:	Locked Bag 2, West Perth, WA 6972
Contact details:	

2.2 Seismic, civil and drilling program

Minerals Australia proposes to undertake a two-dimensional (2D) Seismic Program comprising six seismic lines with a total length of 31.77 km. Lines 2 – 5 are located on either side of Hodgson River Road and are within Alawa 1 Aboriginal Land Trust. Lines 1 and 1A have been removed from the project. Minerals Australia also proposes the drilling of a stratigraphic drill hole in the middle of seismic line 5. The following key activities are included:

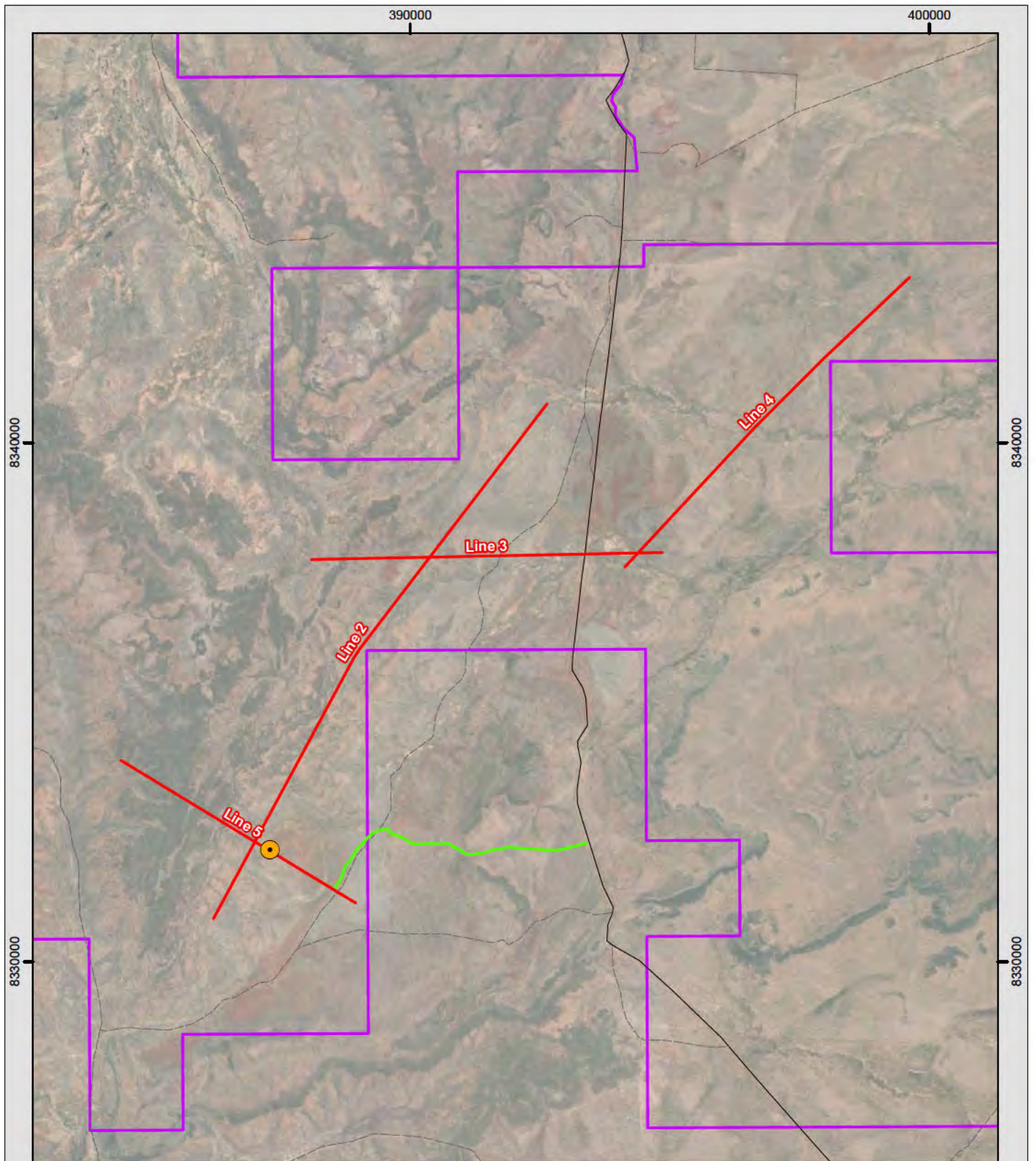
- Vegetation clearing.
- Grading, excavation, stockpiling, compaction of soil material.
- Respreading of any removed vegetation on the seismic lines following completion of the program, to promote regeneration.
- Removal of all surface infrastructure and rehabilitation.

The location of key project infrastructure is provided in Figure 2-2.



Path: Z:\01 EcoZ_Documents\04 EcoZ_Vantage GIS\NZ10103 - Hancock - EMP EP154\01 Project Files\Report Maps\Figure 1 2. Map of the location of EP154, the proposed exploratory works and surrounding land use.mxd

Figure 2-1. Map of the location of EP154, the proposed exploratory works and surrounding land use



Project data

- Principal road
- Secondary road
- Minor road
- Track
- EP 154
- Proposed drill hole
- Seismic Lines
- Existing access track



0 0.5 1 2
Kilometres



MAP INFORMATION
 Scale: 1:100,000 @ A4
 Projection: GDA 1994 MGA Zone 53
 Date Saved: 17/03/2023
 Client: Hancock Prospecting Pty Ltd
 Author: DC
DATA SOURCE
 Topographic data: Geoscience Aust.
 Project data: NTG

Figure 2-2. Key project infrastructure

2.3 Extent of ground disturbance

Civil works involve vegetation clearing along seismic lines and drill hole sites; grading, excavation, stockpiling and compaction of soil material, provision of construction access and drilling of a stratigraphic drill hole, as described below.

2.3.1 2D seismic profiling

Minerals Australia proposes 31.77 km of survey, comprised of 4 separate survey lines shown in Figure 2-2. Seismic lines need to be approximately 4 metres wide to ensure sufficient access for the seismic survey vehicles. This may require clearing of lines to allow for unobstructed access. Clearing of lines will, as far as is possible, avoid the removal of any vegetation, topsoil, rootstock and seeds, but will unavoidably involve some disturbance.

Seismic lines will be prepared utilising a grader or dozer to allow access to the survey vehicles. The majority of seismic lines will be traversed 'blade up' to minimise environmental impact, however due to the nature of the environment the blade may be needed for short sections. This will include when encountering dense vegetation, erosion channels, holes etc. Where possible, the seismic line will avoid trees and large shrubs, as well as creek or drainage lines. Where creek crossings are required, the least sensitive crossing point will be utilised.

2D seismic profiling is scheduled to be undertaken between May and November and is expected to take 9 weeks, including rehabilitation – see Table 2-1.

2.3.2 Drill pad

The proposed drill hole is at longitude 133.94859, latitude -15.08217, approximately 6.4 km west of the Hodgson River Road, and 20.5 km northwest of the community of Minyerri. Access to the site will be via the Hodgson River Road off the Roper Highway for 24 km, and then 5.7 km along an existing station road, followed by 1.8 km along a proposed seismic line as shown in Figure 2-2.

Additional clearing will be required to clear the access route to transport associated drilling equipment. Approximately 2.25 ha will be cleared to accommodate the 150 m x 150 m drill pad, with vegetation and topsoil stockpiled separately for rehabilitation. Two sumps (25 m x 25 m x 2 m per hole) will be excavated to contain water and drilling fluids. Stockpiles and sumps will be within the 150 m x 150 m drill pad. Drilling is scheduled to be undertaken between May and November and is expected to take approximately five weeks to complete, including rehabilitation – see Table 2-1.

2.3.3 Access roads

Access to site is south from Mataranka on the Stuart Hwy, east on the Roper Hwy, then south onto Hodgson River Road. Existing access tracks will be utilised wherever possible during site activities. Maintenance of tracks may be required before, during and following project activities. This may include grading, patching and watering. Where possible seismic lines will also be utilised as access roads to avoid additional clearing. Access to various components are as follows:

- Drill pad accessed 24 km down Hodgson Downs Rd, 5.7 km along existing station track, then 1.8 km along proposed seismic line
- Seismic lines accessed via same route as drill pad, then at 12.5 km and 18.1 km down Hodgson Downs Rd
- All seismic lines planned are new lines which will require clearing.

Water crossings have been identified along access roads and seismic lines. See Figure 3-3 and for further details).

2.3.4 Campsite and Laydown

No campsite will be required for EP154. Accommodation will be organised at Flying Fox Station.

2.3.5 Borrow pits

There are no borrow pits proposed.

2.4 Project schedule

Minerals Australia propose the following schedule for project activities on EP154 – see Table 2-1.

Table 2-1. Schedule of activities EP154

Activity	Duration	Dates
2D Seismic line clearing, survey and pointing	4 weeks duration	Dates yet to be confirmed, will depend on access conditions – between May and November 2023
2D seismic data acquisition	4 weeks duration	Dates yet to be confirmed, will depend on access conditions – between May and November 2023
2D seismic line rehabilitation	1 week duration	Dates yet to be confirmed, will depend on access conditions – between May and November 2023
Drill pad clearing and drilling	4 weeks duration	Dates yet to be confirmed, will depend on access conditions – between May and November 2023
Drill pad and access track rehabilitation	1 week duration	Dates yet to be confirmed, will depend on access conditions – between May and November 2023

3 SITE CHARACTERISTICS

3.1 Climate and rainfall

The project footprint is located in the transition between the hot arid steppe and tropical climates of the Northern Territory – respectively *BSh* and *Aw* – according to the Köppen–Geiger classification (Beker et al. 2018). The area is characterised by hot dry summers and cool dry winters, with a low average annual rainfall restricted between December and March. The closest long-term Bureau of Meteorology weather station is located in Ngukurr Airport (station number 014299), approximately 90 km northeast of the project footprint. Mean annual maximum temperature recorded at that station is 35.6 °C, while the mean annual minimum is 21.2 °C.

Extremes averages oscillate between 14.3 °C in July and 40.1 °C in November. Median annual rainfall is 717.3 mm with extremes in the past ten years reaching 1068.4 mm of rain in 2014, and 443.4 mm of rain in 2019. If heavy rainfall occurs, it is generally in January, coinciding with the monsoon storms in the north that can result in flash flooding in the waterways (BoM 2021). Figure 3-1 presents the average monthly rainfall and temperatures extremes for Ngukurr Airport weather station.

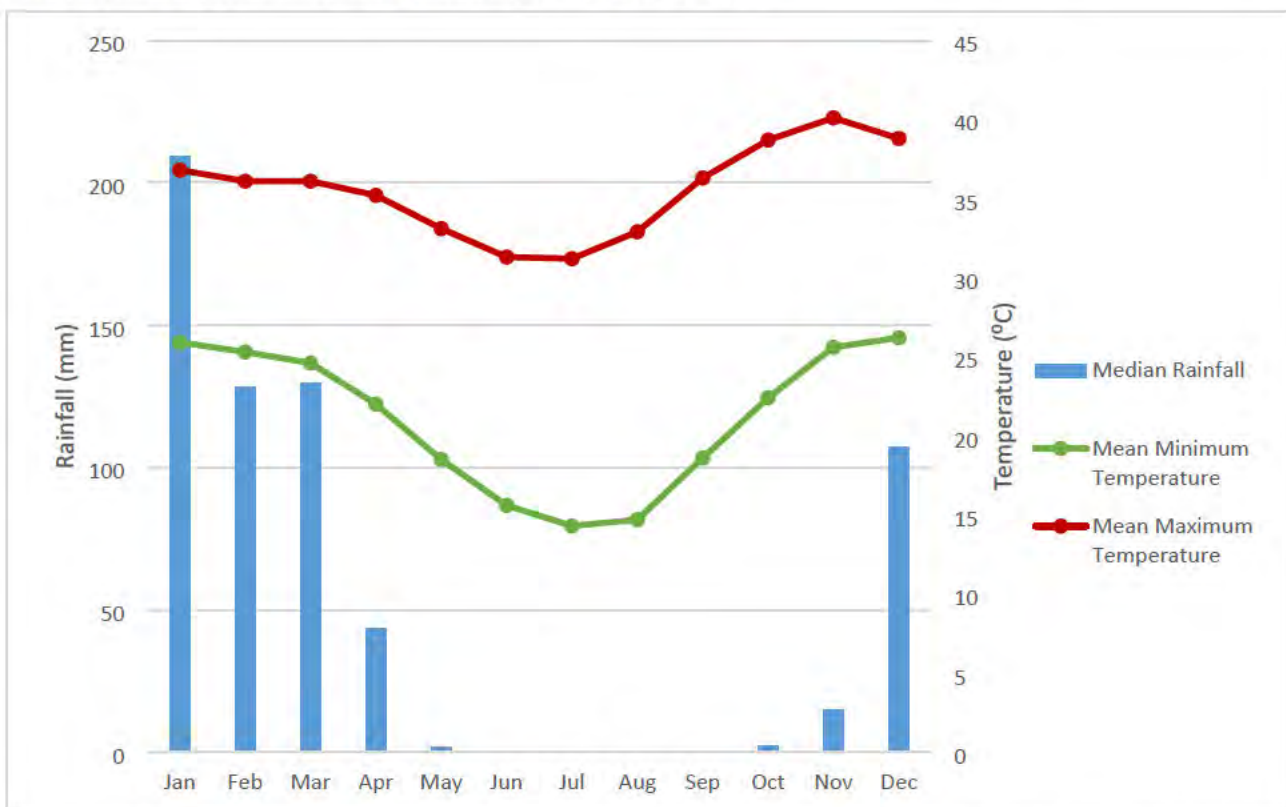


Figure 3-1 Average monthly rainfall and temperature at Ngukurr Airport (014299) from 2012 to 2021 (BoM, 2021)

3.2 Topography and bioregions

EP154 occurs within two bioregions – the Sturt Plateau (western side of EP154), and the Gulf Uplands and Falls (eastern side of EP154). Sturt Plateau comprises flat to gently undulating plains of predominant Eucalypt woodlands or tall shrublands and woodlands of Bullwaddy and Lancewood. In more open areas, perennial grasses predominate. Soils are mainly lateritic, but deep sands occur in the south and cracking

clays in the south-east. Gulf Falls and Uplands is characterised by undulating terrain with scattered low, steep hills. Soils are mostly skeletal or shallow sands. The most extensive vegetation is dominated by Darwin Stringybark and variable Barked Bloodwood over a spinifex understory and woodland dominated by Northern Box over tussock grasslands.

3.3 Land systems

Land system mapping of the region at a scale of 1:250,000 shows that EP154 intersects 48 land systems. Land systems are grouped into landscape classes. EP154 is dominated by eight landscape classes described as lateritic plains (243,174 ha), sandstone plains and rises (173,165 ha), rugged quartz sandstone plateaux and hills (51,090 ha), alluvial floodplains (32,904 ha) associated with several river systems, sandstone hills (31,842 ha), lateritic plateaux (9,859 ha), small areas of basalt plains and rise (2,549 ha) and basalt hills (132 ha). The project footprint intersects twelve land systems within six landscape classes (see Figure 3-2).

The dominant land systems and their landscape classes to occur along all seismic lines are: Sandstone plains and rises (landscape classes: Arnold, Emmerugga, Kangaroo, McLeod, Patterson and Siegel), with occasional alluvial floodplain (landscape classes: Lindsay and McArthur) associated with Packsaddle, Blackwater and Deadmans Creeks. The seismic access track intersects Basalt hills and rises (landscape class: Nutwood), Lateritic plains and rises (landscape class: Langdon) and, Rugged quartz sandstone plateaux and hills (landscape class: Bukalara).

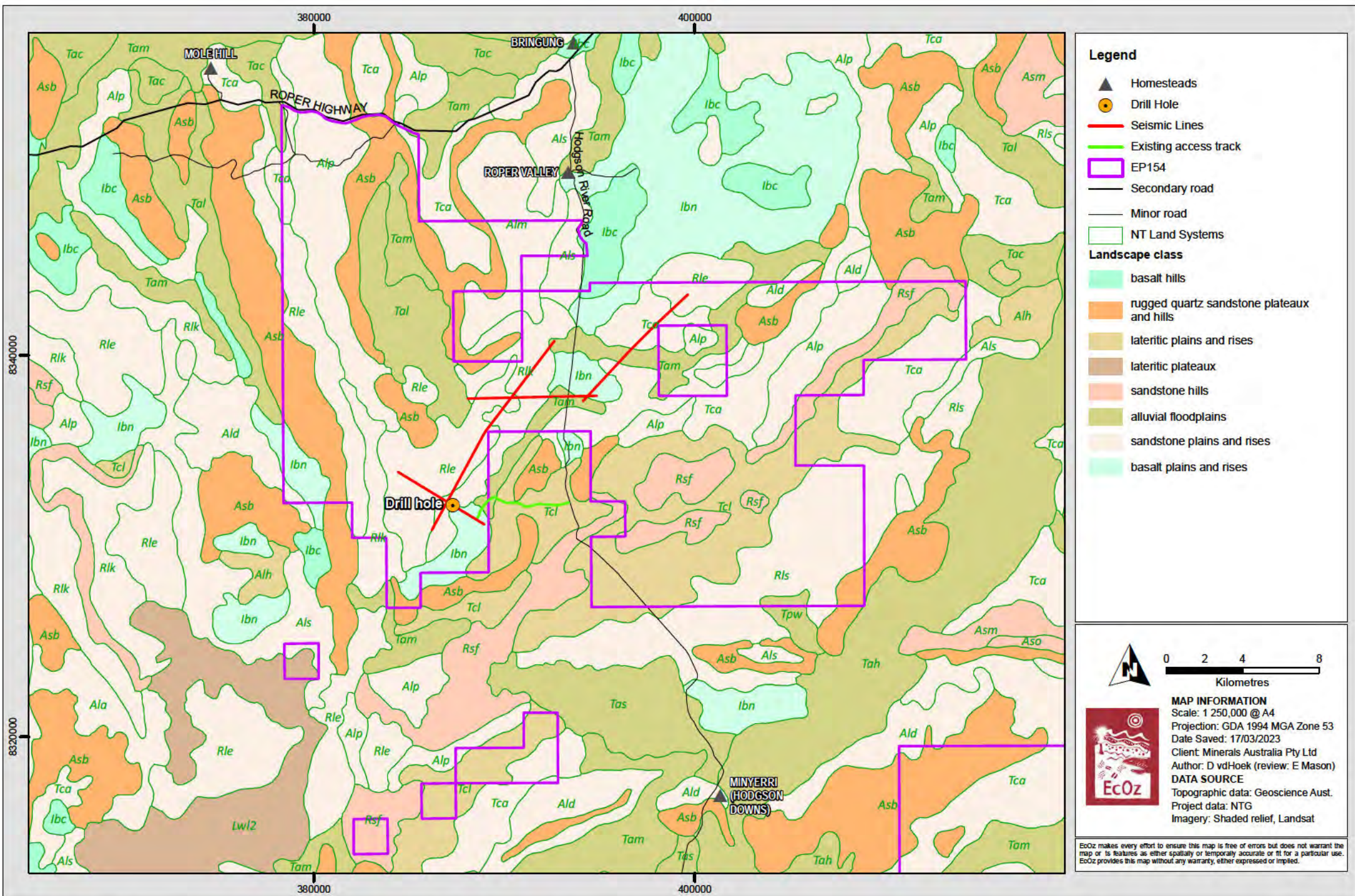
3.4 Soils

The project footprint is located mostly within sandstone plains and rises typical of the Gulf Fall and Uplands bioregion. Soils are mostly yellow earths with varying concentrations of sand. See Table 3-3 for soil descriptions.

3.5 Surface water

The major watercourses within the project area were identified using NR Maps and aerial imagery. The *Directory of Important Wetlands in Australia* was queried to identify wetlands within survey area. The project footprint sits within the Roper River (west), Towns River (north-east) and Limmen Bight River (east) catchments – see Figure 3-3. The Roper River (stream order 6) is the dominant watercourse in the region, draining east into the Gulf of Carpentaria. Eleven creeks and their tributaries associated with the Roper River and Limmen Bight River are included within EP154. The watercourses within EP154 are intermittent – flowing only during the wet season – although there are some permanent spring-fed waterholes. Packsaddle Creek, Deadmans Creek and Blackwater Creek are crossed by the project footprint (i.e. seismic lines or access tracks).

There are no wetlands of international or national significance within EP154. Watercourses within the project footprint are heavily impacted by cattle, with compacted soil and loss of groundcover vegetation resulting in an increased risk of erosion within this landform. The drainage lines intersecting the project footprint range from not steep and easily trafficable to steep and not easily trafficable (see Figure 3-4). It is recommended scouting the watercourses to find a crossing point with the shallowest gradient on the banks. This will reduce the need for cuts (if any) for the transit of vehicles and machinery. See Figure 6-1 for typical design of low-traffic water crossing.



Path: Z:\01 EcOz_Documents\04 EcOz_Vantage GIS\IEZ\10103 - Hancock - EMP EP154\01 Project Files\Report Maps\Figure 2.3. Map of land systems within and surrounding EP 154.mxd

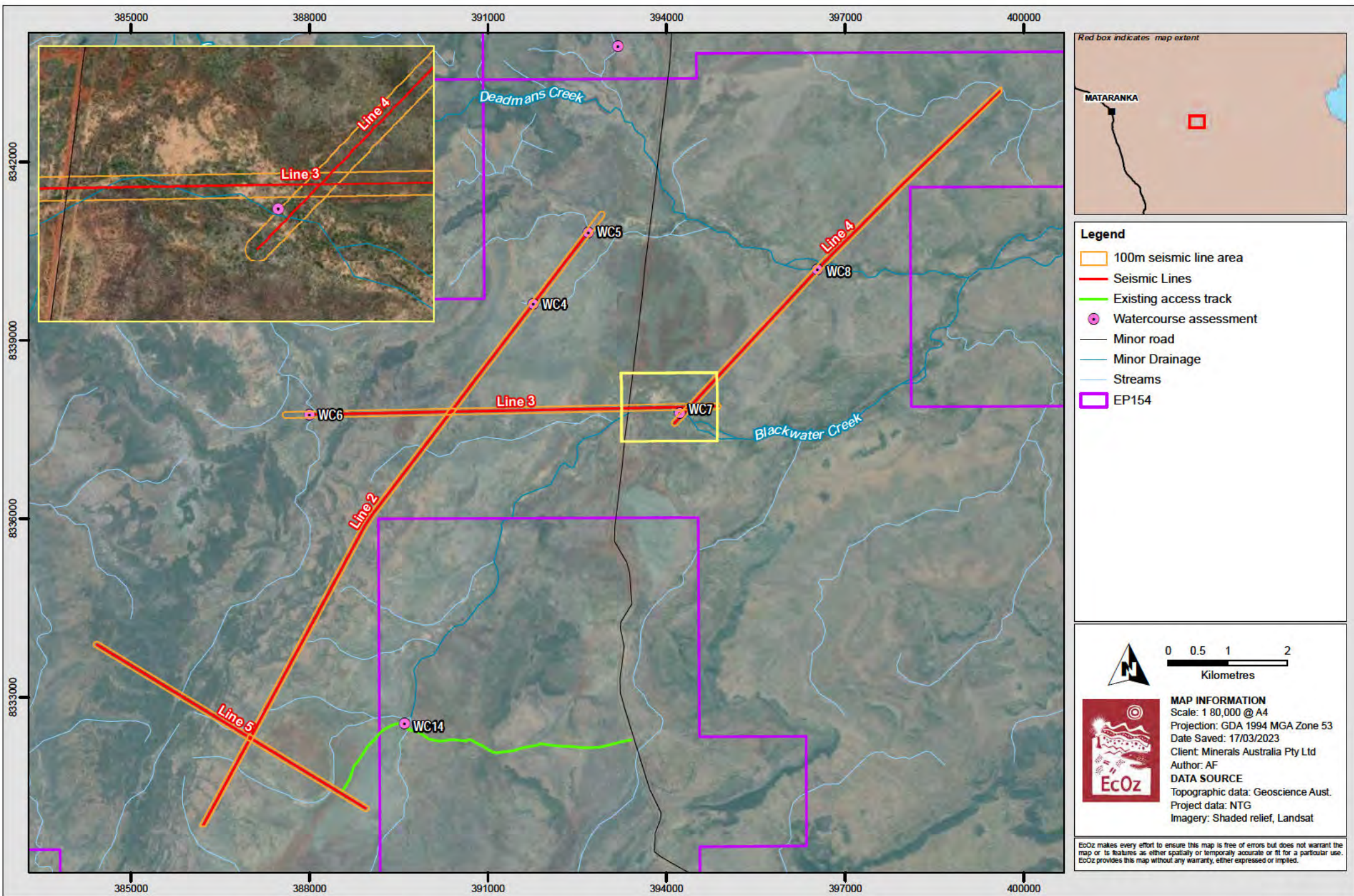
Figure 3-2. Map of land systems relevant to the project

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Table 3-3. Summary of the land systems relevant to the project footprint

Land System	Landform	Soil	Main Vegetation
Sandstone plain and rises			
Arnold	Very gently sloping pediplains, pediments, colluvial slopes and some alluvium, rarely sedentary.	Yellow earths, yellow podzolics, and other soils with hard, mottled B horizons.	Low open woodland of <i>Melaleuca citrolens</i> with some <i>E. pruinosa</i> .
Emmerugga	Undulating to rolling low hills on mainly argillaceous sediments	Lithosols and shallow yellow earths	Mid-high open woodland of <i>C. latifolia</i> , <i>C. grandifolia</i> , <i>E. tectifera</i> , <i>C. confertiflora</i> , <i>Erythrophleum chlorostachys</i> over <i>Chrysopogon fallax</i> , <i>Themeda triandra</i> , <i>Sorghum plumosum</i> .
Kangaroo	Gently undulating to undulating rises on mainly argillaceous sediments	Shallow yellow earths and yellow podsolics	Mid-high open woodland of <i>E. tectifera</i> , <i>C. terminalis</i> , <i>Erythrophleum chlorostachys</i> , <i>Terminalia platyphylla</i> , <i>Brachychiton diversifolius</i> over <i>Chrysopogon fallax</i> , <i>Sorghum plumosum</i> , <i>Heteropogon triticeus</i> .
McLeod	Gently undulating plains and low plateaux with frequent steeply incised valleys on sub-horizontally bedded massive sandstones and siltstones	Leptic Tenosols and Rudosols	Mid-high open woodlands of <i>E. tetradonta</i> , <i>Callitris intratropica</i> , <i>C. ferruginea</i> , <i>Erythrophleum chlorostachys</i> , <i>E. miniata</i> over <i>Plectrachne pungens</i> , <i>Eriachne obtusa</i> , <i>Aristida hygrometrical</i> .
Patterson	Low hills, rises and undulating area on reddish platy sandstones and siltstones, often micaceous	Leptic Rudosols and Leptic Tenosols, shallow red and brown Kandosols	Mid-high open woodland of <i>E. leucophloia</i> , <i>Acacia shirleyi</i> , <i>E. tectifera</i> , <i>C. grandifolia</i> , <i>C. ferruginea</i> over very sparse grass cover (<i>Plectrachne pungens</i> , <i>Eriachne obtusa</i> , <i>Chrysopogon fallax</i>).
Seigal	Gently undulating to undulating rises with abundant, often linear rocky outcrops	Lithosols, minor siliceous and earthy sands	Mid-high open woodland of <i>E. miniata</i> , <i>E. tetradonta</i> , <i>C. ferruginea</i> , <i>C. dichromophloia</i> , <i>Callitris intratropica</i> over <i>Plectrachne pungens</i> , <i>Sorghum plumosum</i> .
Rugged quartz sandstone plateaux and hills			
Bukalara	Rugged rocky plateaux and steep, linear ridges, on massive sandstones such as the Bukalara and Kombolgie Sandstones	Lithosols and shallow siliceous sands	Mid-high open woodland of <i>C. dichromophloia</i> , <i>E. miniata</i> , <i>E. tetradonta</i> , <i>Erythrophleum chlorostachys</i> over <i>Plectrachne pungens</i> , <i>Chrysopogon fallax</i> , <i>Eriachne obtusa</i> .
Lateritic plains and rises			


Langdon	Gentle colluvial slopes, mainly below areas of argillaceous rocks with some poorly drained depressions	Yellow Kandosols, some Chromosolic Redoxic Hydrosols and Aquic Vertosols	Mid-high open woodland of <i>E. tectifera</i> , <i>Erythrophleum chlorostachys</i> , <i>Brachychiton diversifolius</i> , <i>C. latifolia</i> , <i>C. confertiflora</i> over mid-dense grass cover (<i>Chrysopogon fallax</i> , <i>Sorghum plumosum</i> , <i>Sehima nervosum</i>).
Basalt plains and rises			
Nutwood	Plains and low rises on basalt and associated basic igneous rock	Brown, grey and red Vertosols, red Ferrosils and brown and red Kandosols	Mid-high open woodland of <i>Lysiphyllum cunninghamii</i> , <i>C. terminalis</i> , <i>C. confertiflora</i> , <i>E. pruinosa</i> , <i>E. patellaris</i> , <i>Erythroxyllum ellipticum</i> over mid-dense grass cover (<i>Chrysopogon fallax</i> , <i>Aristida latifolia</i> , <i>Panicum</i> spp.).
Basalt hills			
Cliffdale	Gentle undulating to hilly terrain on basalt, dolerite, agglomerate and tuff, some dolerite; mostly rock outcrop with surface stone pockets of clayey soils	Leptic Rudosols, red Dermosols and black Vertosols	Mid-high open woodland of <i>E. pruinosa</i> , <i>E. tectifera</i> , <i>C. terminalis</i> , <i>Erythrophleum chlorostachys</i> , <i>Brachychiton diversifolius</i> over <i>Chrysopogon fallax</i> , <i>Sehima nervosum</i> , <i>Sorghum plumosum</i> .
Alluvial floodplains			
Lindsay	Floodplains and terraced, some lower slopes and small swamps, drainage floors and flats, with fine sandy materials	Yellow and brown Kandosols and Chromosolic and Kandosolic Redoxic Hydrosols	Low open woodland of <i>M. viridiflora</i> , <i>Grevillea pteridifolia</i> , <i>Brachychiton diversifolius</i> over <i>Chrysopogon fallax</i> , <i>Eriachne obtusa</i> , <i>Sorghum plumosum</i> .
McArthur	Broad or narrow fluvial corridors conducting regional drainage across various land systems towards the coast	Grey and brown clays, red and yellow earths and siliceous sands	Mid-high open woodland of <i>C. terminalis</i> , <i>E. microtheca</i> , <i>Excoecaria parvifolia</i> , <i>Lysiphyllum cunninghamii</i> , <i>C. papuana</i> over <i>Chrysopogon</i> spp., <i>Eulalia fulva</i> , <i>Iseilema vaginiflorum</i> .





Path: Z:\01 EcOz_Documents\04 EcOz_Vantage GIS\EZ19103 - Hancock - EMP EP154\01 Project Files\Report Maps\Figure X-X - watercourse crossings.mxd

Figure 3-3. Map of watercourses within the project area

Table 3-4 Water crossing within the project area

Reference site	WC4	Date	13-7-2021	 <p>WGS 84 133.9931, -15.0164</p>		
Stream Order	Ephemeral creek or drainage line					
Direction	E	Width	10		Depth	0.5 - 1
Vegetation type	Low to mid mixed open woodland of <i>Corymbia confertiflora</i> , <i>C. polycarpa</i> , <i>Eucalyptus pruinosa</i> and <i>Brachychiton diverifolius</i> , over grassland of <i>Heteropogon contortus</i> , <i>Dichanthium fecundum</i> and <i>Chrysopogon fallax</i> .					
Weeds	<i>Sida spinosa</i>					
Erosion potential	High, some erosion observed.					
Cattle Impact	None observed, signs of feral animals					
Recommendations	Implement the erosion and sediment control plan to minimise impacts to the waterway.					

Reference site	WC5	Date	13-7-2021	 <p>WGS 84 134 0018, -15.0055</p>		
Stream Order	Ephemeral creek					
Direction	S	Width	13		Depth	1
Vegetation type	Mid open woodland of <i>Eucalyptus camaldulensis</i> over <i>Terminalia bursarina</i> shrubland. Other species present include <i>Calytrix archaeta</i> , <i>Acacia platycarpa</i> and <i>Terminalia platyptera</i> .					
Weeds	Hyptis					
Erosion potential	Moderate, tracks from feral animals present					
Cattle Impact	None, signs of feral animals					
Recommendations	Implement the erosion and sediment control plan to minimise impacts to the waterway.					

Reference site	WC6	Date	14-7-2021	 <p>WGS 84 133 9581, -15.0330</p>		
Stream Order	Ephemeral creek					
Location in works area	Seismic line 3					
Direction	N	Width	10		Depth	2
Vegetation type	Open woodland with <i>Eucalyptus camaldulensis</i> , <i>Corymbia polycarpa</i> over <i>Acacia holosericea</i> <i>Antidesma</i> sp. and <i>Helicteres isora</i> open shrubland, and <i>Heteropogon contortus</i> and <i>Chrysopogon fallax</i> closed grassland.					
Weeds	Hyptis					
Erosion potential	Moderate, channel erosion observed					
Cattle Impact	None observed, signs of feral animals.					
Recommendations	Implement the erosion and sediment control plan to minimise impacts to the waterway.					

Reference site	WC7	Date	14-7-2021
Stream Order	Ephemeral creek		
Location in works area	Seismic line 3		
Direction	E	Width	20
		Depth	4
Vegetation type	Woodland of <i>Eucalyptus camaldulensis</i> , <i>Terminalia bursarina</i> and <i>T. platyphylla</i> over <i>Helicteres isora</i> open shrubland and <i>Heteropogon contortus</i> grassland.		
Weeds	Hyptis		
Erosion potential	Moderate to high		
Cattle Impact	None observed, signs of feral animals.		
Recommendations	Implement the erosion and sediment control plan to minimise impacts to the waterway.		



WGS 84
134 0159, -15.0331

Reference site	WC8	Date	14-7-2021
Stream Order	Ephemeral creek		
Direction	E	Width	15
		Depth	3
Vegetation type	Mid Woodland of <i>Eucalyptus camaldulensis</i> , <i>Terminalia platyphylla</i> , and <i>T. platyptera</i> , over <i>Acacia difficilis</i> tall shrubland and <i>Aristida</i> sp. grassland		
Weeds	Hyptis and <i>Stylosanthes</i> sp.		
Erosion potential	High, channel erosion		
Cattle Impact	None observed, signs of feral animals.		
Recommendations	Implement the erosion and sediment control plan to minimise impacts to the waterway.		



WGS 84
134 0376, -15.0113

Reference site	WC14	Date	13-7-2021
Stream Order	Ephemeral creek		
Direction	E	Width	8
		Depth	1
Vegetation type	Low to mid woodland of <i>Terminalia bursarina</i> and <i>T. platyptera</i> over <i>Heteropogon contortus</i> and <i>Chrysopogon fallax</i> grassland.		
Weeds	<i>Stylosanthes</i> sp., <i>Sida</i> spp., Hyptis		
Erosion potential	Moderate, established track running through creek line.		
Cattle Impact	None observed, signs of feral animals.		
Recommendations	Implement the erosion and sediment control plan to minimise impacts to the waterway.		



WGS 84
133.9727, -15.0801

4 EROSION AND HAZARD RISK

Inputs and equations used to assess erosion hazard and risk for the project area are detailed in the sections below.

4.1 Erosion hazard

Erosion hazard is assessed using the Revised Universal Soil Loss Equation – RUSLE (IECA 2008). This is commonly used to predict the long term, average, annual soil loss from sheet and rill erosion under specified management conditions. The RUSLE is represented by the following equation:

$$A = R * K * L * S * P * C, \text{ where:}$$

Factor	Description	Value	Comment
A	estimated soil loss (tonnes/ha/yr)	variable	As calculated per catchment
R	rainfall erosivity factor	4,087	Based on BoM IFD for drill site coordinates (2 year ARI 6 hr = 13.7 mm/hr)
K	soil erodibility factor	0.053	0.053 adopted – silty gravels, poorly graded gravel, sand, silt (Section 4.1.2)
LS	slope length/gradient factor	variable	Based on catchment characteristics. (Section 4.1.3)
P	erosion control practice factor	1.3	Construction phase condition (Section 4.1.5)
C	ground cover and management factor	0.37-0.44	Based on proposed surface cover. (Section 4.1.4)

4.1.1 Rainfall erosivity (R-factor)

The rainfall erosivity factor (R-factor) is a measure of the ability of rainfall to cause erosion. It is a product of two components: total energy (E) and maximum 30-minute intensity for each storm (Landcom 2004). Due to the remote location of the project, an appropriate R-factors have not been predetermined for the region therefore it can be calculated using the annual R-factor calculations as per the IECA (2008) :

$$R = 164.74 (1.1177)^S S^{0.6444}$$

Where S is the 2 year ARI, 6 hour rainfall event [mm]

According to BoM, for the project area S is determined to be 13.7 mm/hour. Therefore, using the above formula, the adopted R-factor for the project is 4,087.

4.1.2 Erodibility (K-factor)

The K-factor is a numerical representation of the ability of soils to resist the erosive energy of rain (IECA 2008). Soil texture is the principal component affecting K, but soil structure, organic matter and profile permeability also contribute. As per IECA 2008 *Table E5 – Typical K-factors based on Unified Soil Classification System* and the most erodible soils likely to be encountered, a K-factor of 0.053 will be applied (silty gravels, poorly graded gravel, sand, silt).

Note that all other soils likely to be encountered have lower K-factors, for example alluvial planes (organic silts and organic silt-clay of low plasticity) with a K-factor of 0.033, however the higher K factor has been adopted as a conservative measure.

4.1.3 Slope (LS-factor)

The LS-factor describes the combined effect of slope length and slope gradient on soil loss. The seismic lines will traverse topography up to 15 % slope (Rocky rises and outcrops). The access roads will traverse topography up to 8 % slope (dissected low hills), with road surface formed with a side slope of 4%. Drill Pad will be in areas not exceeding 2 % slope. Water crossings will have short lengths of up to 50 % slope.

4.1.4 Cover and management factor (C-factor)

The cover and management factor is a measure of the level of soil surface protection provided by various groundcovers. It includes proportion of vegetation, rock, hardstand, paving, soil binders, matting and associated non-erodible material. The C-factor for the project will vary depending on stabilisation and management of surfaces exposed by construction and operation. C-factors for various surface are summarised in Table 4-1.

Table 4-1. Adopted C-factors

Surface type	% Cover	C-factor
Concrete, bitumen	100	0
Vegetation (highly variable)	25 - 80	0.37 – 0.025
Soil stabiliser (eg. Vital Bon-Matt HR or Bon-Matt RDS (S72))	80	0.025
Rock	80-100	0.025 - 0
95% compacted gravel/soil surface (eg. haul roads/pads)	25	0.37
Bare soil, erosive surface	0 - 20	1 - 0.44

4.1.5 Erosion control practice factor (P-factor)

The P-factor measures the combined effect of all support practices and management variables. It also represents structural methods for controlling erosion (IECA 2008). The nominated P-factor for all areas without permanent stable groundcover is 1.3 (based on the default construction phase condition).

4.1.6 Estimated soil loss

Potential soil loss calculations and associated erosion hazard for defined project areas are provided within Table 4-2. Note that individual calculations have been done for sections of seismic lines encountering different gradients. The slope length has been adjusted to minimise the requirement for Type 2 controls. Slope length is the maximum distance between whoa-boys (cross banks) on seismic lines tracking down gradient.

Table 4-2. Soil loss and erosion hazard

Project Areas	Seismic Lines (flat)	Seismic Lines (gentle sloping)	Seismic Lines (Steep)	Seismic Lines (very steep)	Drill Pad	Access Road
Rainfall erosivity (R)	4,087	4,087	4,087	4,087	4,087	4,087
Soil erodibility (K)	0.053	0.053	0.053	0.053	0.053	0.053
Slope length (L)	40	30	30	20	100	10
Slope gradient (S)	2	5	10	15	2	5
Length/gradient (LS)	0.31	0.68	1.44	1.98	0.44	0.36
Erosion control practice (P)	1.3	1.3	1.3	1.3	1.3	1.3
Ground cover in disturbed catchment - %	25	25	25	25	25	25
Ground cover in disturbed catchment (C)	0.37	0.37	0.37	0.37	0.37	0.37
Soil Loss (t/ha/yr)	32	71	150	206	46	38
Soil Loss Class	1	1	1	2	1	1
Erosion Risk (area specific)	Very low			Low	Very low	
Required sediment control standard	Type 1		Type 2		Type 1	

4.2 Erosion risk

Erosion risk refers to the evaluation of the “risk” of soil erosion when consideration is given to both the degree of erosion and the likelihood of the erosion occurring (IECA 2008). In the absence of a site specific risk assessment procedure, erosion risk rating is determined from the average monthly rainfall depth at Ngukurr Airport (Table 4-3).

Erosion risk ratings range from very low for the dry season (May - September), moderate in the early wet (Nov), then high for the wet season (October - April).

Table 4-3. Monthly erosion risk rating (based on Daly Waters Airstrip)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall depth (mm)	190.7	181.1	155.7	43.9	12.3	0.6	0.2	0.1	6.2	12.9	33.3	132.4
Rating	High	High	High	Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Low	High

4.3 Erosion and sediment control requirements

Recommended erosion and sediment control measures are based upon the soil loss calculations (Table 4-2) and monthly erosion risk (Table 4-3). The reliable and prolonged dry season (May to September) provides a low risk of erosion from rainfall throughout these months, although wind erosion potential (dust) is significant.

It is essential that erosion and sediment control measures are fully implemented prior to the 1 October in preparation for the wet season. Table 4-4 summarises erosion and sediment control requirements for all stages of civil construction and operation across a full calendar year. Typical measures to be implemented during works are discussed in Section 5. Additional specific design, timing and location are to be provided within Progressive ESCP's and associated engineering drawings.

Table 4-4. Erosion risk and ESC requirements during construction

Erosion Risk Rating	Monthly Rainfall Depth	Period	Erosion & Sediment Control Requirements
Very low	0 to 30mm	May - Oct	<ul style="list-style-type: none"> • ESCs not required for activities which do not disturb groundcover • Unfinished earthworks are suitably stabilised if rainfall is reasonably possible • Sediment control to be installed around areas of erosion risk prior to 1st October (wet season commencement)
Low	30 + to 45mm	Apr & Nov	<ul style="list-style-type: none"> • Areas of erosion risk protected within 30 days completion (or cessation) of earthworks or inactivity ^[1] • Sediment control fully installed & maintained
High	100+ to 225mm	Dec - Mar	<ul style="list-style-type: none"> • Areas of erosion risk protected within 10 days completion (or cessation) of earthworks or inactivity ^[1] • Sediment control fully installed & maintained
Notes:	^[1] Areas of erosion risk may be protected using the following types of cover: hardstand, soil binder (eg. polymer), placement of mats, blankets (eg. geotextile, jute) or vegetative cover (min 75% for all areas, with min 90% for drainage channels).		

5 EROSION AND SEDIMENT CONTROL - SPECIFIC AREAS AND ACTIVITIES

5.1 Drill pad

The drill pad will be constructed by blading and/or slashing of vegetation within the approved boundary. Surface groundcover and soil disturbance will be avoided as far as practical. Layout of physical ESCs is provided in Appendix A. Physical controls include the following:

- Perimeter topsoil berm to divert clean water and enable treatment of site water (1:2 batters; seeded with suitable groundcover species).
- Mulch/cleared vegetation bund around the perimeter down-gradient of surface water flow.
- Whoa Boy at vehicle entrance points to the drill pad.
- Rock filter dams within the stabilised topsoil stockpile/bund on the down-gradient of surface water flow.
- Compacted hardstand surface.
- Application of soil binder (polymer) for erosion control and dust suppression where necessary (ie. in event of lack of vegetation cover and/or excessive dust).

Refer to Appendix B for ESC design detail.

Upon completion of drilling activities, rehabilitation of the drill pad area is to incorporate:

- Removal of any drill spoil.
- Light cross ripping to a depth not exceeding 100mm (only where soil disturbance has been undertaken).
- Re-spreading of topsoil and stripped vegetation across disturbed areas (where initial stripping took place).

5.2 Site roads/access

Project access is to be via existing roads from the adjacent Roper Hwy and Hodgson Downs Road (Figure 2-2). Existing tracks and seismic lines will be utilised wherever possible.

Access road design include the following:

- 4 metre carriage width
- Formed with 4% side-slope
- Minimum 200 mm surface coarse, compacted to 95% MMDD
- Drainage (table drains and mitre drains)

Access roads are to be constructed and maintained consistent with the following principles (refer to Appendix B for ESC design detail).

5.2.1 Route selection

Consideration will be given to the following when selecting routes:

- Reuse existing access roads wherever possible
- Minimise disturbance to soil and vegetation
- Minimise the number of watercourse and drainage line crossings
- Reduce the catchment area above the road by locating the road along a ridge or as high as possible on side slopes
- Locate roads to avoid:
 - Steep cross-slopes
 - High erosion hazard soils
 - Areas of riparian vegetation
 - Perched water tables, swamps, or areas of poor drainage
 - Unstable geology, steep topography or rock outcrops.

5.2.2 Design and construction

Consideration will be given to the following when designing and constructing access:

- Roads are to be graded to a crown, or with crossfall drainage.
- Watercourse crossings and associated approaches are to be protected from erosion.
- Road runoff to be directed to stable outlets (vegetated or rocky areas).
- Upon completion of construction, roads no longer required are to be ripped, topsoiled and revegetated (returned to the pre-disturbance condition).

5.2.3 Cross banks

Where access road runoff cannot be adequately controlled by cross fall drainage (eg. Observation of rills along road surface), construct cross banks consistent with the following:

- Interval spacing based on contributing catchment area, length of slope and site observations.
- Level outlets, enabling discharge of runoff into undisturbed areas (not directly into watercourses).
- 300mm consolidated effective height, 2-3m crest width.
- Cross drains (excavated dished drains) may be used for low road grades in place of cross banks.

5.2.4 Drainage

V-shaped drains, with regular discharge to mitre drains, are proposed for upgraded access road sections. This design requires significantly less clearing than alternative profiles (eg. trapezoidal); and suits the construction methodology (ie. grader). Drainage will incorporate check dam controls (eg. rock check dam, filter bag/tube) to provide flow energy dissipation in addition to providing sediment control.

A regular monitoring regime is to be implemented with additional controls implemented if erosion is identified. This may include additional check dams, application of suitable soil binder, or upgrading of drainage profile (subject to project approvals).

5.3 Vegetation clearing

Vegetation clearing associated with exploration activities is to be undertaken in accordance with applicable approvals. Clearing methodology is to incorporate the following:

- Clearing activities to be implemented consistent with the *NTG Land Clearing Guidelines* (DENR 2019) where possible.
- Vegetation clearing shall be kept to the minimum amount necessary to allow access and/or approved activities.
- Areas of protected vegetation and significant areas of vegetation are to be retained, and must be clearly identified prior to the commencement of clearing.
- Approved areas for native vegetation clearing to be clearly identified.
- Previously cleared areas shall be utilised where possible for laydown and turn around points.
- Disturbance to natural watercourses and associated riparian zones must be limited to the minimum practicable.
- Cleared vegetation is to be retained and reused in site rehabilitation wherever possible.

5.4 Topsoil & spoil management

Earthworks are to incorporate the stripping and preservation of topsoil for reuse. The depth of topsoil stripping is dependent upon soil type, however ideally the top 50 mm should be retained separately from other material (contains most of the biological activity and nutrients required for successful rehabilitation).

Topsoil is to be stripped and stockpiled as a bund along the perimeter of the lease pads (inside the cleared vegetation windrow where present). This enables separation of clean and dirty stormwater runoff, in addition to allowing for progressive rehabilitation.

Where additional stockpile sites are required, these areas will be located and constructed as follows:

- Located at least 5 m from existing remnant vegetation, minor flow lines and hazard areas.
- Constructed along the contour as low, flat elongated mounds.
- Topsoil stockpiles are to be constructed less than 2 m in height where available space allows.
- Protected upslope by earth diversion banks to divert run-on water and downslope by either mulch, sediment fence or similar Type 3 sediment control.

5.5 Rehabilitation of cleared areas

After survey activities are complete, all tracks should be scouted to identify potential erosion zones. These locations should be rehabilitated by ripping the site perpendicular to flow direction and scattering large timber, increasing roughness and encouraging revegetation. This also minimises concentration of water flow during rainfall events – which can cause severe rilling and gullying.

Rehabilitation of the access tracks should occur as soon as possible to prevent these lines becoming preferred walking trails for cattle, which, if allowed to travel along the lines will damage soil structure and accelerate erosion.

5.6 Seismic profiling

Seismic profiling is described within Section 2.3.1. The seismic method uses vibrator trucks to gather data. Due to varying terrain, the line preparation is usually undertaken by a dozer/grader and a light 4WD vehicle, adopting the following methodology to ensure minimal ground disturbance:

- Seismic line will be located to avoid requirement for ground disturbance within riparian areas (eg. watercourse crossings).

- The dozer will 'walk' with the blade up in easily traversable terrain, with the marks of the dozer tracks being sufficient for the surveyors and recording crew to follow.
- The dozers will not be utilised in areas where riparian vegetation is present.

5.7 Watercourse crossings

The watercourses within EP154 are intermittent – flowing only during the wet season – although there are some permanent spring-fed waterholes; Deadmans Creek and Blackwater Creek.

Where access roads or tracks are required to cross watercourses, the crossings are to be bed level crossings, constructed flush with the existing invert level of the specific watercourse. Crossings will incorporate a stable rock base, hardstand approaches and flow diversion berms (to shed road runoff), designed to be stable in a 1 in 1 year event. Seismic lines that cross watercourses are to be as low impact as possible with minimal or no use of blades.

Roads crossing waterways are to be constructed in accordance with the following requirements:

- Temporary stockpiling of soil, equipment and materials within watercourses, or on adjacent banks and floodplains, is to be avoided (unless integral to drainage control requirements).
- Where possible, crossings should be constructed at right angles in locations where the stream is straight.
- Access road runoff is to be prevented from directly entering the watercourse by construction of flow diversion banks (rollovers) immediately upslope to divert flow.

All drainages should be clear of cleared soil and debris to enable natural flow of water, because if drainages are blocked or impeded erosion may occur, or the material will be lost (and therefore unavailable for post survey rehabilitation activities). Therefore, the method to create access ramps at creek crossings is described and illustrated below:

- Select crossing where bank is lowest, avoiding trees and dense vegetation (if possible).
- Construct ramp by **pushing material away from the creek bank** (i.e. *don't push* material into the creek).
- Build a cross bank (using the pushed up material) at the top of the ramp. This directs water away from the ramp, reducing the chance of gully erosion development if rainfall occurs prior to rehabilitation.
- Ramp to be constructed at right angles to direction of flow.
- These techniques are to be undertaken on both approaches of the creek.

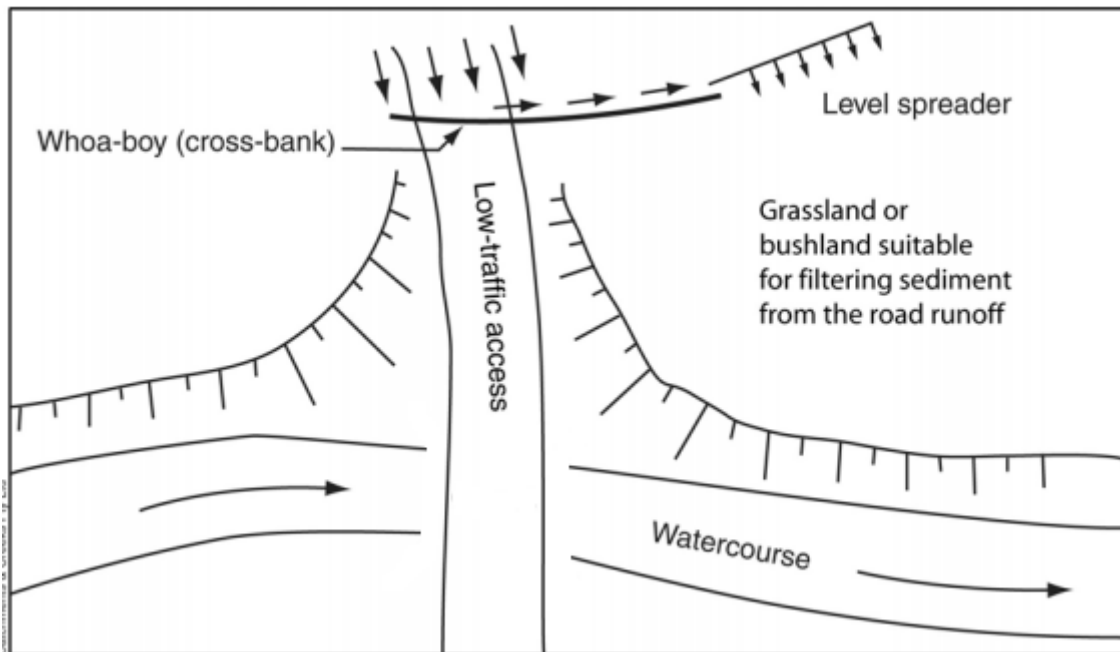


Figure 5-1 Construction technique for water crossing taken from IECA (2008)

Rehabilitation should involve pushing and compacting material (used to make the low bank) back to its original position. If available, spread any surface vegetation that was removed for the creation of the ramp (as this will help reduce surface water velocity).

5.8 Site stabilisation

Following the completion of project activities, long-term protection of the site from erosion will be provided by appropriate cover, typically vegetation. Minerals Australia may request approval to undertake additional exploration activities following the completion of the activities covered under this ESCP (which would require an updated ESCP and applicable approvals). Consequently, permanent stabilisation and rehabilitation will depend on exploration outcomes and the potential for reservoir development.

Photo points (geo-referenced) will be established to provide a balanced representation of the ground condition and various landform and vegetation types encountered, and enable rehabilitation success to be effectively monitored. The process is repeated after the drilling program is completed (i.e. post well completion). The revisit intervals are proposed immediately after rehabilitation works have been completed post decommissioning, following the first wet season, one year after rehabilitation works, and three years after rehabilitation (although the return period is determined by weather/road conditions and current activity in the region). Revisits may also be targeted, with emphasis on sensitive areas and areas potentially subject to erosion such that environmental impact of re-accessing remote locations is minimised in consultation with, and on the advice of, an independent environmental consultant.

Stabilisation of the project area will incorporate the following practices:

- Progressive rehabilitation of disturbed areas (timing of progressive rehabilitation will depend on exploration outcomes and the potential for reservoir development and production).
- Management of topsoil to ensure preservation of its long-term value (refer Section 5.4).
- Removal of all rubbish and waste.
- Removal of above ground infrastructure so that in the event the civils works rehabilitation such as the reprofiling of access roads and lease pads can occur unimpeded.
- Lightly scarifying or rolling all disturbed areas to break up consolidated surfaces.

- Reshaping of drilling sites and access (if required) to ensure lease pads and roads are safe, stable and do not pose a long-term erosion risk.
- Back filling of pits. Pits to be levelled off, mixed with dry stockpiled fill material, and capped with at least 100 mm of topsoil.
- Spreading of stockpiled topsoil material and trees, shrubs and grasses across the lease pad and areas not needed for future monitoring and maintenance.
- Selected plant species for revegetation are appropriate for site conditions and endemic to local vegetation communities.
- Erosion and sediment controls are to remain in place until minimum 70 % self-sustaining groundcover (or groundcover % consistent with adjacent undisturbed areas) is achieved for disturbed areas.

6 MANAGEMENT AND IMPLEMENTATION

This ESCP provides a framework for managing erosion and sediment issues for the exploration activities as detailed within the Project EMP.

6.1 Responsibilities

Key personnel roles and responsibilities are detailed within the EMP and summarised in Table 7-1 below.

Table 6-1. Key personnel roles and responsibilities

Role	Responsibility
Project Manager	Ensure overall compliance with the EMP. Ensure relevant environmental legislative requirements, performance outcomes, performance standards, measurement criteria and requirements in the implementation strategy in this EMP are communicated to the activity key personnel; and audited. Undertake consultation with relevant persons throughout project planning and implementation. Document consultation with relevant persons. Ensure any commitments to relevant persons are undertaken
Site Manager	Ensure adequate resources are in place to meet the requirements within the EMP (i.e. implement relevant management plans such as this ESCP) Undertake daily environmental checks as described within the EMP Ensure incidents and non-conformances are managed as per EMP Report environmental incidents to the Project Manager and ensure reporting and investigations are undertaken. Ensure records and documents are managed so they are available and retrievable. Ensure non-conformances identified are communicated and actions completed.

6.2 Training and awareness

Minerals Australia staff and contractors undertaking work in the field are required to undertake an induction process. At a minimum, the induction will cover:

- Activity description
- Environmental impacts and risks; and associated controls to be implemented
- Roles and responsibilities
- Incident and non-conformance reporting and management

6.3 ESC installation and maintenance

The installation and maintenance of all ESC measures is to be overseen by a suitably qualified person. Installation is to be consistent with this ESCP and any associated progressive ESCP's.

All required temporary erosion and sediment control measures must be fully operational and maintained in proper working order until permanent stabilisation is achieved. If ESCs are observed to have reduced capacity, damage or insufficient effectiveness, they are to be repaired, improved or substituted as follows:

- Identified soil erosion areas are to be resolved as soon as possible, with additional control measures implemented to prevent recurrence.
- All sediment control devices (other than sediment basins) must be de-silted and made fully operational as soon as reasonable and practicable after runoff-producing rainfall, or if the sediment retention capacity of the device falls below 75% of the design retention capacity (IECA 2008).
- Sediment removed from areas of deposition is to be incorporated within subsoil stockpile areas and/or buried on-site.

Spare materials including geo-fabric, sediment fence material, mulch and rock are to be stored on-site to enable repairs to be conducted within a short timeframe.

6.4 Monitoring & reporting

ESC measures will be inspected in accordance with the SMS, including:

- weekly during dry season work activities
- daily during wet season work activities
- as soon as reasonably practical after receiving significant rainfall events (i.e. >10 mm in 24 hr period).

Visual assessment will be carried out of surface water runoff structures, drainage structures and erosion control structures to ensure they are operating efficiently.

Environmental objectives and targets for erosion and sediment control are to be documented in the EMP. Where monitoring identifies environmental objectives are not being achieved, corrective actions will be enacted. If significant erosion is recorded, a CPESC will be engaged to advise on suitable controls.

6.5 Updates and variations

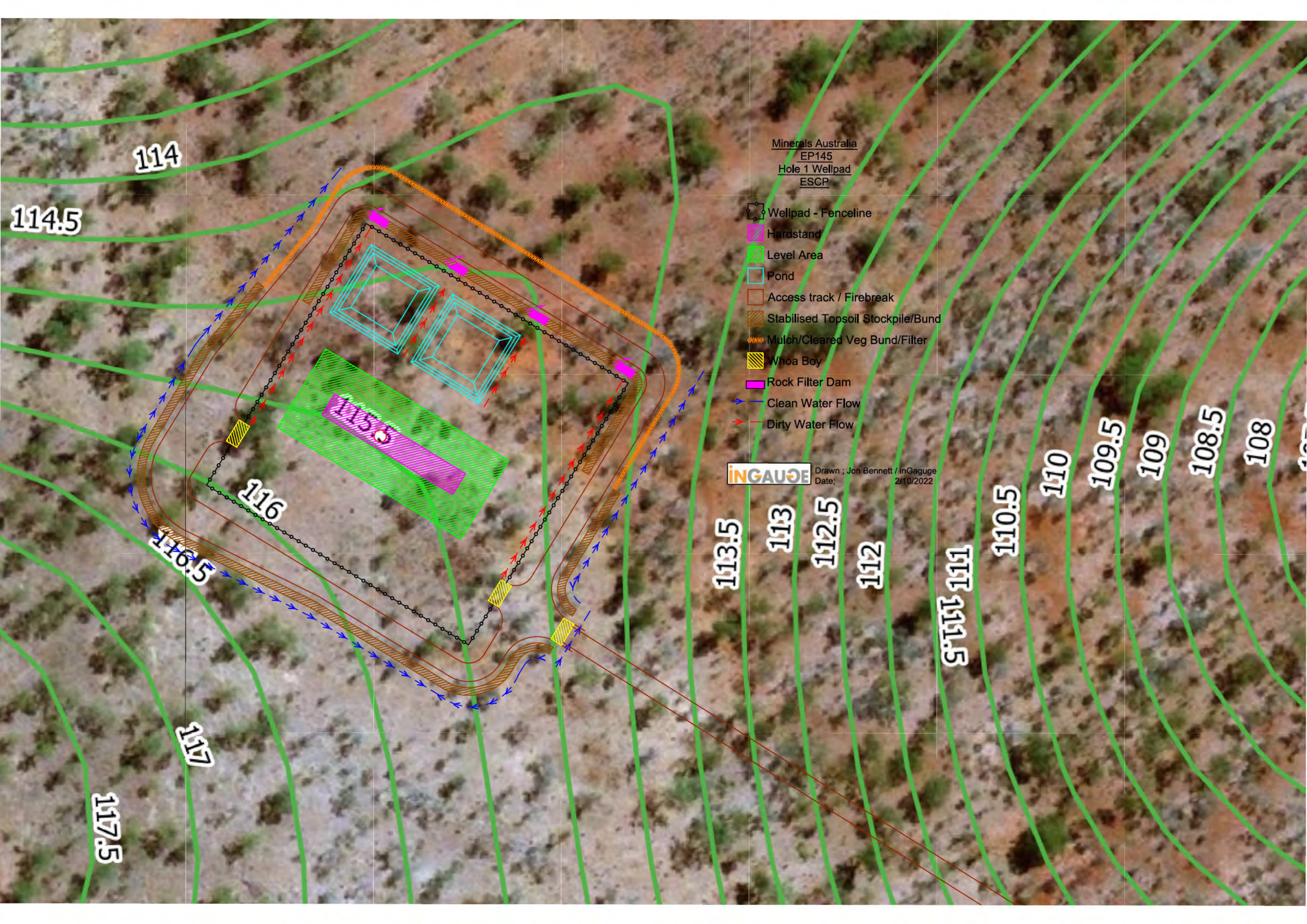
ESCP's are dynamic documents, typically requiring updating as construction and operational stages progress and site characteristics alter. Any alterations to the implementation of erosion and sediment controls within specific areas will be recorded and outlined in progressive ESCP's. This may include the following scenarios:

- Controls require alteration due to change in work practices or new stage of works is commenced.
- Controls require alteration due to change in seasonal conditions (e.g. dry season vs wet season).
- Changes occur in slope gradients and drainage paths, with their exact form unpredictable before works start.
- A change in the project design occurs that potentially impacts on ESC requirements.
- The desired outcome (e.g. protection of receiving environments) is not being achieved.

7 REFERENCES

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APPENDIX A ESCP SITE LAYOUT



Minerals Australia
EP145
Hole 1 Wellpad
ESCP

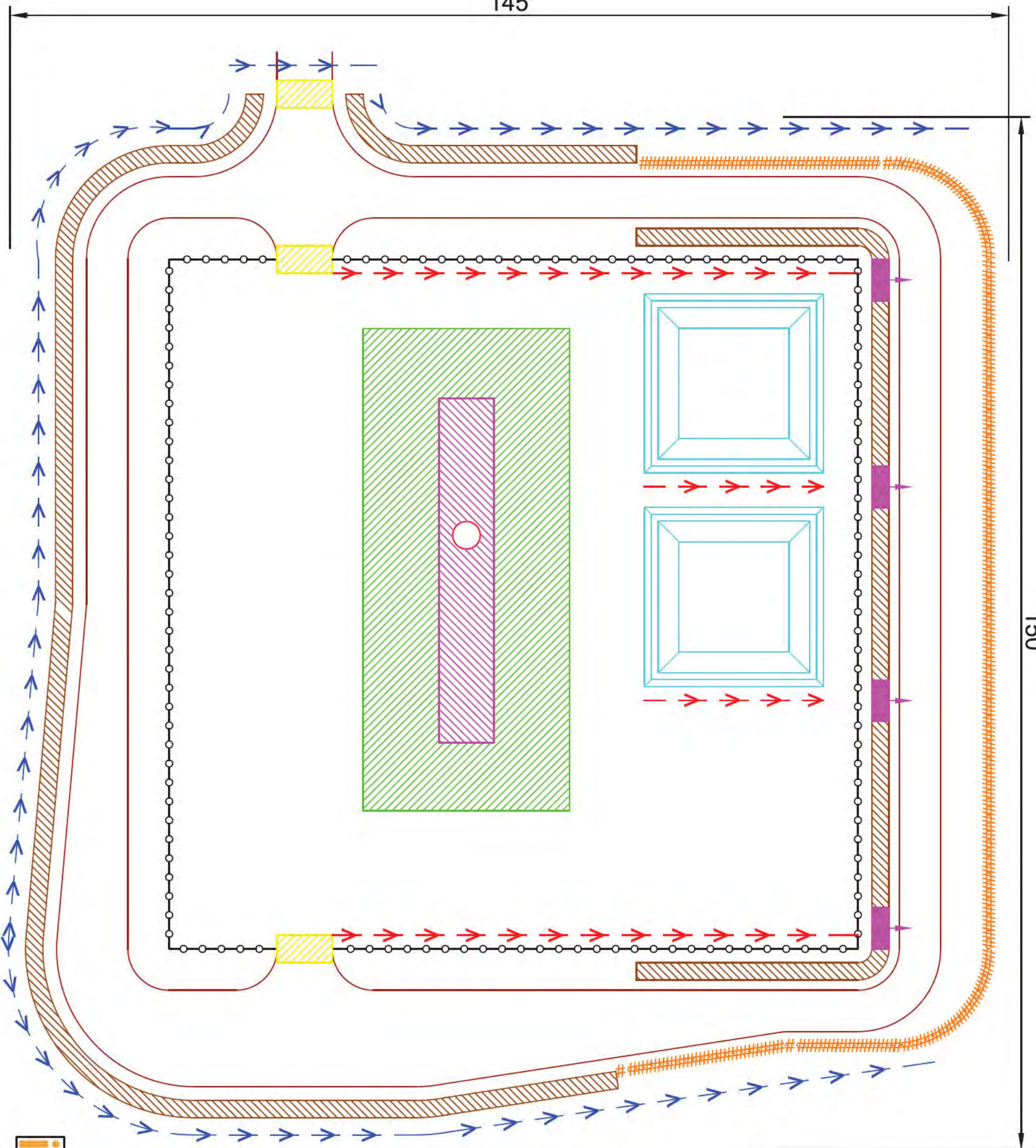
- Wellpad - Fenceline
- Hardstand
- Level Area
- Pond
- Access track / Firebreak
- Stabilised Topsoil Stockpile/Bund
- Mulch/Cleared Veg Bund/Filter
- Whoa Boy
- Rock Filter Dam
- Clean Water Flow
- Dirty Water Flow

INGAUGE Drawn : Jon Bennett / inGaguge
Date: 2/10/2022












APPENDIX B STANDARD DESIGNS

150

145



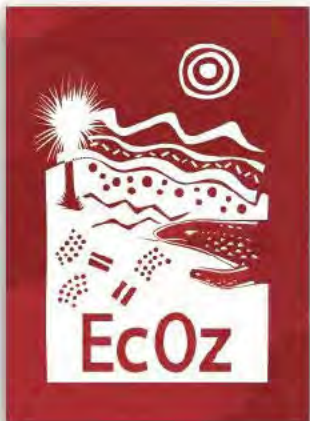
Minerals Australia - EP144
 ESCP - Standard Design

-  Wellpad - Fenceline
-  Hardstand
-  Level Area
-  Pond
-  Access track / Firebreak
-  Stabilised Topsoil Stockpile/Bund
-  Mulch/Cleared Veg Bund/Filter
-  Whoa Boy
-  Rock Filter Dam
-  Clean Water Flow
-  Dirty Water Flow



Drawn : Jon Bennett / inGaguge
 Date: 20/10/2022

Jon Bennett



EcOz Environmental Consultants

EcOz Pty Ltd.

ABN 81 143 989 039

Level 1, 70 Cavenagh St,
GPO Box 381,
Darwin, NT 0801

T: +61 8 8981 1100
E: ecoz@ecoz.com.au

www.ecoz.com.au



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APPENDIX H WEED MANAGEMENT PLAN EP144



Weed Management Plan
EP 144 Exploration drilling
program
Minerals Australia

DOCUMENT CONTROL RECORD

Job	EZ19192
Document ID	206789-21
Author(s)	N Harvey

DOCUMENT HISTORY

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

EcOz Pty Ltd.
ABN: 81 143 989 039
Level 1, 70 Cavenagh Street
DARWIN NT 0800
GPO Box 381, Darwin NT 0800

Telephone: +61 8 8981 1100
Email: ecoz@ecoz.com.au
Internet: www.ecoz.com.au



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Appendices

Appendix A	Environmental Policy
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Appendix B Weed hygiene declaration
Appendix C Weed control recording template

ACRONYMS

EMP	Environmental Management Plan
EP	exploration permit
NLC	Northern Land Council
NT	Northern Territory
WoNS	<i>Weed of National Significance</i>

1 INTRODUCTION

Minerals Australia Pty Ltd (Minerals Australia), a wholly owned subsidiary of Hancock Prospecting, operates exploration permits (EP) 144 and 154. The EP's are part of an Exploration and Coexistence Deed between Minerals Australia Pty Ltd, Jacaranda Minerals Ltd (a co-shareholder) and the Northern Land Council (NLC).

EP144 involves the drilling of two exploratory stratigraphic core drill holes to a maximum of approximately 1000m in depth to obtain stratigraphic information.

1.1 Scope and objectives

The scope of this weed management plan is to outline the weed management measures that will be implemented to prevent the introduction and spread of weeds during the works associated with the project.

The objectives of this weed management plan are to:

- Comply with all applicable legislation, regulations, conditions and regional weed management plans.
- Address the specific weed management requirements of station owners.
- Provide controls for all project activities to avoid introducing new weed species into the project area.
- Avoid or control the spread of existing weed species into new areas within the project area.
- Detail the monitoring, reporting and incident response procedures appropriate for the management measures.

The weed management plan is applicable to all activities associated with the drilling on EP 144 and will be used by all personnel (including contractors) involved in project activities.

1.2 Dedicated weed officer

The *Scientific Inquiry into Hydraulic Fracturing* recommended a dedicated weed officer for each Project and its specified regulated activity under the Petroleum Act. To ensure necessary weed management outcomes, the weed officer must have relevant skills and experience and availability to successfully manage weed related issues for the project.

They are to be responsible and accountable for delivery of all weed related requirements of the project in accordance with this WMP and the overarching EMP.

Contact details for Minerals Australia's' weed officer for the project are:

Ruth Marr EcOz	Phone: (08) 8981 1100 Email: Ruth.marr@ecoz.com.au
-------------------	---

2 PROJECT AREA

2.1 Project components

Key components associated with the project are described below and shown in Figure 2-1. The 'project area' refers to the physical footprint of the proposed activities.

2.1.1 Drilling

Minerals Australia propose to undertake drilling activities on EP144.

To undertake these works the following key activities are required:

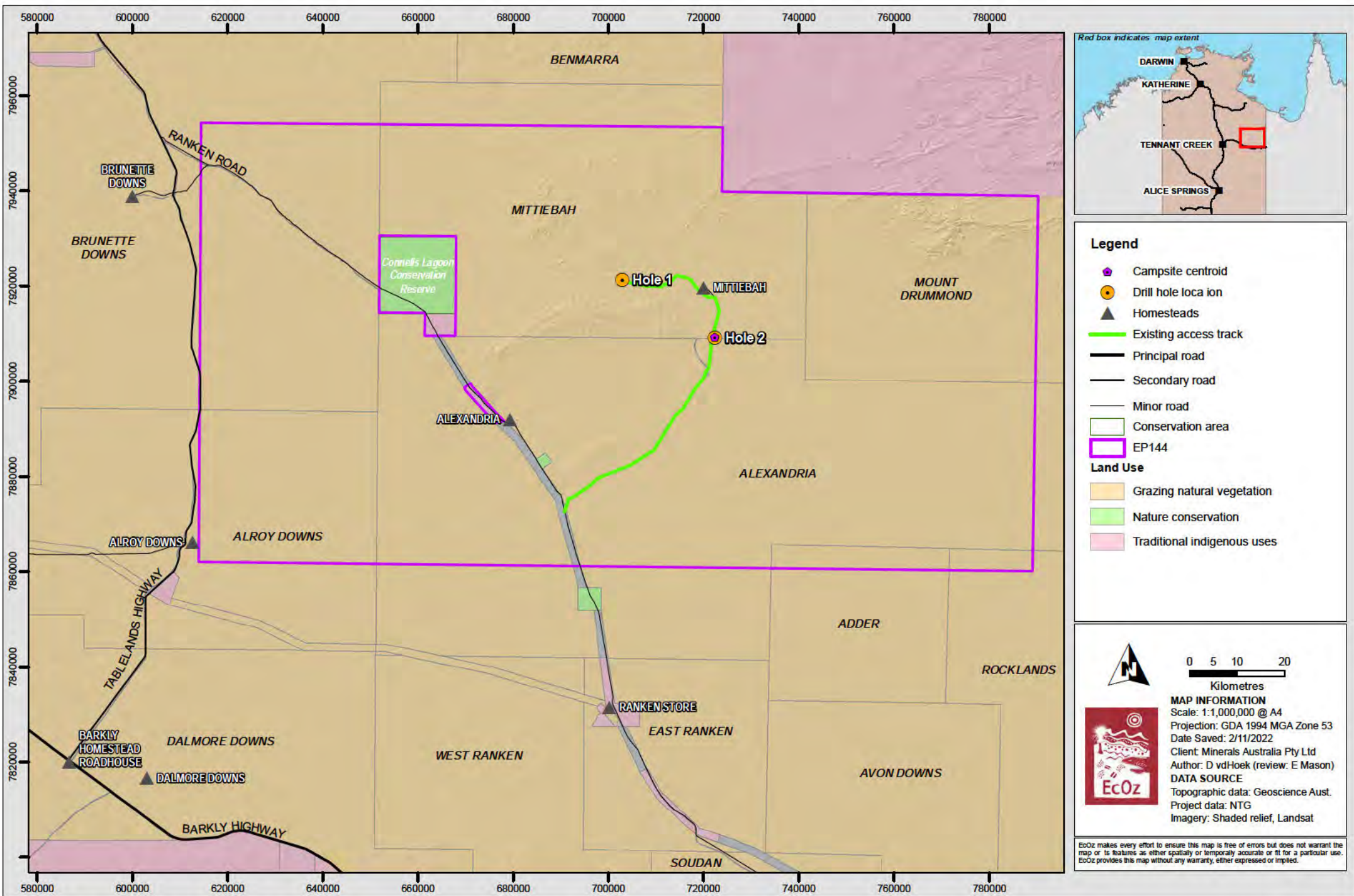
- Vegetation clearing
- Grading, excavation, stockpiling, compaction of soil material
- Drilling
- Re-spreading of any removed vegetation
- Upon completion, removal of all surface infrastructure and rehabilitation.

2.1.2 Access tracks

Where possible, access to project areas will be via existing station access tracks, which will be maintained as required.

2.1.3 Campsite

The proposed camp will occupy an area approximately 1 ha and be approximately 100 m by 100 m in size.



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EP144\1 - Hancock - EMP EP144\01 Project Files\Report maps\Figure 1 1 Map of the location of EP144, the proposed exploratory works and surrounding land use.mxd

Figure 2-1. Map of the project location and proposed infrastructure for EP144

3 LEGISLATION

This following legislation, statutory obligations and guidelines were considered during the preparation of this weed management plan.

3.1.1 Petroleum (Environment) Regulations

The Petroleum (Environment) Regulations, (the regulations), require submission of an EMP prior to any petroleum exploration or production activity. This weed management plan represents a component of the Hancock 2021 EMP for EP144 and 154, as required under the regulations.

3.1.2 Weed Management Act

This NT Act aims to:

Protect the Territory's economy, community, industry and environment from the adverse impact of weeds

It declares undesirable species of plants as weeds, and requires these species to be controlled, eradicated or prevented from entering the Northern Territory (NT) depending on their classification. Under the Act, weeds are classified into one of three classes:

- Class A declared plant – to be eradicated
- Class B declared plant – growth and spread to be controlled
- Class C declared plant – not to be introduced into the NT (all Class A and B weeds are also Class C)

The Act specifies how weeds in each of the classes must be treated. Weed management plans for specific weeds are endorsed under this Act.

The Commonwealth government has also categorised some species as Weeds of National Significance (WoNS). The remaining introduced flora species are referred to as environmental weeds.

3.1.3 Management Plans and guidelines

Statutory Weed Management Plans

These plans are legal documents containing specific information about management requirements for certain high priority weeds. Section 5 lists weeds that are present or have the potential for introduction on EP 144 and notes those with an associated statutory weed management plan.

Guidelines and standards

The following guidelines associated with the management of weeds in the NT have also been considered during the preparation of this WMP:

- *Northern Territory Weed Management Handbook* (Weed Management Branch, 2015a)
- *Northern Territory Weed Data Collection Manual* (Weed Management Branch, 2015b)

3.1.4 Minerals Australia environmental policy

Minerals Australia's Environmental Policy is a public declaration of its understanding of the environmental impacts and risks associated with its operations, as well as a demonstration of its compliance with all relevant environmental, health and safety regulations, legislation and guidelines. A copy is provided as Appendix A.

4 WEED RISK MITIGATION MEASURES

The EMP risk assessment process identified a number of weed introduction and/or spread risks associated with the scope of this project. Table 4-1 documents these risks, as well as the mitigation measures that will be implemented to reduce this risk.

Table 4-1. Weed risk and mitigation measures

Weed risk	Mitigation measures	Measurement criteria	Responsible person
Introduction of new weed species to EP 144 from plant and vehicles.	All vehicles / machinery /equipment entering the EP to be cleaned and free of soil and vegetative matter, and have a valid weed hygiene declaration	A register of vehicle / equipment / machinery inspection is kept. ¹ Spot checks on vehicle / equipment / machinery to ensure inspections are completed correctly	Minerals Australia Dedicated Weed Officer
	Site environmental inductions for all personnel and contractors to include vehicle weed hygiene requirements	All project staff undertake an environmental induction, to be recorded in the Minerals Australia Training Register	Minerals Australia Dedicated Weed Officer
Weed spread in EP 144 resulting from vehicles/plant traversing existing weed infestations	All infestations of declared weeds are mapped; all personnel and contractors made aware of existing infestation locations and trained in the identification of existing weeds	All project staff undertake an environmental induction, to be recorded in the Minerals Australia Training Register Weed maps and factsheets included as part of environmental induction All operational staff to attend weed identification training delivered by the NT Weed Management Branch	Minerals Australia Dedicated Weed Officer
	All vehicles, machinery and equipment to stay on formed access tracks, except for those involved in clearing	All vehicle movements tracked via in-vehicle management systems	Minerals Australia Dedicated Weed Officer
	If infestations are identified during the 2022 program, they will be demarcated and avoided, where possible, via a detour around the infestation	Maintain demarcation during operations and inspect (and rectify if needed) daily	Minerals Australia Field Representative
	If infestations cannot be avoided, treat prior to traversing using methods set out in Table 6-1.	Work plan to reflect additional tasks required	Minerals Australia Dedicated Weed Officer
	Vehicles/plant to be cleaned and free of soil and vegetative matter prior to	Spot checks on vehicle / equipment / machinery to ensure inspections are	Minerals Australia Field Representative /

¹ Weed hygiene declaration included as Appendix B.

Weed risk	Mitigation measures	Measurement criteria	Responsible person
	moving beyond infestation	completed correctly	Minerals Australia Dedicated Weed Officer
Existing weed distribution not fully known due to survey conducted outside of prime growth period	Further monitoring to be undertaken, as set out in Section 7 of this document	Annual reporting against this WMP, as per Section 7.	Minerals Australia Dedicated Weed Officer

5 WEED SPECIES

Some species of introduced flora are declared weeds under the NT *Weeds Management Act* because of the harm they can cause. Class A weeds are to be eradicated by land owners and occupiers. Class B weeds must have their growth and spread controlled by land owners and occupiers. The remaining introduced flora species are referred to as *environmental weeds*. The Commonwealth Government has also categorised some species as Weeds of National Significance (WoNS).

Weed distribution is often related to environmental disturbances caused by the construction of roads and tracks, cattle grazing and feral animals. Weeds are most prevalent on land under pastoral lease, with infestations generally concentrated around infrastructure such as water points, fence lines and tracks, and also along the banks of watercourses where cattle and feral animals tend to congregate.

A review of the NT Weed Branch weed dataset shows that there are very few weed species recorded within EP144 and within a 100 km radius. This does not necessarily mean that there are few weed infestations in the region, instead, remoteness of the area has prevented extensive surveys. By far the most frequently reported species is Parkinsonia (*Parkinsonia aculeata*). This Class B weed grows in a wide range of climates and soil types.

EP144 lies within region covered by the *Tennant Creek Regional Weeds Strategy 2021-2026* (DEPWS 2021). The strategy focusses on weeds that are most important to the region, categorising them as either:

- Category 1 – Priority weeds (present in the region, widely considered feasible to eradicate from the Region, typically evaluated as very high risk and have isolated and restricted distributions).
- Category 2 – Priority weeds or strategic control – including the eradication of outliers (species warranting strategic control across the landscape due to the high impact they have on land managers and on broader economic and environmental values).
- Category 3 – Weeds of concern (assessed by the weed risk management system as a medium to high risk, or have not been assessed, but have been identified by stakeholders as posing a threat to the values of the Region).
- Category 4 – Hygiene and biosecurity weeds (it is important for landholders to implement weed hygiene and other biosecurity measures to prevent the spread of weeds into clean areas, and to control these species where the opportunity arises).
- Category 5 – Alert weeds (have the potential to have a high level of impact to the region should it become established, the likelihood of the species naturalising and spreading in the region is perceived to be high).

All such weeds are listed in Table 5-1. Buffel Grass (*Cenchrus ciliaris*) is described in the plan as a significant threat but, because of its value to pastoralists, is not a declared weed. Figure 5-1 and Figure 5-2 show the distribution for the weeds (DEPWS 2021).

Table 5-1. Weed species relevant to EP144

Common name	Botanical name	Class	WoNS	Status in the strategy
Bellyache Bush*	<i>Jatropha gossypifolia</i>	A	Yes	Category 1
Mesquite*	<i>Prosopis</i> spp.	A	Yes	Category 1
Prickly Acacia*	<i>Acacia nilotica</i>	A	Yes	Category 1
Athel Pine*	<i>Tamarix aphylla</i>	A	Yes	Category 2
Parkinsonia	<i>Parkinsonia aculeata</i>	B	Yes	Category 2

Common name	Botanical name	Class	WoNS	Status in the strategy
Rubber Bush	<i>Calotropis procera</i>	B	No	Category 2
Burr – Noogoora	<i>Xanthium strumarium</i>	B	No	Category 3
Buffel Grass	<i>Cenchrus ciliaris</i>	-	No	Significant threat

* Species must be eradicated or managed as directed by its Statutory Weed Management Plan

Weed species recorded during the survey are listed and described in Table 5-2; their occurrence is shown in Figure 5-3. Results show that weeds are concentrated along major drainage lines or areas with permanent surface water flow. No Category 1 species were recorded during the survey.

Parkinsonia (*Parkinsonia aculeata*) – a Category 2 weed – is widespread along the drainage lines, including within the project footprint. This species is also a declared WoNS and listed as a Class B weed in the NT. The field survey recorded multiple infestations in close proximity to the access tracks that represent high risk of spread. The location of identified weeds are presented in Figure 5-3.

Noogoora Burr (*Xanthium strumarium*) – a Category 3 weed – was recorded in a moderate infestation within the project footprint. It is also a declared Class B in the NT. The risk of spreading this weed is high due to the infestations location at the intersection between Ranken Rd. and Playford River (see Figure 5-3). Athel Pine (*Tamarix aphylla*) – a Category 2 weed – was observed at a single location outside the project area. It is a declared WoNS and a Class A species in the Barkly Region. Although this infestation was located outside of the project footprint adjacent to a turkey nest dam in Alexandria Station (location in Figure 5-3), prompt control measures and hygiene protocols must be implemented to ensure that this weed is not spread.

Table 5-2. Weed species observed during field surveys, July 2021

Species	Status	Occurrence	Comment
Parkinsonia (<i>Parkinsonia aculeata</i>)	Class B Category 2 (Very High Priority)	Six sites (two along the Playford River, one along Eastern creek, two along Buchanan Creek, and one in a minor drainage in Ranken Rd.)	This is a WoNS. It is widespread in the Playford River and Buchanan Creek banks within Alexandria Station (DEPWS 2021a).
Noogoora Burr (<i>Xanthium strumarium</i>)	Class B Category 3 (High Priority)	One site (along the Playford River crossing in Ranken Rd.)	There is no plan or strategy published for the management of this weed species. Seeding plants were widespread.
Athel Pine (<i>Tamarix aphylla</i>)*	Class A Category 2 (Very High Priority)	One site adjacent to a turkey nest dam	This species is a WoNS. This weed must be eradicated or managed as directed by its Statutory Weed Management Plan. The project footprint is located within the Athel Pine Weed Eradication Zone (Class A) (DEPWS 2021b).

* Found outside of project footprint however, important to be avoided to prevent spread and further infestations.

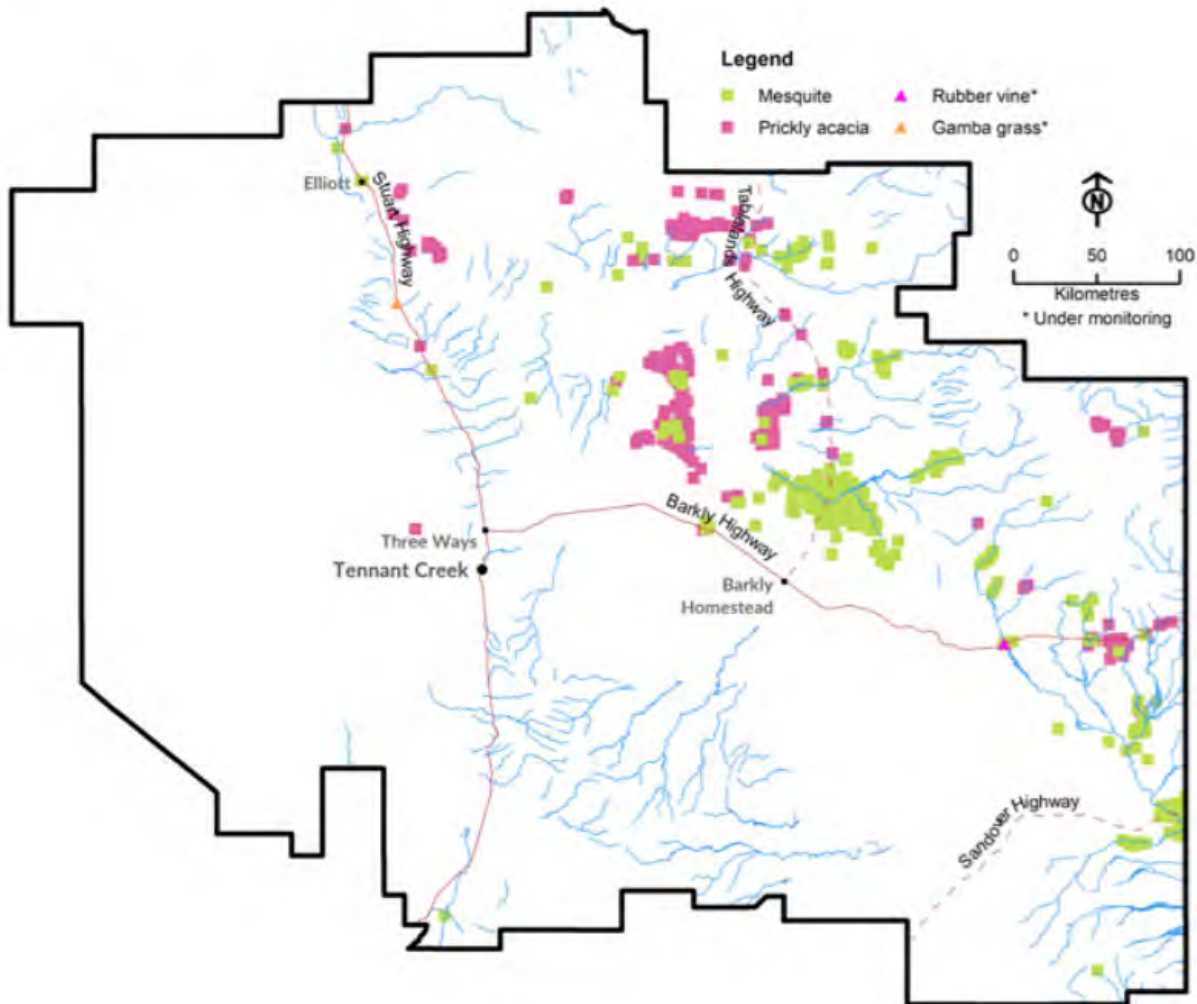


Figure 5-1. Distribution of priority weed species for eradication in the Tennant Creek Region (DEPWS 2021)

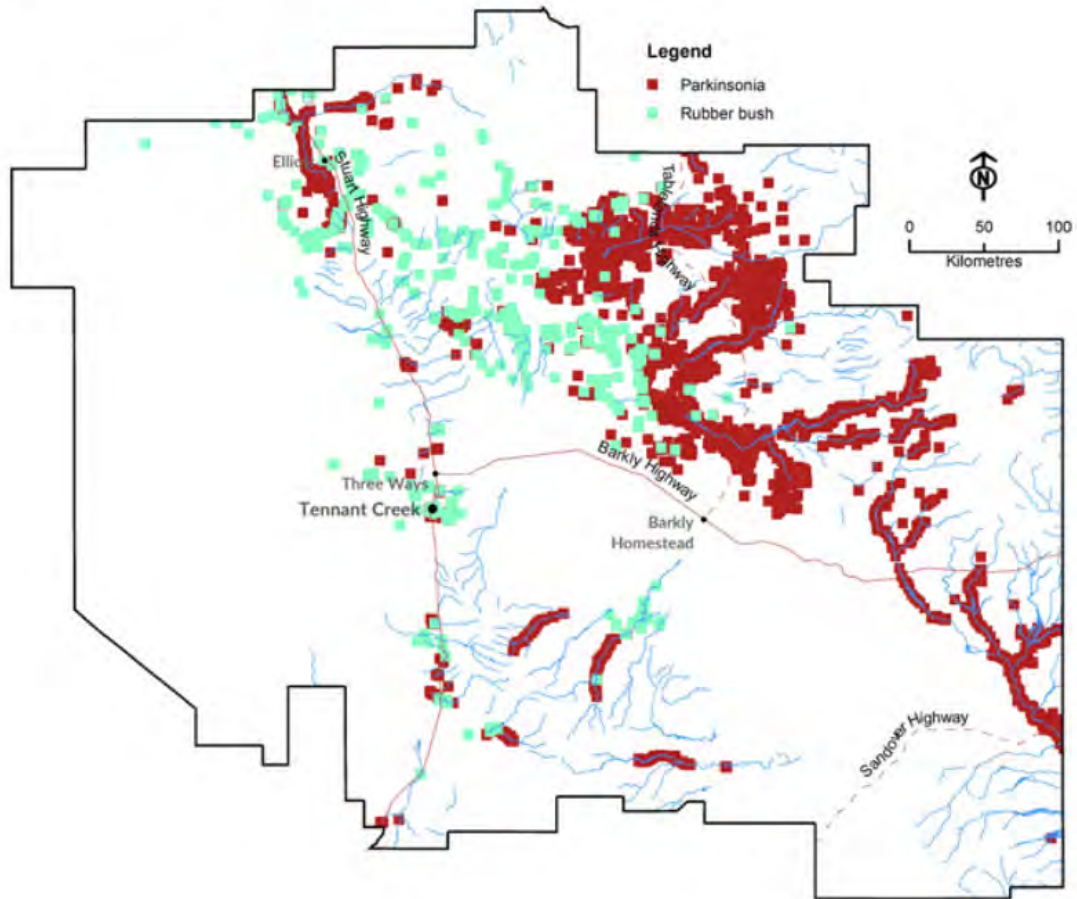
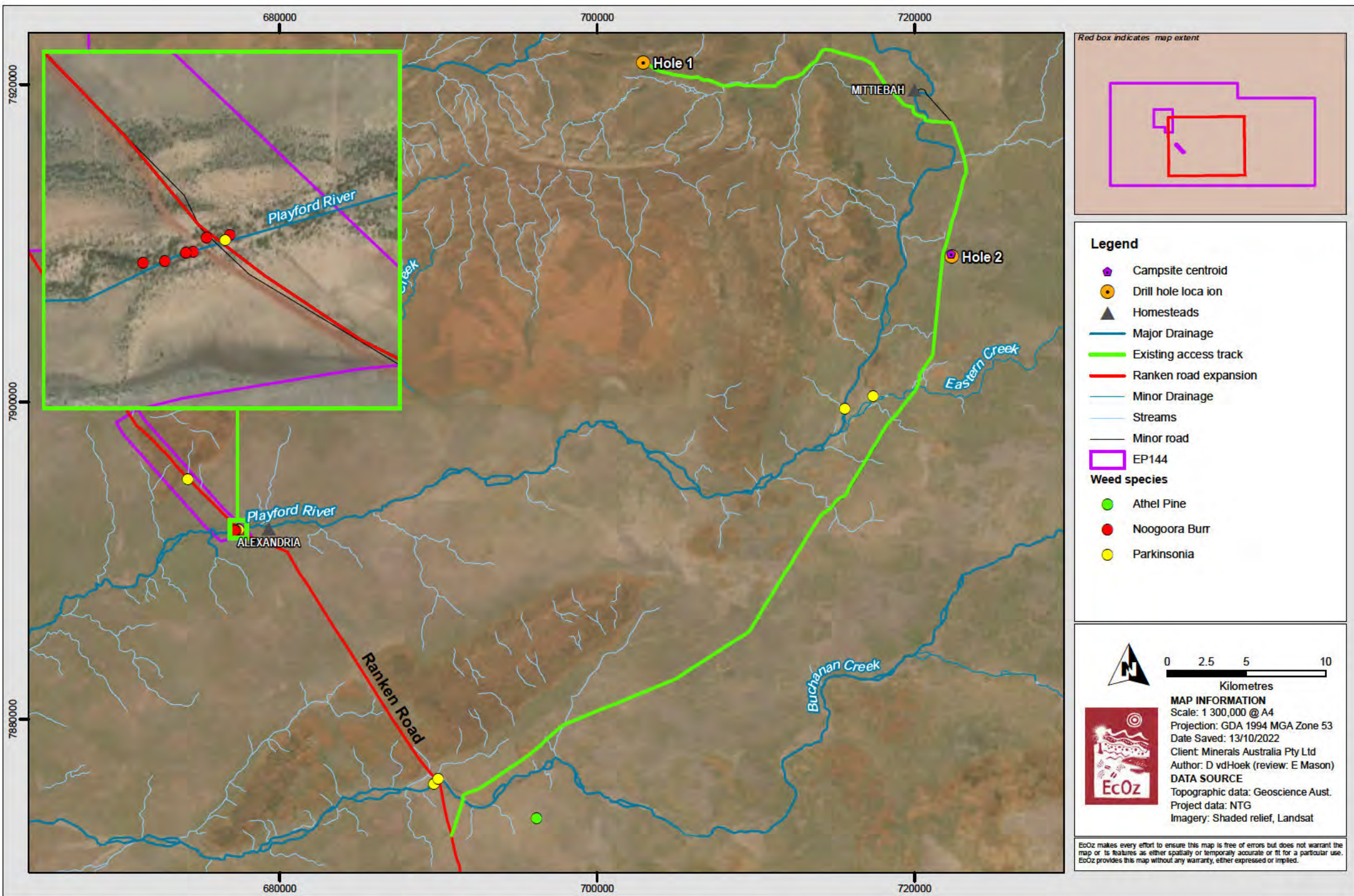
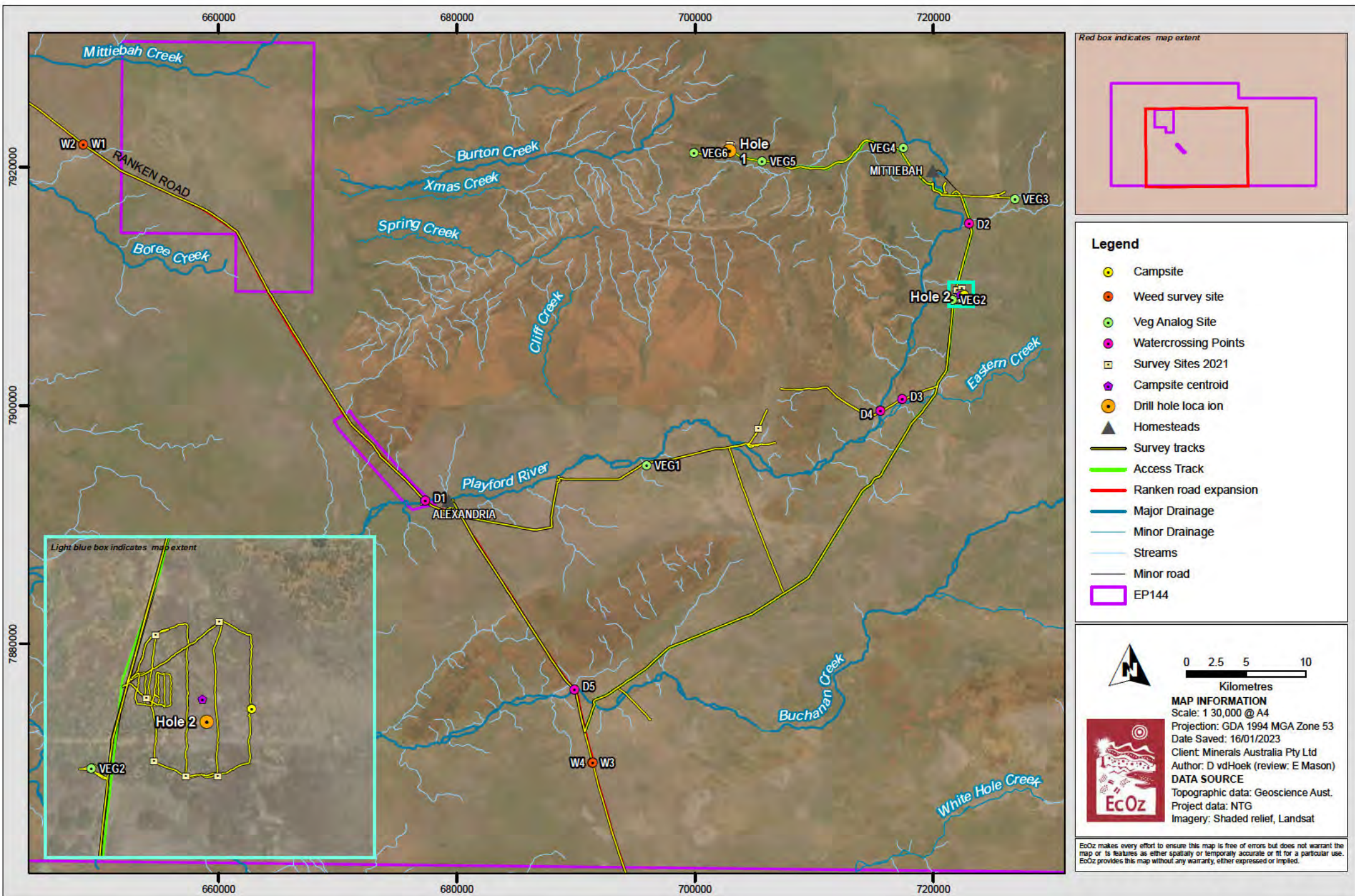


Figure 5-2. Distribution of priority weed species for strategic control in the Tennant Creek Region (parkinsonia and rubber bush only) (DEPWS 2021)



Path: Z:\01 EcOz_Documents\04 EcOz_Vantage GIS\EZ19101 - Hancock - EMP EP144\01 Project Files\Report maps\Figure 5.4. Map of weed occurrences and drainage within, or adjacent to, the project footprint.mxd

Figure 5-3. Map of weed occurrences within, or adjacent to, the project footprint



Path: Z:\01 EcOz_Documents\04 EcOz_Vantage GIS\EZ\10101 - Hancock - EMP EP144\01 Project Files\Report maps\Figure 3-1. Map showing survey effort within investigation area.mxd

Figure 5-4. Map showing survey effort within project area

6 ANNUAL ACTION PLAN

The annual action plan in Table 6-1 details the survey and control activities for weeds recorded within the project area.

Table 6-1. Annual action plan

Weed Management Area	Weed species	Management objective	Survey / monitoring time/s	Treatment time/s	Control method/s	Herbicide
Drill pads Access tracks Campsite		Prevent the introduction of weeds	Within 4 weeks of the next rainfall event that is sufficient to result in weed growth.	Immediately if weeds are found	Refer to the <i>NT Weed Management Handbook</i>	
Drill pads Access tracks Campsite	Parkinsonia (<i>Parkinsonia aculeata</i>)	Control spread	Within 4 weeks of the next rainfall event that is sufficient to result in weed growth.	All year round, however, preferred time is during March to May	<p>Blade-ploughing, stick-raking, bulldozing and chaining can be effective if the root layer is removed from the soil. Fire destroys seed in the soil surface and can be used as a follow-up to remove seedlings after other control efforts. Fire may also be used to manage mature trees.</p> <p>Basal bark <5 cm stem diameter, Cut stump >5 cm stem diameter with Triclopyr 240 g/L + Picloram 120 g/L, 1L/60L diesel.</p> <p>Foliar spray – avoid spraying if plants are stressed or bearing pods – Uptake Spraying Oil required Foliar spray – plants up to 2 m or 2 years old - Uptake Spraying Oil required. Aminopyralid 8 g/L + Triclopyr 300 g/L + Picloram 100 g/L at a rate of 350 mL / 100 L</p>	

Weed Management Area	Weed species	Management objective	Survey / monitoring time/s	Treatment time/s	Control method/s	Herbicide
<p>Drill pads Access tracks Campsite</p>	<p>Noogoora Burr (<i>Xanthium strumarium</i>)</p>	<p>Control spread</p>	<p>Within 4 weeks of the next rainfall event that is sufficient to result in weed growth.</p>	<p>All year round, however, preferred time is during December to March.</p>	<p>Mow, slash, grub and burn plants to prevent burr formation.</p> <p>Foliar spray – apply when actively growing using 2, 4-D amine 625 g/L at a rate of 180 mL / 100 L</p> <p>Foliar spray – apply when actively growing using glyphosate 360 g/L, at a rate of 15 mL / 1 L</p>	

7 WEED MONITORING

The requirements for weed monitoring within each component of the project area are outlined above in Section 6. Additional to the survey / monitoring times listed in Table 6-1, monitoring for weed incursions will be ongoing during operations, as all operational staff will have a responsibility to report new weed incursions to Minerals Australia's' dedicated weed officer. Should new weed incursions be identified during monitoring, control will be undertaken during recommended treatment times, and follow-up surveys will be within three months to ensure effective eradication of the incursions.

The potential for weed spread within the project area is mostly within the access tracks, campsites and drill pads. To target survey efforts within areas at high risk of weed establishment, annual weed monitoring will focus on the following areas:

- Known weed locations
- Along access tracks
- Drill pads
- 50 m buffer around stock watering points traversed by access tracks
- Any other areas that were disturbed during the drilling project.

7.1 Notification procedure

All new weed incursions will be reported to the NT Weed Management Branch by Minerals Australia's' dedicated weed officer. Initial notification will be verbal, followed by written notification of preliminary species identification and location within seven working days.

7.2 Recording

All weed monitoring and survey activities will be recorded in accordance with *the NT Weed Data Collection Guidelines* available at: <https://nt.gov.au/environment/weeds/weed-mapping-and-data-sharing>.

The following attributes of any new weed infestations will be recorded into a GPS-enabled device:

- Site ID
- Weed name
- ID confidence
- Date of record
- Coordinate information
- Recorder / organisation
- Infestation size
 - 5 m diameter
 - 20 m diameter
 - 50 m diameter
 - 100 m diameter
- Infestation density
 - 1 = Absent, no weeds of this species in the area
 - 2 = < 1%; very few, not many weeds
 - 3 = 1 – 10%; more than one or two isolate plants
 - 4 = 11 – 50%; Many plants, covering up to half the area
 - 5 = > 50%; Weed forms the dominant cover

Weed data will be submitted as an Excel spreadsheet to the Weeds Management Branch (refer Appendix C for an example template).

7.3 Reporting

Minerals Australia's' weed management officer will submit annual reporting against this WMP as a component of the EMP environmental reporting requirements. This will include

- Details of activities implemented to address weed spread and introduction risks
- Submission of all weed data collected
- Details of survey and monitoring events, including dates, personnel, maps and track data
- An overview of weed control events and success rates.

This annual report will be reviewed by the NT Government's Onshore petroleum weed management officer.

8 REFERENCES

Department of Environment, Parks and Water Security (DEPWS) (2021). *Tennant Creek Regional Weeds Strategy (2021-2026)*. Darwin, Northern Territory.

Weed Management Branch (2015a) *Northern Territory Weed Management Handbook*, Department of Land Resource Management, Northern Territory Government, Darwin

Weed Management Branch (2015b). *Northern Territory Weed Data Collection Manual*, Department of Land Resource Management, Northern Territory Government, Darwin

APPENDIX A ENVIRONMENTAL POLICY

APPENDIX 110A

HPPL.RDG.HSE.SP.003 ENVIRONMENTAL MANAGEMENT (HANCOCK)

Relates to Blocks: 1, 2 & 4

CONTEXT AND PURPOSE

Exploration activities have the potential to adversely impact the environment. Hancock Prospecting Pty Ltd. (HPPL) is committed to environmental protection and any potential environmental impacts caused by our activities need to be understood, evaluated and effectively managed.

SCOPE AND APPLICATION

This Standard establishes environmental management expectations for all HPPL controlled exploration activities or activities managed by others in partnership with HPPL.

PERFORMANCE REQUIREMENTS

1. We will not explore in any World Heritage Area, National Park, Protected Areas Categories I-IV, a threatened species habitat (as defined by the World Conservation Union) or in a sub-marine environment.
2. Program Execution Plans will include:
 - A Land Management Plan;
 - Environmental Management Plans for hazardous materials and activities with the potential to cause *material environmental impacts* or to cause impacts to biodiversity;
 - A Water Management Plan;
 - identification of National Parks, Conservation Areas or threatened species habitats where legislation or public sentiment may impact the ability to execute the proposed exploration operation;
 - closure criteria and costed rehabilitation plans; and
 - the expected cost of current and future environmental liabilities.
3. The respective HPPL designated senior *project leader (or assigned delegate)* is responsible for ensuring that HPPL explicitly considers, any significant environmental issues associated with a proposed Exploration, including the potential for the proposed activity to impact local and regional biodiversity, prior to providing approval for the proposed activity.
4. *Environmental baselines*, developed with input of appropriately experienced and knowledgeable environmental consultants, will be established prior to commencing any field activity where:
 - our planned activities will cause ground disturbance or will have the potential impact biodiversity; or
 - there has been previous exploration, mining or other activity that may have caused environmental impacts.
5. Performance against Environmental Management Plans will be monitored by the respective Exploration Manager and or HSE Specialist and reported at the annual Program or Regional Appraisal.
6. Environmental impacts will be monitored and progressively rehabilitated.
7. Waste generation will be measured and records of waste disposal will be retained.
8. Land Disturbance Plans and Registers will be maintained for every operations area. The Land Disturbance Plan will include the process required to gain legal approvals and authorities for any land disturbance.
9. Consumption of natural resources and raw materials and emissions of *prescribed materials* will be recorded for all HPPL activities.
10. A register of *legacy environmental obligations* will be maintained and all environmental commitments will be managed through to completion.

ROLES AND RESPONSIBILITIES

The HPPL designated senior *project leader (or assigned delegate)* are responsible for:

- ensuring that HPPL is aware of potential environmental issues associated with a proposed Exploration program prior to approving funding for the Program; and
- approving Environmental Management Plans contained in a Program Execution Plan.

Program Managers are responsible for:

- approving Project-specific Land Disturbance Plans;
- monitoring performance against Environmental Management Plans; and
- recording and reporting consumption of prescribed material and emissions for the exploration operation.

The HPPL **HSE Specialist** is responsible for:

- establishing and maintaining a system for recording consumption and emissions of prescribed materials; and
- maintaining a register of legacy environmental obligations and reporting.

RELATED DOCUMENTS

- Appraisals and Assurance
- Land Management Plan

DEFINITIONS

Environmental Baselines	means	a documented account of the condition of the ground, plants, animals, water and air in a project area prior to planned exploration activities commencing.
Legacy environmental obligations	means	an obligation to monitor environmental conditions or rehabilitate disturbance that extends beyond the life of an Exploration Program and has not been transferred to an independent operating legal entity.
Material Environmental Impact	means	any disturbance to the ground, plants, animals, water or air that has the potential for an impact comparable to a maximum foreseeable loss of Level 4 or above on the Incident Severity Table
Prescribed materials	means	Any material for which HPPL reporting may be required

APPENDIX B WEED HYGIENE DECLARATION



Weed Hygiene Declaration

This declaration is valid for transport and movement of vehicles and equipment from to (provide locations) and will stay current pursuant to the definition of clean in Definitions.

VEHICLE DESCRIPTION

Make: Registration # or engine number:

Was clean prior to entry to (destination)

Add equipment examined to the Equipment Register

Certifier name

Certifier qualification Qualification date

DECLARATION

I, (name), of (street)
 town state telephone

declare the information I provided in this declaration is true and correct and I have read the accompanying explanatory notes before completion of this declaration.

Signature Date

EXPLANATORY NOTES

This certification process was developed to fulfill one of the stated purposes of the NT *Weed Management Act* and the Qld Land Protection (*Pest and Stock Route Management Act 2002*).

It applies to, as a minimum, all weeds listed as weeds in the relevant jurisdiction and any plants that a stakeholder does not want transported or introduced.

DEFINITIONS

Clean:

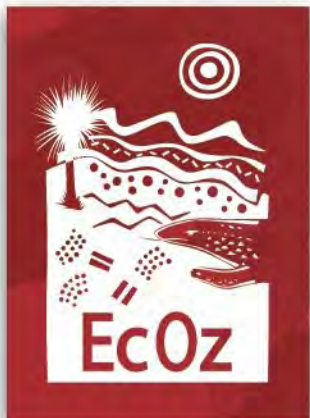
- Means that no soil or organic matter is present on vehicles or equipment
- Vehicles and equipment are considered clean if, after certified weed free, it does not touch soil or vegetative material, ie for a vehicle this means it travels on sealed or well-maintained unsealed roads.

Equipment means anything other than a vehicle.

Vehicle includes anything used for carrying a thing or person by land, water or air.

Weed reproductive material means any part of a plant that is capable of producing another plant by sexual or asexual means. This includes seeds, bulbs, rhizomes, tuber, stem, leaf cuttings or a whole plant.

Well-maintained unsealed road means roads that do not have vegetation growing on or encroaching onto the area occupied by traffic.



EcOz Environmental Consultants

EcOz Pty Ltd.

ABN 81 143 989 039

Level 1, 70 Cavenagh St,
GPO Box 381,
Darwin, NT 0801

T: +61 8 8981 1100
E: ecoz@ecoz.com.au

www.ecoz.com.au



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APPENDIX I WEED MANAGEMENT PLAN EP154



Weed Management Plan

EP 154 2D Seismic Survey

Minerals Australia

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Author(s)	N Harvey

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EcOz Pty Ltd.
ABN: 81 143 989 039
Level 1, 70 Cavenagh Street
DARWIN NT 0800
GPO Box 381, Darwin NT 0800

Telephone: +61 8 8981 1100
Email: ecoz@ecoz.com.au
Internet: www.ecoz.com.au



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Appendices

Appendix A	Weed distrubution maps (DEPWS 2021)
Appendix B	Environmental Policy
Appendix C	Weed hygiene declaration
Appendix D	Weed control recording template

ACRONYMS

2D	two dimensional
EMP	Environmental Management Plan
EP	exploration permit
NLC	Northern Land Council
NT	Northern Territory
WoNS	<i>Weed of National Significance</i>

1 INTRODUCTION

Minerals Australia Pty Ltd (Minerals Australia), a wholly owned subsidiary of Hancock Prospecting, operates exploration permits (EP) 144 and 154. The EP's are part of an Exploration and Coexistence Deed between Minerals Australia Pty Ltd, Jacaranda Minerals Ltd (a co-shareholder) and the Northern Land Council (NLC).

Minerals Australia proposes on EP 154, 31.7 km of two dimensional (2D) seismic survey and the drilling of one stratigraphic core drill hole to 1000 m depth to obtain stratigraphic information.

1.1 Scope and objectives

The scope of this weed management plan is to outline the weed management measures that will be implemented to prevent the introduction and spread of weeds during the works associated with the project.

The objectives of this weed management plan are to:

- Comply with all applicable legislation, regulations, conditions and regional weed management plans.
- Address the specific weed management requirements of station owners.
- Provide controls for all project activities to avoid introducing new weed species into the project area.
- Avoid or control the spread of existing weed species into new areas within the project area.
- Detail the monitoring, reporting and incident response procedures appropriate for the management measures.

The weed management plan is applicable to all activities associated with the 2D seismic survey and drilling on EP 154 and will be used by all personnel (including contractors) involved in project activities.

1.2 Dedicated weed officer

The *Scientific Inquiry into Hydraulic Fracturing* recommended a dedicated weed officer for each Project and its specified regulated activity under the Petroleum Act. To ensure necessary weed management outcomes, the weed officer must have relevant skills and experience and availability to successfully manage weed related issues for the project.

They are to be responsible and accountable for delivery of all weed related requirements of the project in accordance with this WMP and the overarching EMP.

Contact details for Minerals Australia's' weed officer for the project are:

Ruth Marr EcOz	Phone: (08) 8981 1100 Email: Ruth.marr@ecoz.com.au
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2 PROJECT AREA

2.1 Project components

Key components associated with the project are described below and shown in Figure 2-1. The 'project area' refers to the physical footprint of the proposed activities.

2.1.1 Seismic survey

Minerals Australia propose to undertake a two-dimensional (2D) seismic acquisition program of six lines totalling 43.6 km on EP 154. No seismic line activities are being conducted for EP144.

To undertake these works the following key activities are required:

- Vegetation clearing
- Grading, excavation, stockpiling, compaction of soil material
- Re-spreading of any removed vegetation on the 2D seismic lines following completion of the program, to promote regeneration
- Upon completion, removal of all surface infrastructure and rehabilitation.

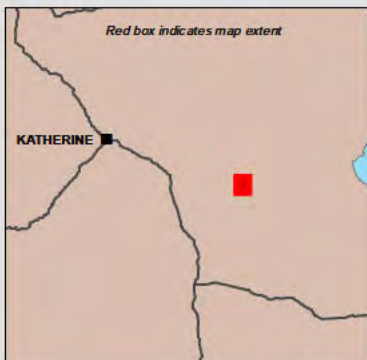
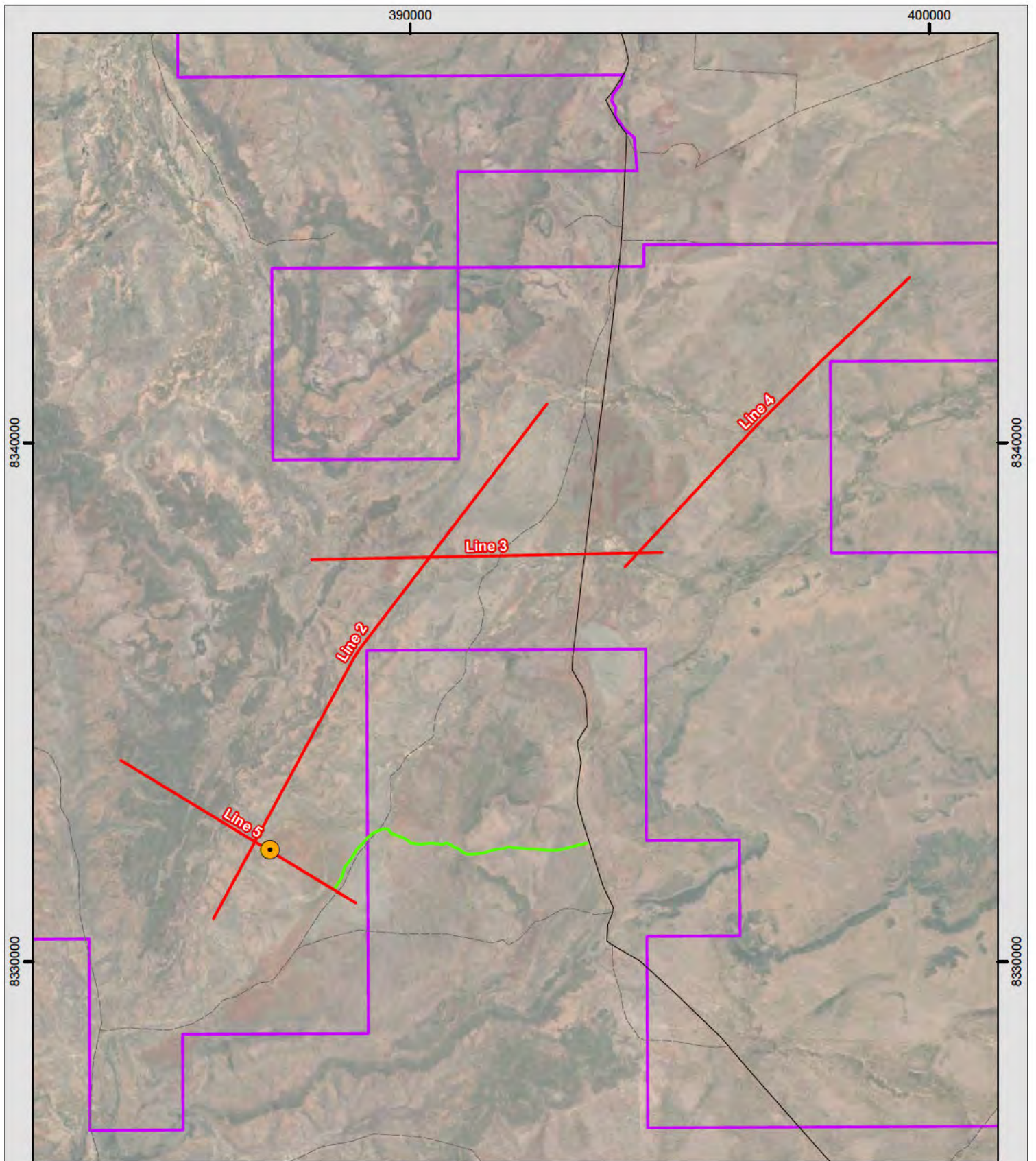
2.1.2 Access tracks

Where possible, access to project areas will be via existing station access tracks, which will be maintained as required.

Access for drill pads will be via seismic lines and station roads for each EP.

2.1.3 Campsite

No campsite will be required for the Project, accommodation will be sourced at Flying Fox Station..



Project data

Principal road	Proposed drill hole
Secondary road	Seismic Lines
Minor road	Existing access track
Track	
EP 154	

MAP INFORMATION
 Scale: 1:100,000 @ A4
 Projection: GDA 1994 MGA Zone 53
 Date Saved: 17/03/2023
 Client: Hancock Prospecting Pty Ltd
 Author: DC

DATA SOURCE
 Topographic data: Geoscience Aust.
 Project data: NTG

Figure 2-1. Map of project location and proposed infrastructure

3 LEGISLATION

The following legislation, statutory obligations and guidelines were considered during the preparation of this weed management plan.

3.1.1 Petroleum (Environment) Regulations

The Petroleum (Environment) Regulations, (the regulations), require submission of an EMP prior to any petroleum exploration or production activity. This weed management plan represents a component of the Hancock 2021 EMP for EP144 and 154, as required under the regulations.

3.1.2 Weed Management Act

This NT Act aims to:

Protect the Territory's economy, community, industry and environment from the adverse impact of weeds

It declares undesirable species of plants as weeds, and requires these species to be controlled, eradicated or prevented from entering the Northern Territory (NT) depending on their classification. Under the Act, weeds are classified into one of three classes:

- Class A declared plant – to be eradicated
- Class B declared plant – growth and spread to be controlled
- Class C declared plant – not to be introduced into the NT (all Class A and B weeds are also Class C)

The Act specifies how weeds in each of the classes must be treated. Weed management plans for specific weeds are endorsed under this Act.

The Commonwealth government has also categorised some species as Weeds of National Significance (WoNS). The remaining introduced flora species are referred to as environmental weeds.

3.1.3 Management Plans and guidelines

Statutory Weed Management Plans

These plans are legal documents containing specific information about management requirements for certain high priority weeds. Section 5 lists weeds that are present or have the potential for introduction on EP 154 and notes those with an associated statutory weed management plan.

Guidelines and standards

The following guidelines associated with the management of weeds in the NT have also been considered during the preparation of this WMP:

- *Northern Territory Weed Management Handbook* (Weed Management Branch, 2015a)
- *Northern Territory Weed Data Collection Manual* (Weed Management Branch, 2015b)

3.1.4 Minerals Australia environmental policy

Minerals Australia's Environmental Policy is a public declaration of its understanding of the environmental impacts and risks associated with its operations, as well as a demonstration of its compliance with all relevant environmental, health and safety regulations, legislation and guidelines. A copy is provided as Appendix A.

4 WEED RISK MITIGATION MEASURES

The EMP risk assessment process identified a number of weed introduction and/or spread risks associated with the scope of this project. Table 4-1 documents these risks, as well as the mitigation measures that will be implemented to reduce this risk.

Table 4-1. Weed risk and mitigation measures

Weed risk	Mitigation measures	Measurement criteria	Responsible person
Introduction of new weed species to EP 154 from plant and vehicles.	All vehicles / machinery /equipment entering the EP to be cleaned and free of soil and vegetative matter, and have a valid weed hygiene declaration	A register of vehicle / equipment / machinery inspection is kept. ¹ Spot checks on vehicle / equipment / machinery to ensure inspections are completed correctly	Minerals Australia Dedicated Weed Officer
	Site environmental inductions for all personnel and contractors to include vehicle weed hygiene requirements	All project staff undertake an environmental induction, to be recorded in the Minerals Australia Training Register	Minerals Australia Dedicated Weed Officer
Weed spread on EP 154 resulting from vehicles/plant traversing existing weed infestations	All infestations of declared weeds are mapped; all personnel and contractors made aware of existing infestation locations and trained in the identification of existing weeds	All project staff undertake an environmental induction, to be recorded in the Minerals Australia Training Register Weed maps and factsheets included as part of environmental induction All operational staff to attend weed identification training delivered by the NT Weed Management Branch	Minerals Australia Dedicated Weed Officer
	All vehicles, machinery and equipment to stay on formed access tracks, except for those involved in clearing	All vehicle movements tracked via in-vehicle management systems	Minerals Australia Dedicated Weed Officer
	If infestations are identified during the 2022 program, they will be demarcated and avoided, where possible, via a detour around the infestation	Maintain demarcation during operations and inspect (and rectify if needed) daily	Minerals Australia Field Representative
	If infestations cannot be avoided, treat prior to	Work plan to reflect additional tasks required	Minerals Australia Dedicated Weed

¹ Weed hygiene declaration included as Appendix C.

Weed risk	Mitigation measures	Measurement criteria	Responsible person
	traversing using methods set out in Table 6-1.		Officer
	Vehicles/plant to be cleaned and free of soil and vegetative matter prior to moving beyond infestation	Spot checks on vehicle / equipment / machinery to ensure inspections are completed correctly	Minerals Australia Field Representative / Minerals Australia Dedicated Weed Officer
Existing weed distribution not fully known due to survey conducted outside of prime growth period	Further monitoring to be undertaken, as set out in Section 7 of this document	Annual reporting against this WMP, as per Section 7.	Minerals Australia Dedicated Weed Officer

5 WEED SPECIES

Some species of introduced flora are declared weeds under the NT *Weeds Management Act* because of the harm they can cause. Class A weeds are to be eradicated by land owners and occupiers. Class B weeds must have their growth and spread controlled by land owners and occupiers. The remaining introduced flora species are referred to as *environmental weeds*. The Commonwealth Government has also categorised some species as Weeds of National Significance (WoNS).

Weed distribution is often related to environmental disturbances caused by the construction of roads and tracks, cattle grazing and feral animals. Weeds are most prevalent on land under pastoral lease, with infestations generally concentrated around infrastructure such as water points, fence lines and tracks, and also along the banks of watercourses where cattle and feral animals tend to congregate.

A review of the NT Weed Branch weed dataset shows that there are over 2,300 weed records for the general area of EP154 (within approximately a 20 km buffer). By far the most frequently reported species are:

- Chinese Apple* (*Ziziphus mauritiana*) (Class A)
- Parkinsonia* (*Parkinsonia aculeata*) (Class B)
- Hyptis* (*Mesosphaerum suaveolens*) (Class B)
- Lantana* (*Lantana camara*) (Class B)
- Neem* (*Azadirachta indica*) (Class B)
- Bellyache Bush* (*Jatropha gossypifolia*) (Class B)

EP154 lies within the region covered by the *Katherine Regional Weed Strategy 2021-2026* (DEPWS 2021). This plan focusses on the weeds that are most important to the region, categorising them as either:

- *Category 1 – Priority weeds* (present in the region, widely considered feasible to eradicate from the Region, typically evaluated as very high risk and have isolated and restricted distributions)
- *Category 2 – Priority weeds or strategic control – including the eradication of outliers* (species warranting strategic control across the landscape due to the high impact they have on land managers and on broader economic and environmental values)
- *Category 3 – Weeds of concern* (assessed by the weed risk management system as a medium to high risk, or have not been assessed, but have been identified by stakeholders as posing a threat to the values of the Region)
- *Category 4 – Hygiene and biosecurity weeds* (it is important for landholders to implement weed hygiene and other biosecurity measures to prevent the spread of weeds into clean areas, and to control these species where the opportunity arises)
- *Category 5 – Alert weeds* (have the potential to have a high level of impact to the region should it become established, the likelihood of the species naturalising and spreading in the region is perceived to be high).

All such weeds are listed in Table 5-1 and Appendix A contains the distribution maps (DEPWS 2021).

Field studies were conducted by EcOz in July 2021. A total of 40 sites were assessed for the occurrence of weeds within the project footprint. These sites include waterway crossing sites, analogue vegetation sites and other specific weed survey sites (Figure 5-1).

Field surveys detected four weed species within the project footprint. One declared weed and three environmental weeds, these are described below.

Thirteen occurrences of Hyptis (*Mesosphaerum suaveolens*), a declared weed species, was recorded during the field survey. It is listed as *Category 4 – Hygiene and biosecurity weed* in the Katherine Regional Weed Strategy and *Class B – to be controlled* in the NT. It is widespread along the drainage lines, including within the project footprint. The field survey recorded multiple infestations in close proximity to the seismic lines that represent a high risk of spread. The location of identified Hyptis infestations are presented in Figure 5-1.

Sites where this weed species was recorded include (water crossing sites - WC2, WC5, WC6, WC7, WC8, WC10, WC12, and WC14). These areas of infestation are considered a high risk for spread.

Three other invasive species (environmental weeds) were recorded in the project footprint. Spiny Sida (*Sida spinosa*) infestations were recorded along seismic lines 2 (WC4), seismic line 5 and the drill pad. *Stylosanthes hamata* infestations were observed along seismic line 4 and *S. scabra* along seismic line 5. Spiny Sida is native to the neotropics and parts of tropical Asia, having become invasive in temperate parts of Australia. *S. hamata* and *S. scabra* were introduced as pasture plants and also have the potential to become weeds. The risk of spreading these species is high due to the location of the infestations in close proximity to the seismic lines increasing the likelihood of them being transported by machinery to other disturbed areas. Their location is mapped in Figure 5-1.

Table 5-1. Weed species relevant to EP154

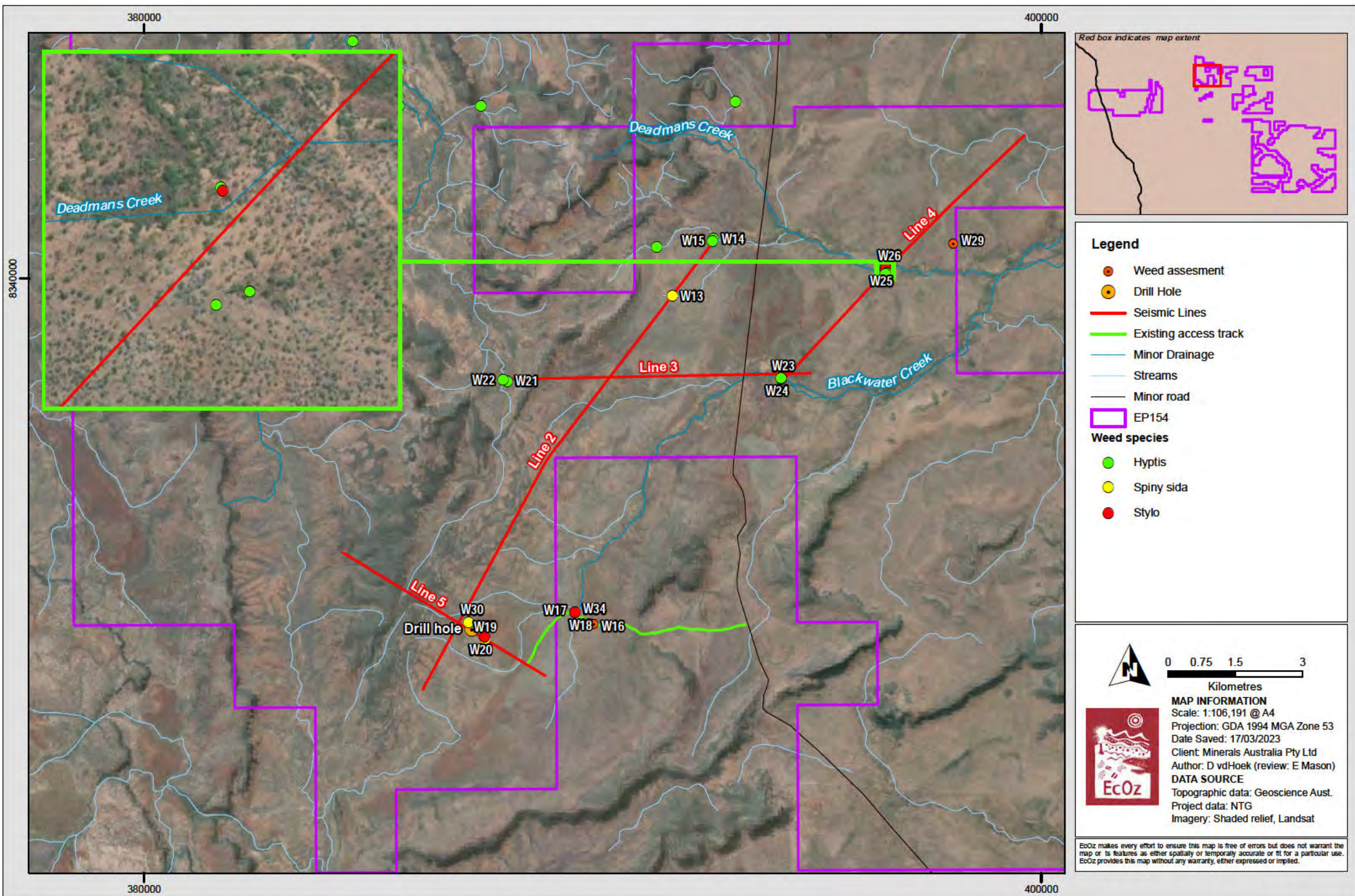
Common name	Scientific name	WoNS	NT Class	Category in regional strategy	Records within project footprint (20km buffer)
Mesquite*	<i>Prosopis spp.</i>	Yes	A	1	-
Prickly Acacia*	<i>Vachellia nilotica (previously Acacia nilotica)</i>	Yes	A	1	Yes
Parthenium	<i>Parthenium hysterophorus</i>	Yes	A	1	Yes
Rubber Vine	<i>Cryptostegia spp.</i>	Yes**	A	1	-
Mimosa*	<i>Mimosa pigra</i>	Yes	A	1	Yes
Salvinia	<i>Salvinia molesta</i>	Yes	B	1	-
Gamba Grass*	<i>Andropogon gayanus</i>	Yes	A	2	Yes
Devils Claw	<i>Martynia annua</i>	-	A	2	Yes
Chinee Apple*	<i>Ziziphus mauritiana</i>	-	A	2	Yes
Bellyache Bush*	<i>Jatropha gossypifolia</i>	Yes	A/B***	2	Yes
Grader Grass*	<i>Themeda quadrivalvis</i>	Yes	B	2	Yes
Neem*	<i>Azadirachta indica</i>	-	B	2	Yes
Parkinsonia	<i>Parkinsonia aculeata</i>	Yes	B	3	Yes
Lantana	<i>Lantana camara</i>	Yes	B	3	Yes
Rubber Bush†	<i>Calotropis procera</i>	-	B	3	Yes
Snake Weed	<i>Stachytarpheta spp.</i>	-	B	4	Yes
Hyptis	<i>Mesosphaerum suaveolens</i>	-	B	4	Yes
Sida species	<i>Sida acuta, S. cordifolia, S. rhombifolia</i>	-	B	4	Yes
Pond Apple	<i>Annona glabra</i>	Yes	A	5	-
Water Hyacinth	<i>Eichhornia crassipes</i>	Yes	A	5	-
Cabomba*	<i>Cabomba caroliniana</i>	Yes	A	5	-
Siam Weed	<i>Chromolaena odorata</i>	Yes	C	5	-
Brazilian Pepper	<i>Schinus terebinthifolius</i>	-	A	-	-

* Species must be eradicated or managed as directed by its Statutory Weed Management Plan

** *Cryptostegia grandiflora* is a WoNS

*** Most of EP154 is within a Class B management zone. The easternmost area is Class A.

† Rubber Bush is considered high priority on the Sturt Plateau but declared class B only south of 16°30' S latitude



Path: Z:\01 EcoZ_Documents\04 EcoZ Vantage GIS\EZ19103 - Hancock - EMP EP154\01 Project Files\Report Maps\Figure 5.3. Map of weed occurrences and drainage within, or adjacent to, the project footprint.mxd

Figure 5-1. Map of weed occurrences within, or adjacent to, the project footprint

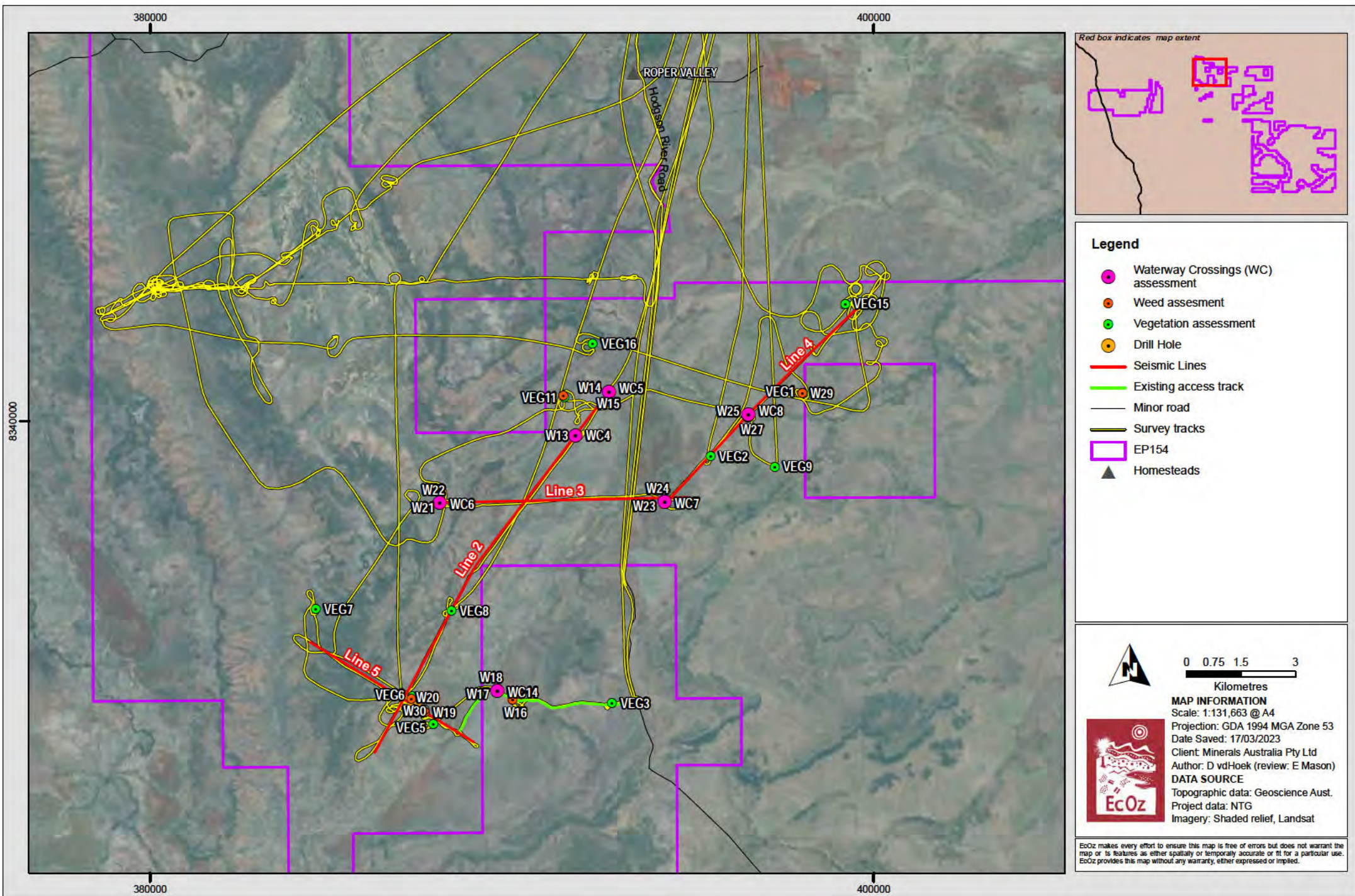


Figure 5-2. Map showing survey effort within investigation area

6 ANNUAL ACTION PLAN

The annual action plan in Table 6-1 details the survey and control activities for weeds recorded within the project area.

Table 6-1. Annual action plan

Weed Management Area	Weed species	Management objective	Survey / monitoring time/s	Treatment time/s	Control method/s / Herbicide
2D seismic lines Drill pads Access tracks Campsite		Prevent the introduction of weeds	Within 4 weeks of the next rainfall event that is sufficient to result in weed growth.	Immediately if weeds are found	Refer to the NT Weed Management Handbook
2D seismic lines Drill pads Access tracks Campsite	Hyptis (<i>Mesosphaerum suaveolens</i>)	Control spread	Within 4 weeks of the next rainfall event that is sufficient to result in weed growth.	November to April, however, December to March preferred	Manually remove all plant material; slash to encourage competition from desirable species. Foliar spray when actively growing using 2, 4-D amine 625 g/L (320 mL / 100 L) or Glyphosate 360 g/L (15 mL / 1 L).
2D seismic lines Drill pads Access tracks Campsite	Spiny Sida (<i>Sida spinosa</i>)	Control spread	Within 4 weeks of the next rainfall event that is sufficient to result in weed growth.	November to April, however, December to March preferred	Repeated slashing and cultivation. Foliar spray when actively growing using 2, 4-D amine 625 g/L (320 mL / 100 L)
2D seismic lines Drill pads Access tracks Campsite	Stylo (<i>Stylosanthes hamata</i>)	Control spread	Within 4 weeks of the next rainfall event that is sufficient to result in weed growth.	November to April, however, December to March preferred	Repeated slashing and cultivation. Contact NT Weed Management Branch for further control advice.
2D seismic lines Drill pads Access tracks Campsite	Stylo (<i>Stylosanthes scabra</i>)	Control spread	Within 4 weeks of the next rainfall event that is sufficient to result in weed growth.	November to April, however, December to March preferred	Repeated slashing and cultivation. Contact NT Weed Management Branch for further control advice.

7 WEED MONITORING

The requirements for weed monitoring within each component of the project area are outlined above in Section 6. Additional to the survey / monitoring times listed in Table 6-1, monitoring for weed incursions will be ongoing during operations, as all operational staff will have a responsibility to report new weed incursions to Minerals Australia's' dedicated weed officer. Should new weed incursions be identified during monitoring, control will be undertaken during recommended treatment times, and follow-up surveys will be conducted within three months to ensure effective eradication of the incursions.

The potential for weed spread within the project area is mostly within the access tracks, campsites, drill pads and the 2D seismic lines. To target survey efforts within areas at high risk of weed establishment, annual weed monitoring will focus on the following areas:

- Known weed locations
- Along access tracks
- Seismic lines and drill pads
- 50 m buffer around stock watering points traversed by access tracks
- Any other areas that were disturbed during the 2D seismic survey project.

7.1 Notification procedure

All new weed incursions will be reported to the NT Weed Management Branch by Minerals Australia's' dedicated weed officer. Initial notification will be verbal, followed by written notification of preliminary species identification and location within seven working days.

7.2 Recording

All weed monitoring and survey activities will be recorded in accordance with *the NT Weed Data Collection Guidelines* available at: <https://nt.gov.au/environment/weeds/weed-mapping-and-data-sharing>.

The following attributes of any new weed infestations will be recorded into a GPS-enabled device:

- Site ID
- Weed name
- ID confidence
- Date of record
- Coordinate information
- Recorder / organisation
- Infestation size
 - 5 m diameter
 - 20 m diameter
 - 50 m diameter
 - 100 m diameter
- Infestation density
 - 1 = Absent, no weeds of this species in the area
 - 2 = < 1%; very few, not many weeds
 - 3 = 1 – 10%; more than one or two isolate plants
 - 4 = 11 – 50%; Many plants, covering up to half the area
 - 5 = > 50%; Weed forms the dominant cover

Weed data will be submitted as an Excel spreadsheet to the Weeds Management Branch (refer Appendix D for an example template).

7.3 Reporting

Minerals Australia's' weed management officer will submit annual reporting against this WMP as a component of the EMP environmental reporting requirements. This will include

- Details of activities implemented to address weed spread and introduction risks
- Submission of all weed data collected
- Details of survey and monitoring events, including dates, personnel, maps and track data
- An overview of weed control events and success rates.

This annual report will be reviewed by the NT Government's Onshore petroleum weed management officer.

8 REFERENCES

- Department of Environment, Parks and Water Security (DEPWS) (2021). *Katherine Regional Weeds Strategy 2021-2026*. Palmerston, Northern Territory Government.
- Weed Management Branch (2015a) *Northern Territory Weed Management Handbook*, Department of Land Resource Management, Northern Territory Government, Darwin
- Weed Management Branch (2015b). *Northern Territory Weed Data Collection Manual*, Department of Land Resource Management, Northern Territory Government, Darwin

APPENDIX A WEED DISTRUBUTION MAPS (DEPWS 2021)

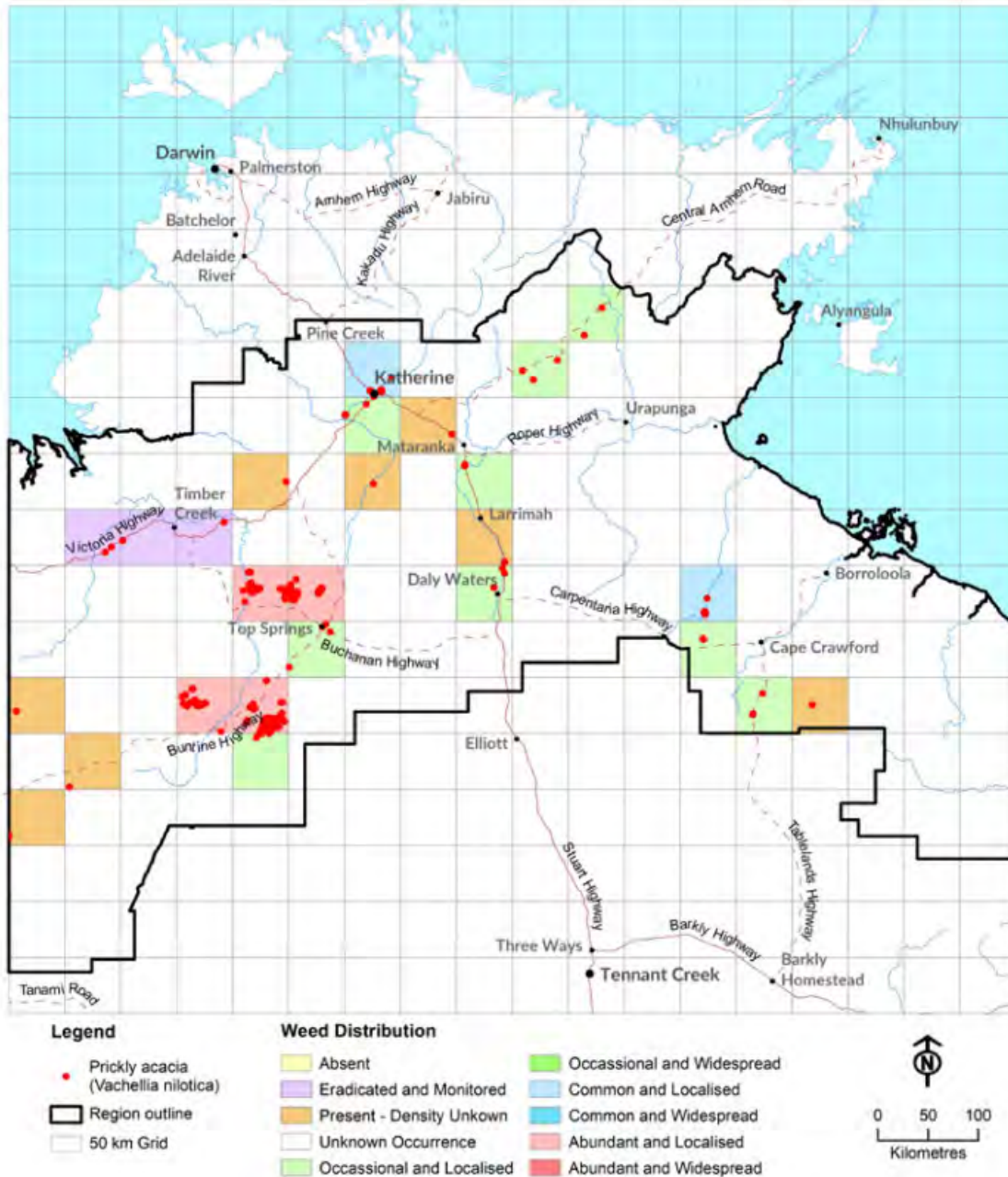


Figure 8-1. Map of Prickly acacia distribution (DEPWS 2021)

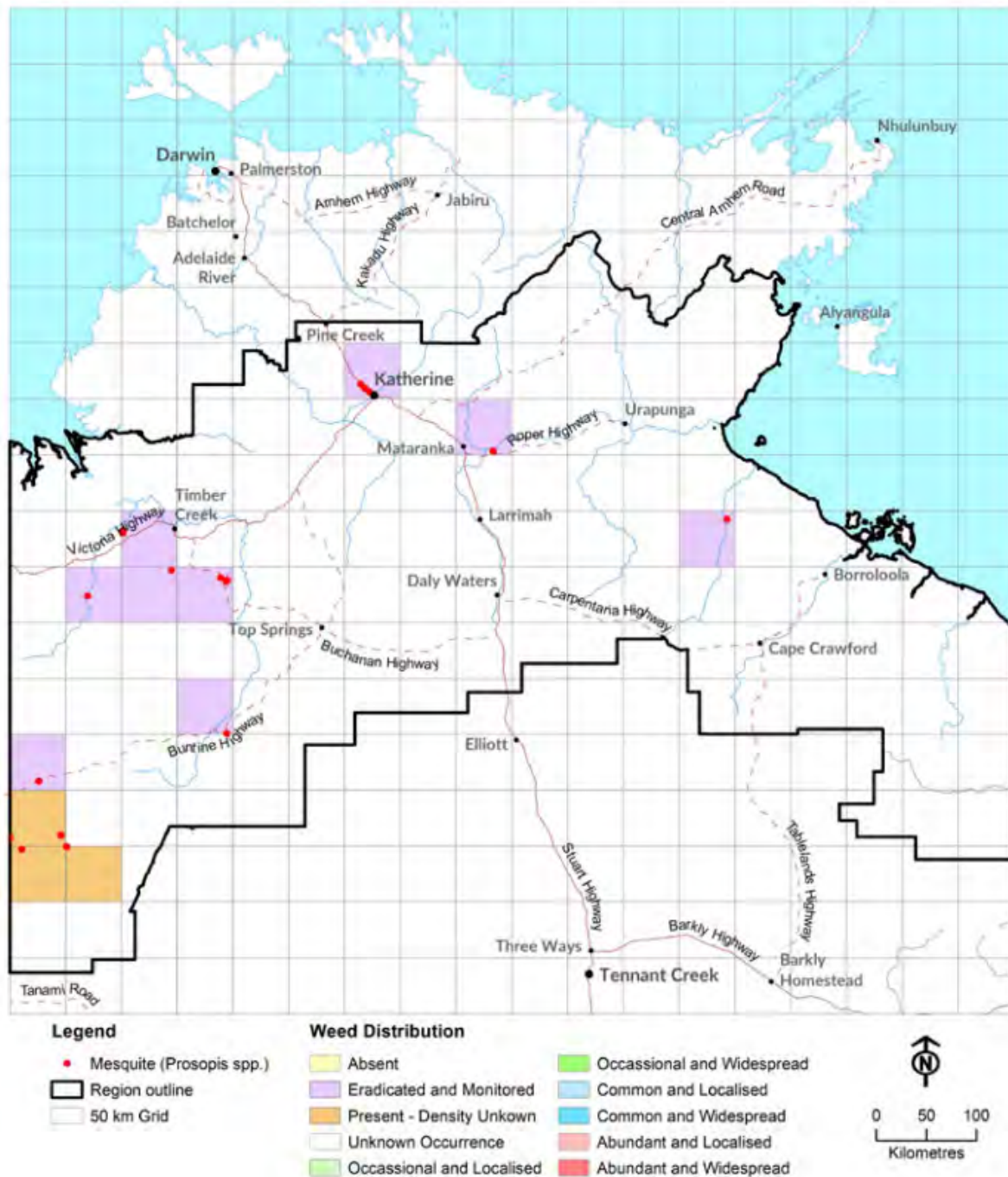


Figure 8-2. Map of Mesquite distribution (DEPWS 2021)

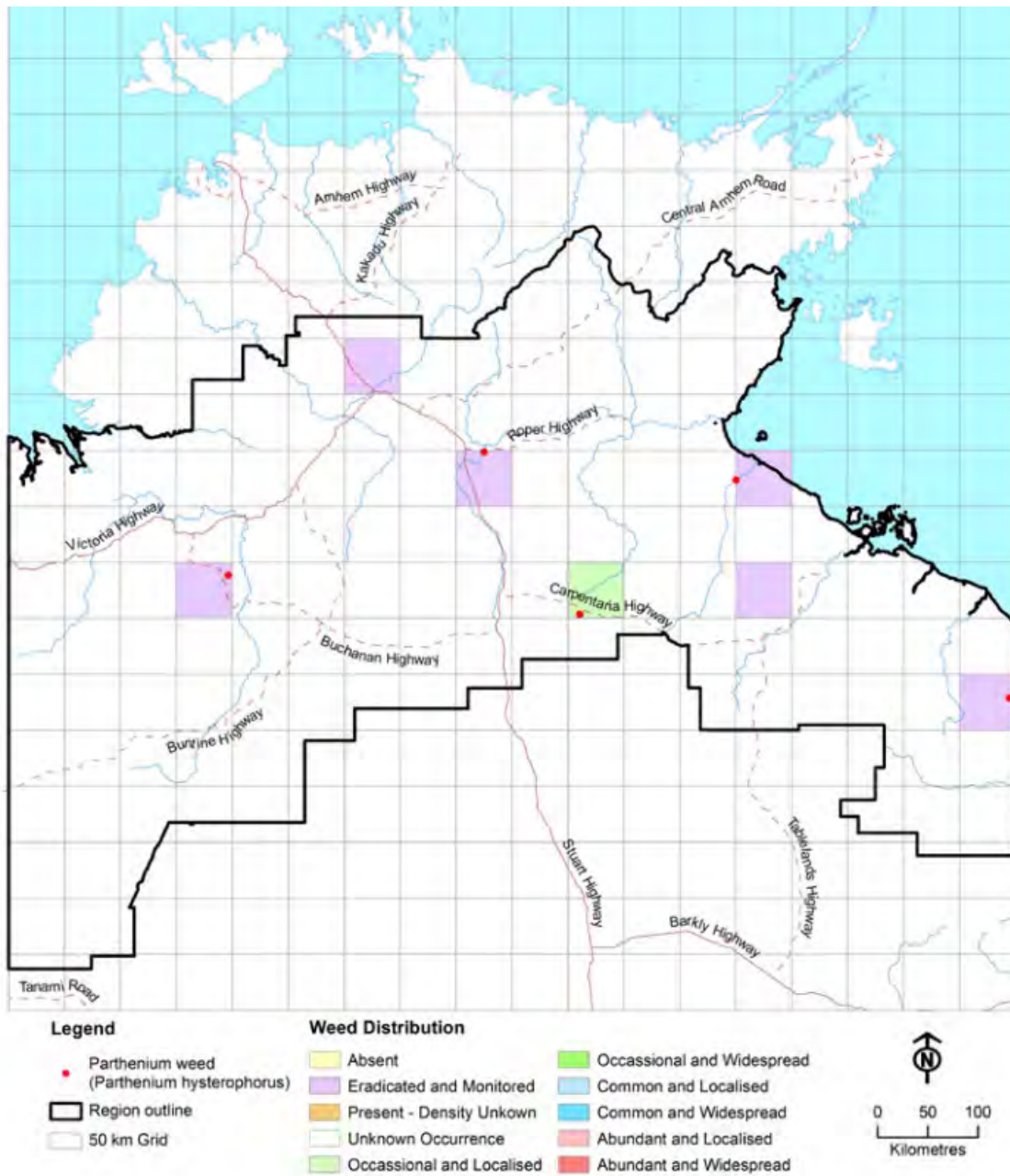


Figure 8-3. Map of Parthenium weed distribution (DEPWS 2021)

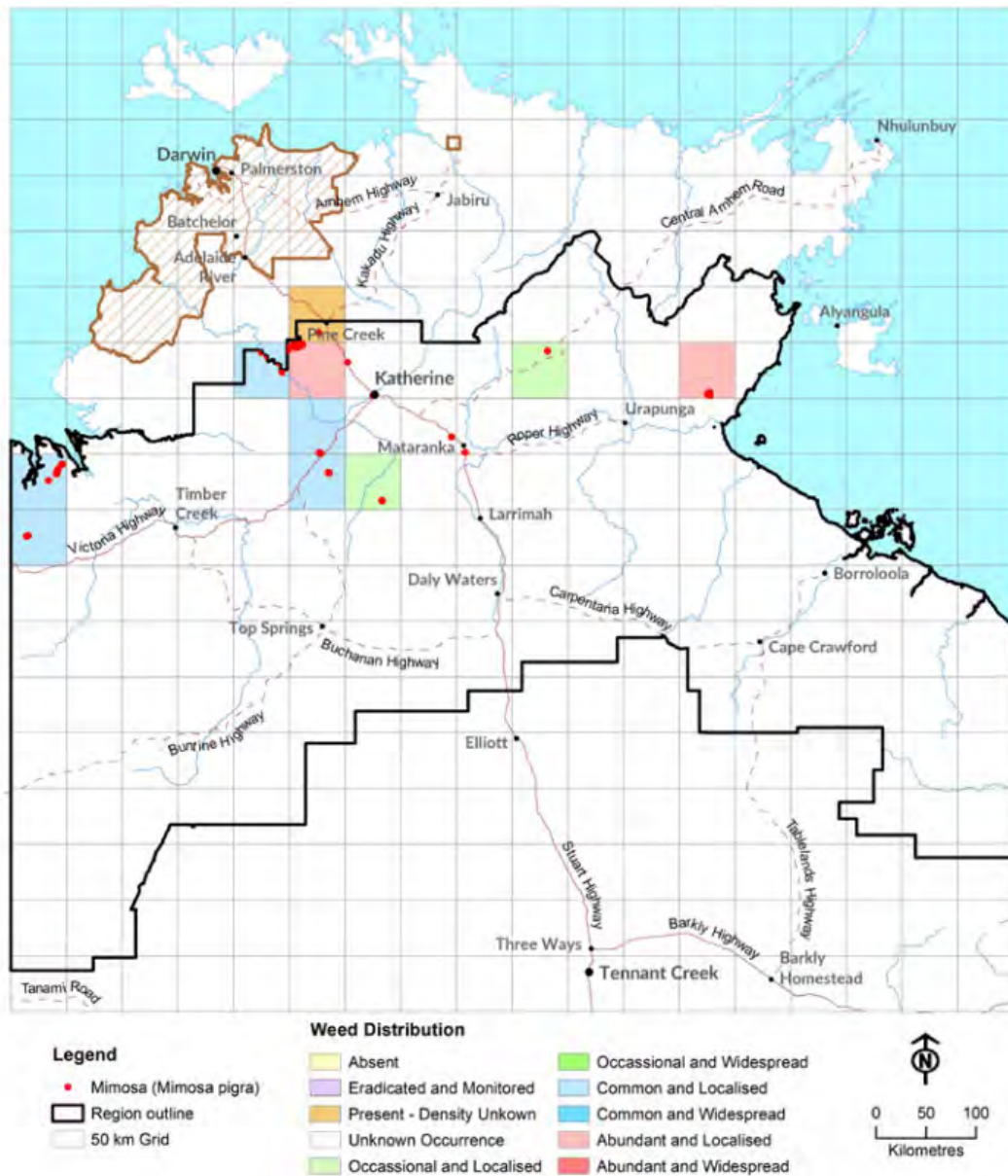


Figure 8-4. Map of Mimosa distribution (DEPWS 2021)

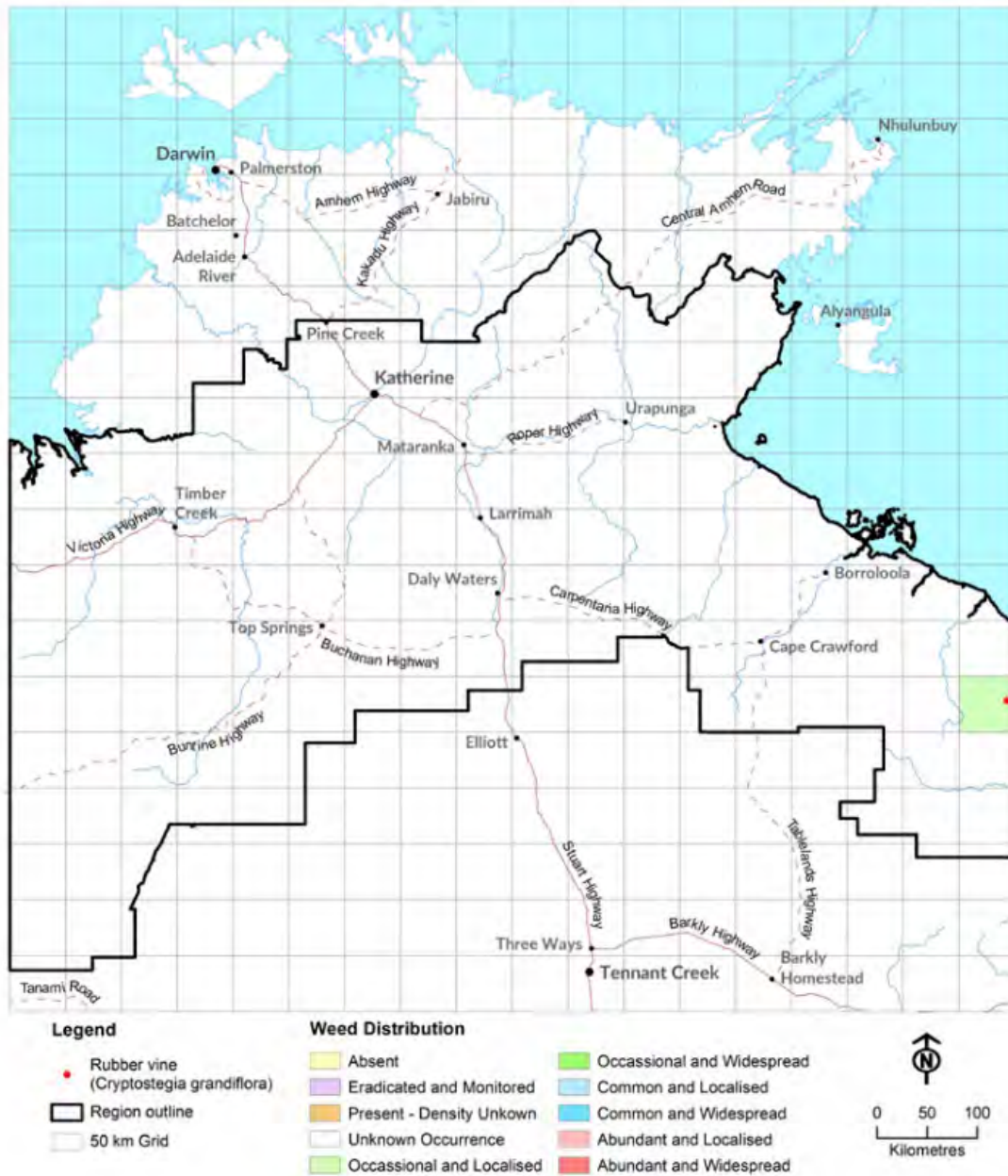


Figure 8-5. Map of Rubber vine distribution (DEPWS 2021)

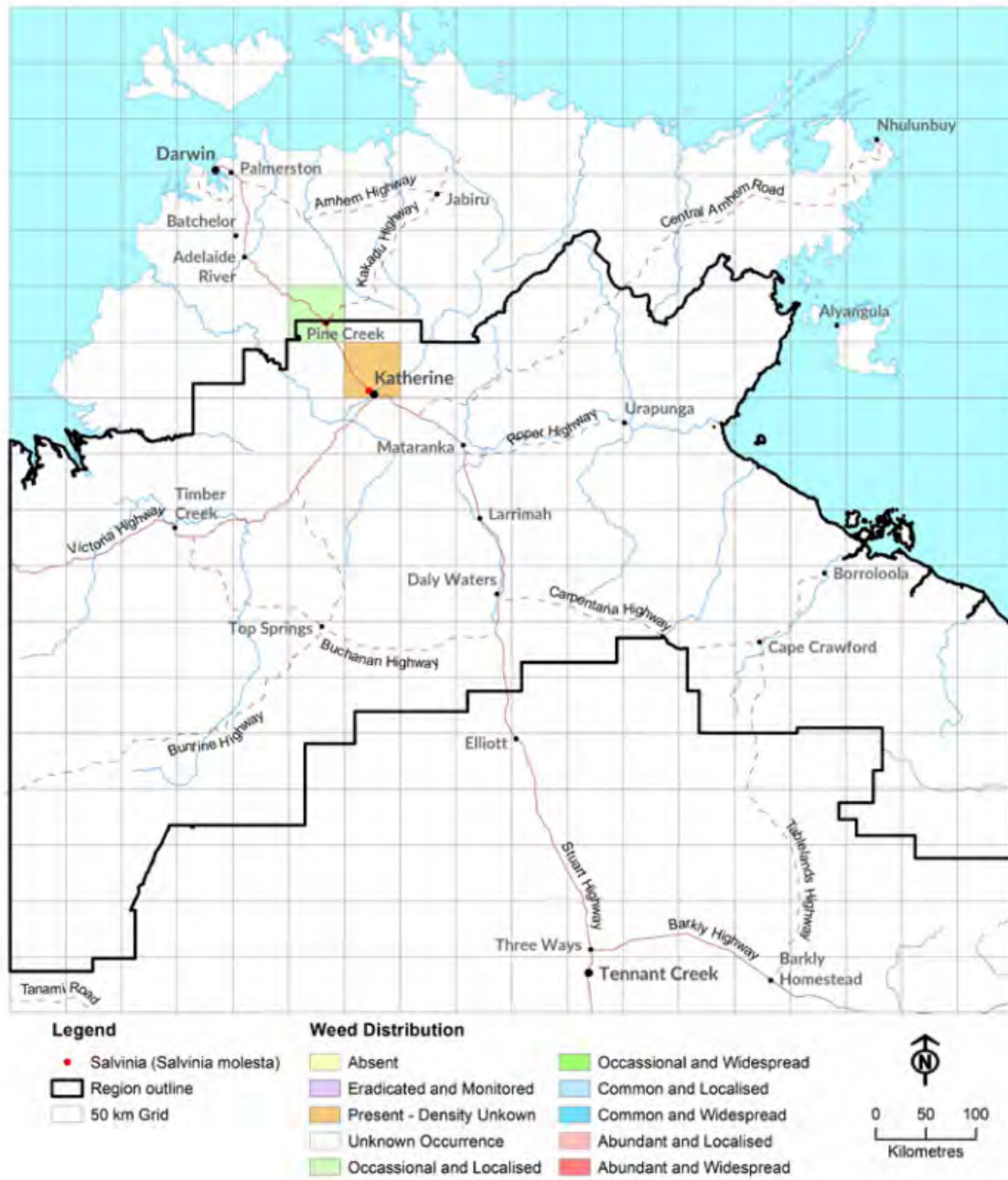


Figure 8-6. Map of Salvinia distribution (DEPWS 2021)

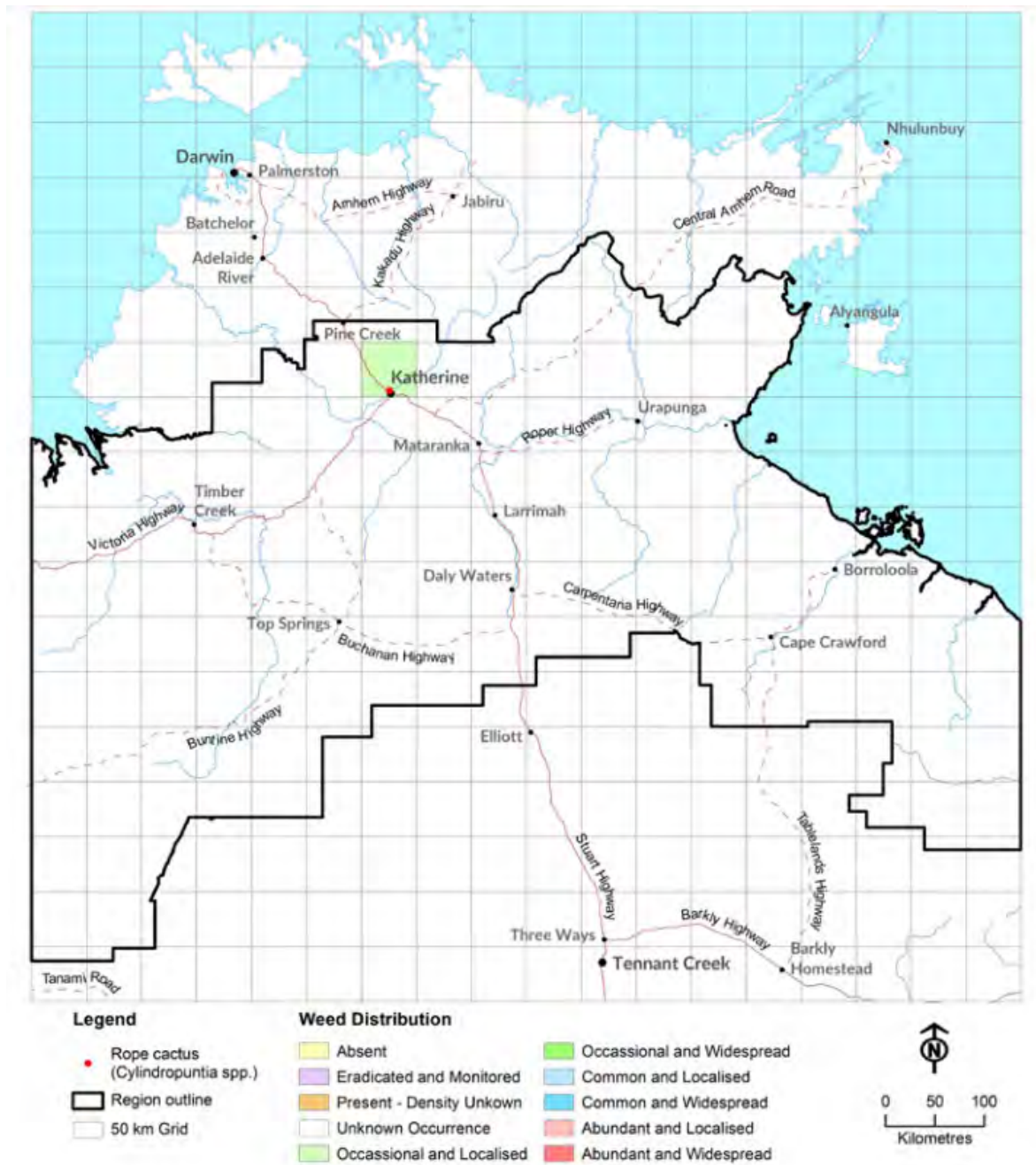


Figure 8-7. Map of Rope cactus distribution (DEPWS 2021)

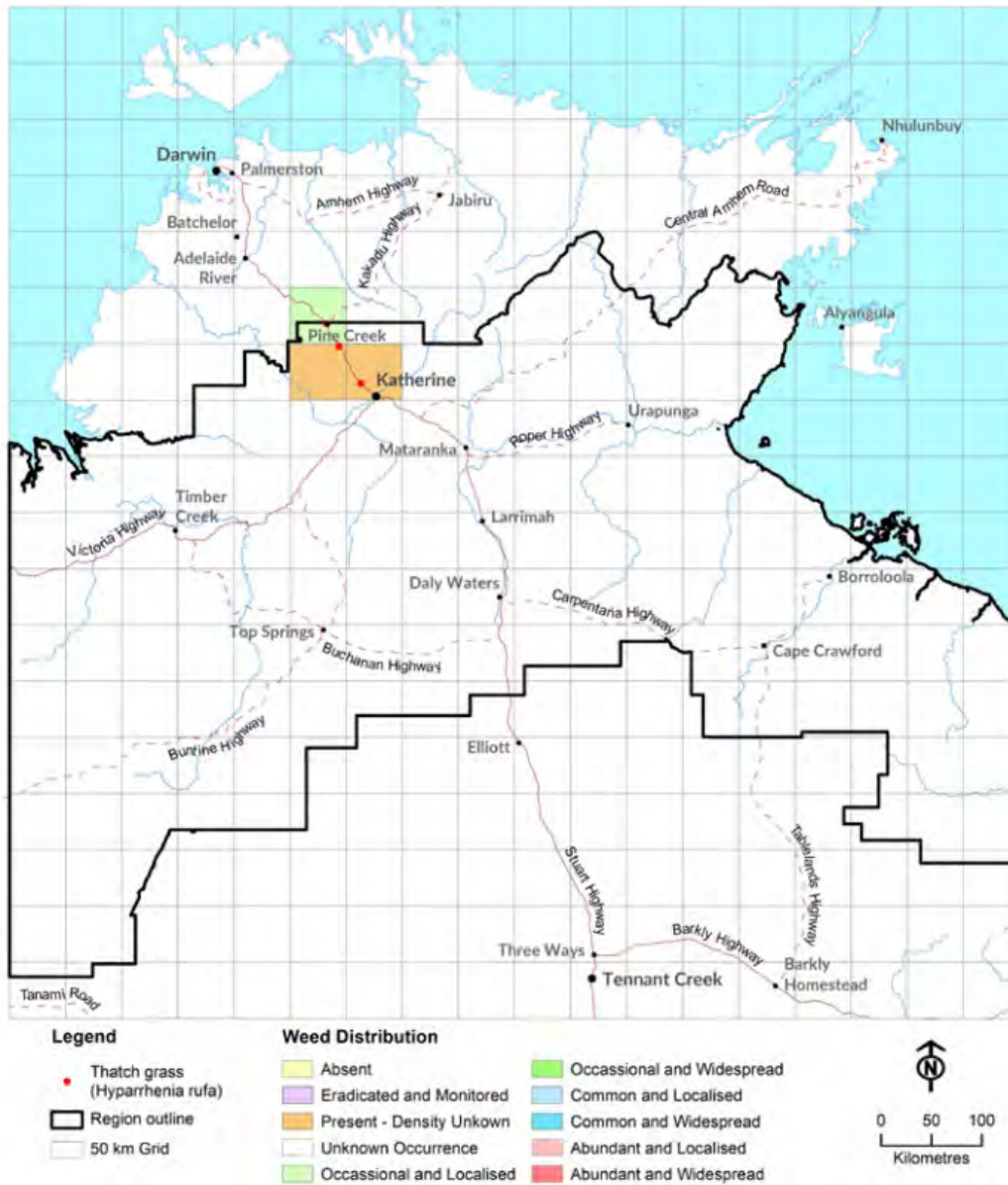


Figure 8-8. Map of Thatch grass distribution (DEPWS2021)

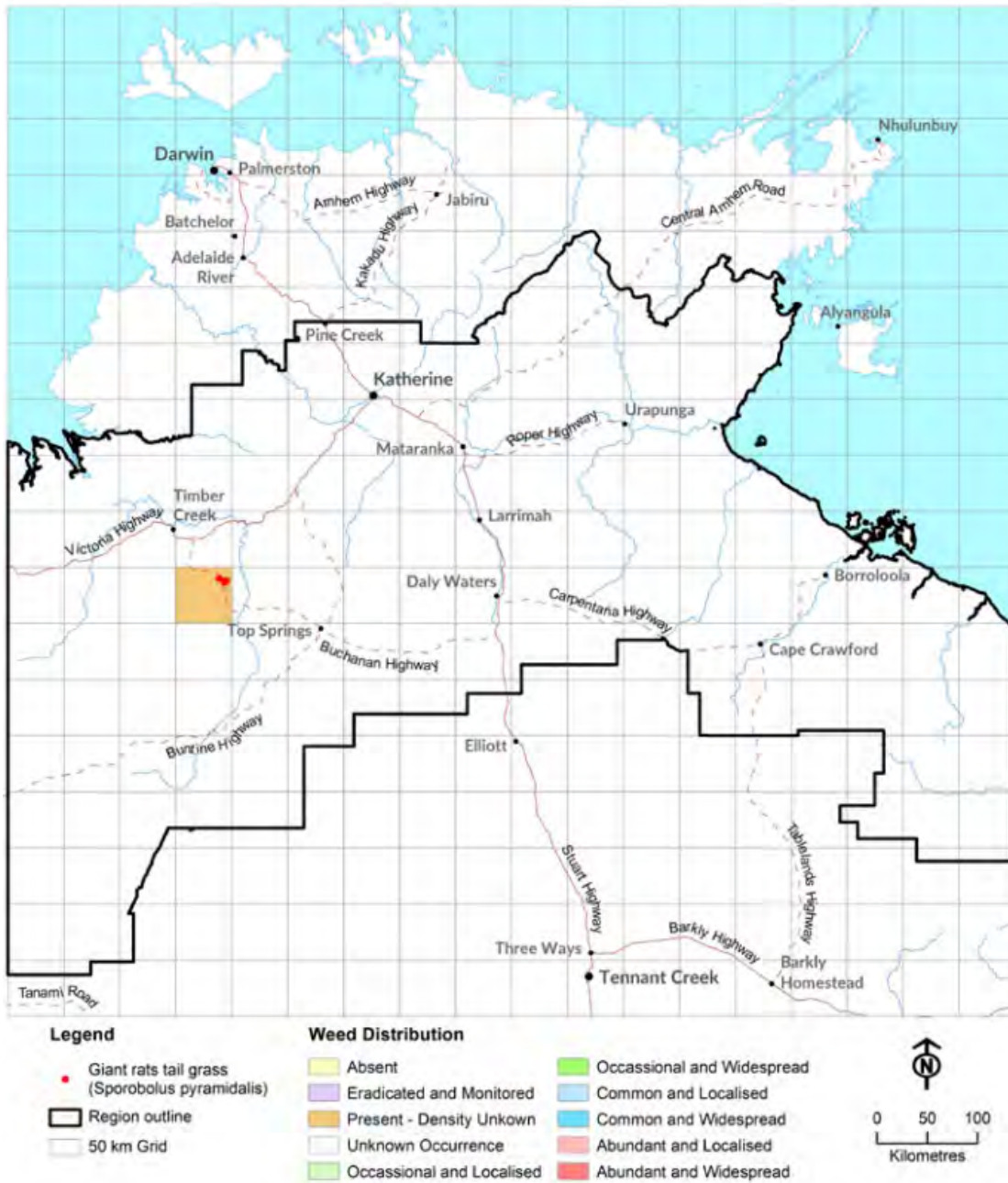


Figure 8-9. Map of Giant rats tail grass distribution (DEPWS 2021)

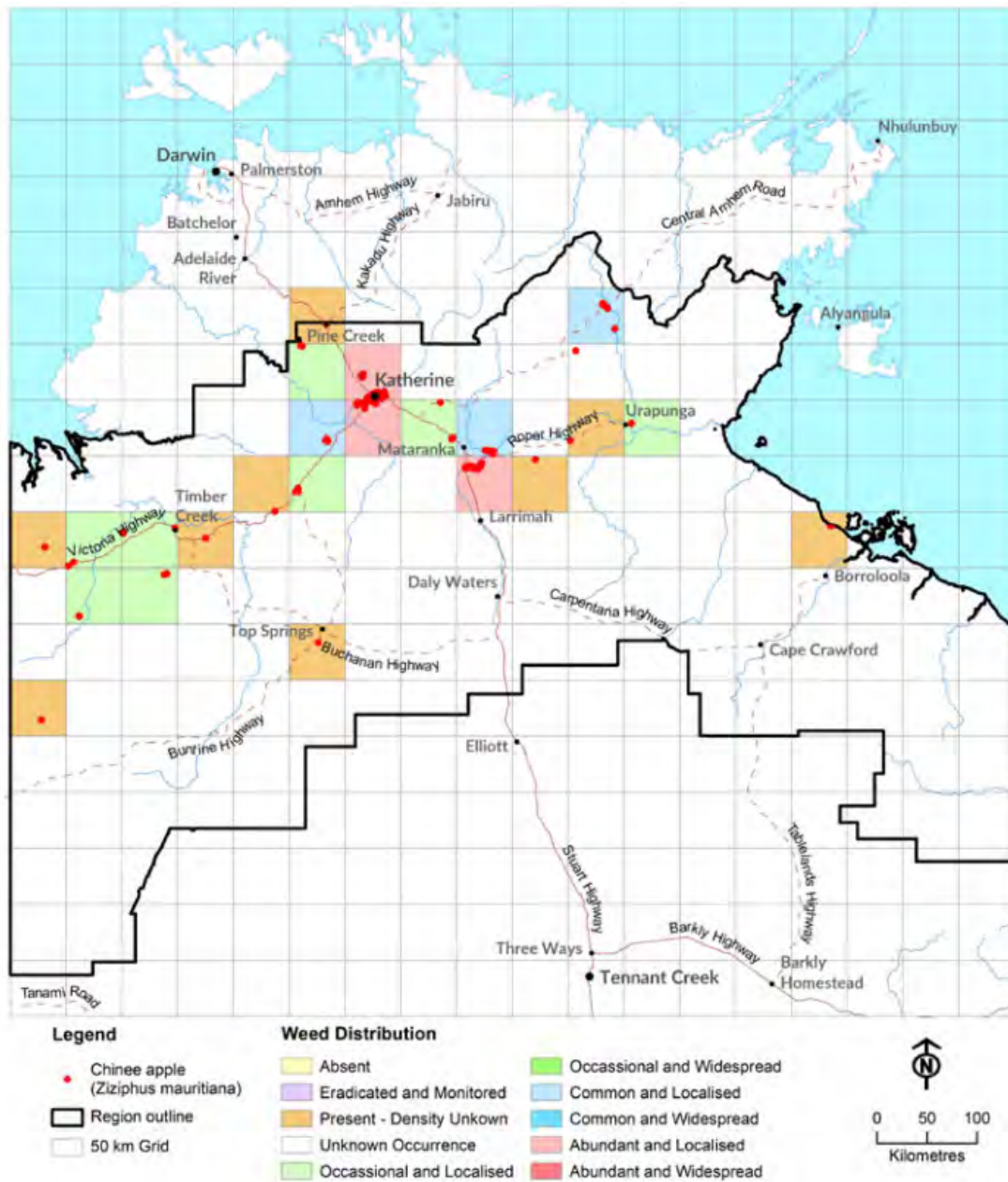


Figure 8-10. Map of Chinee apple distribution (DEPWS 2021)

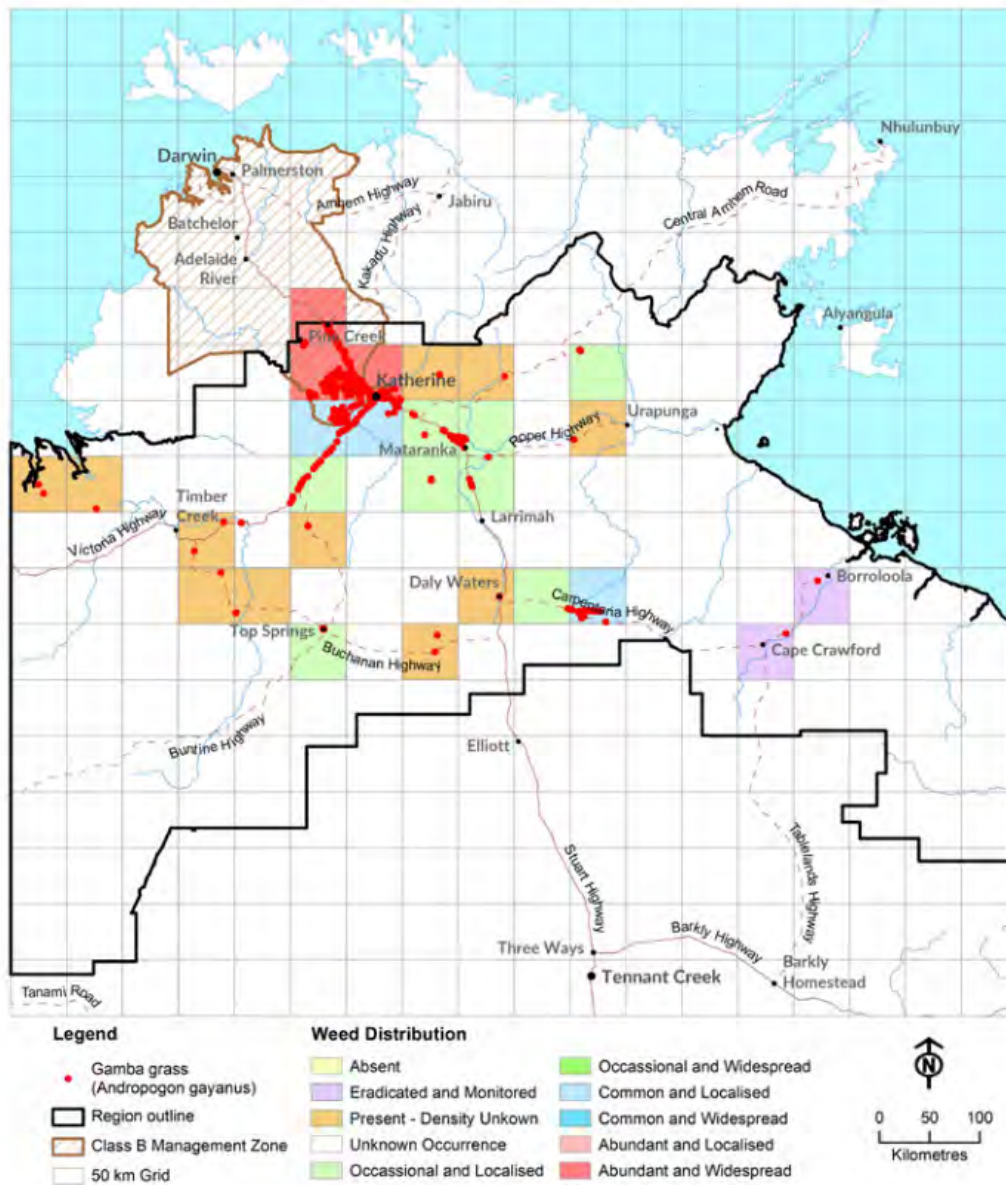


Figure 8-11. Map of Gamba grass distribution (DEPWS 2021)

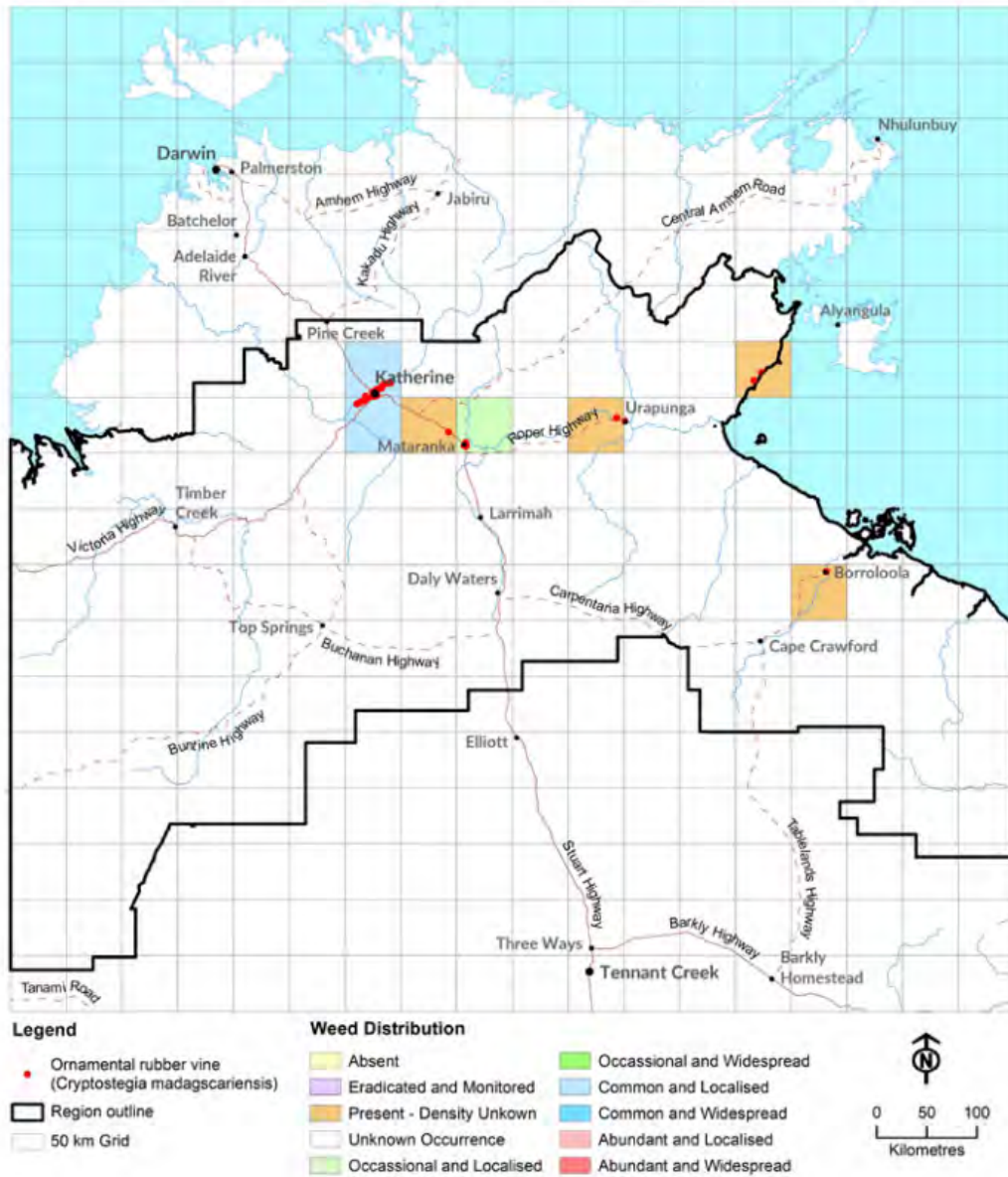


Figure 8-12. Map of Ornamental rubber vine (DEPWS 2021)

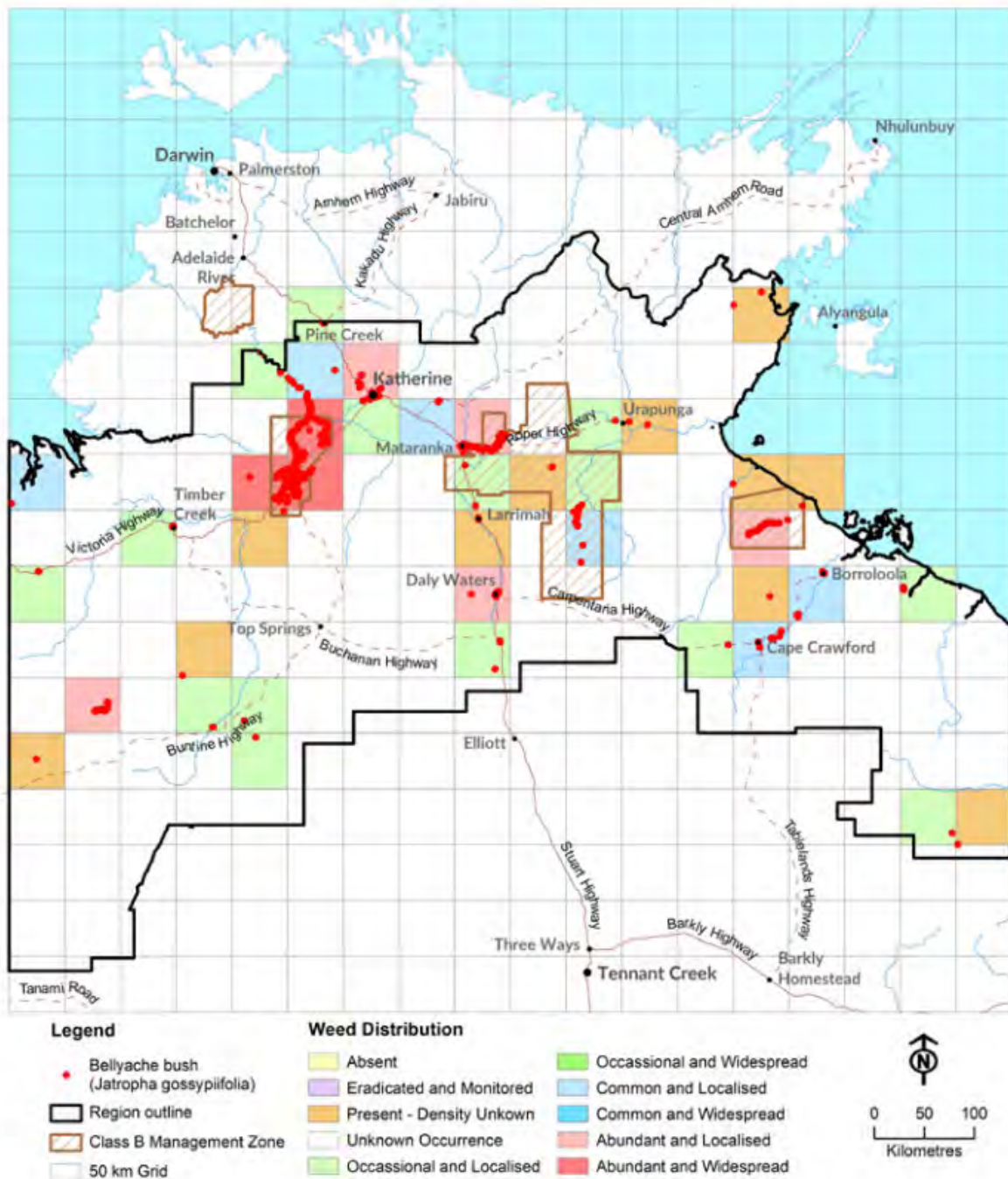


Figure 8-13. Map of Bellyache bush distribution (DEPWS 2021)

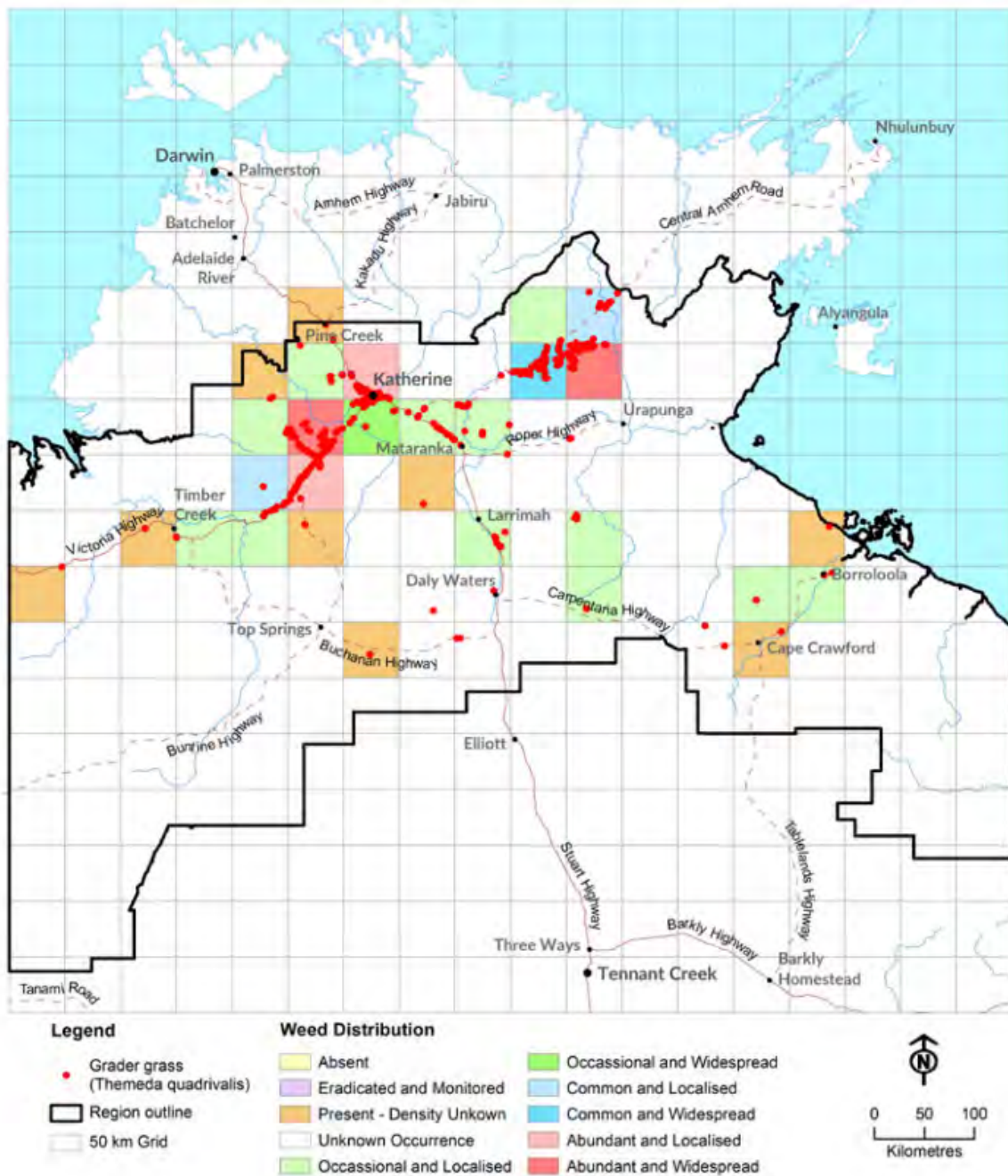


Figure 8-14. Map of Grader grass distribution (DEPWS 2021)

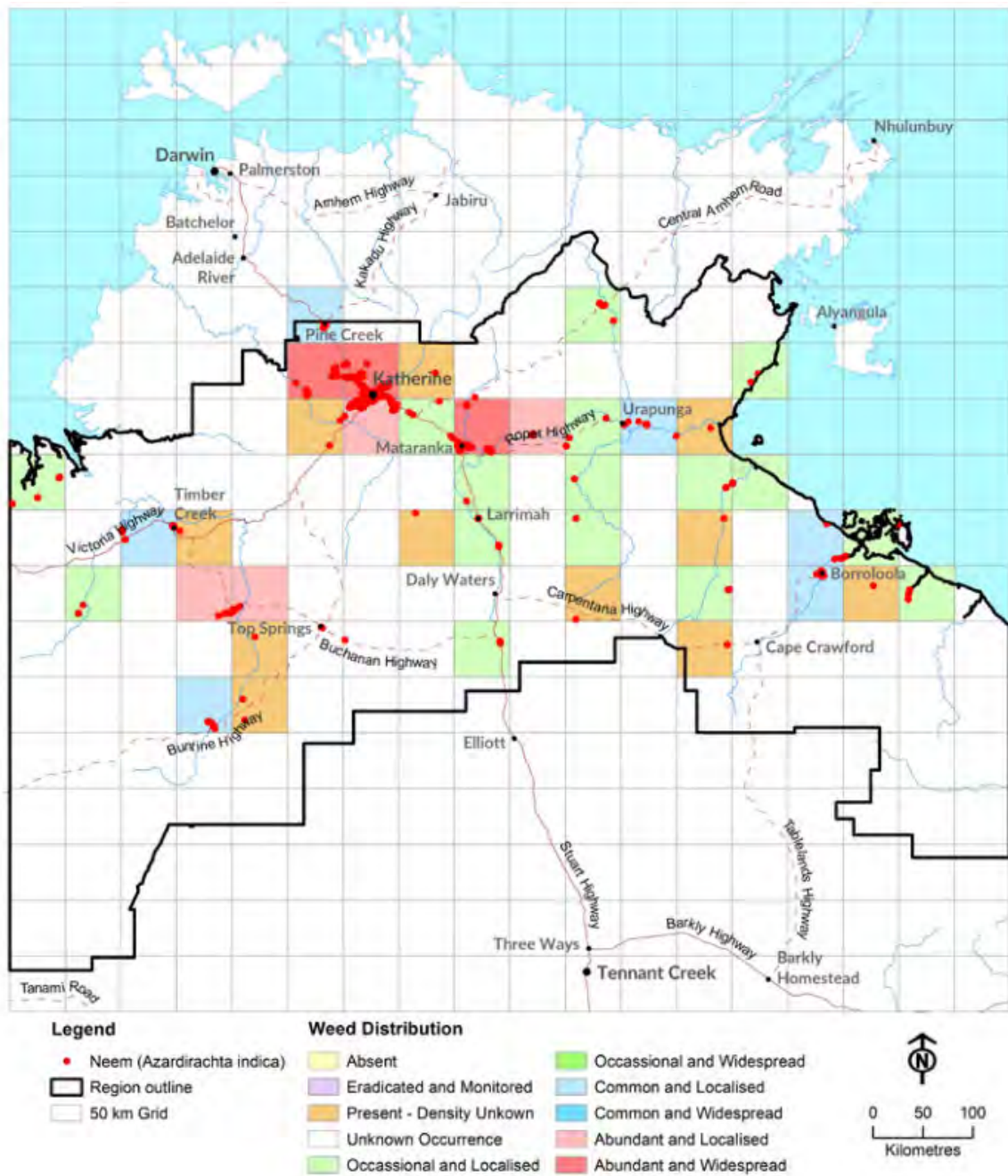


Figure 8-15. Map of Neem distribution (DEPWS 2021)

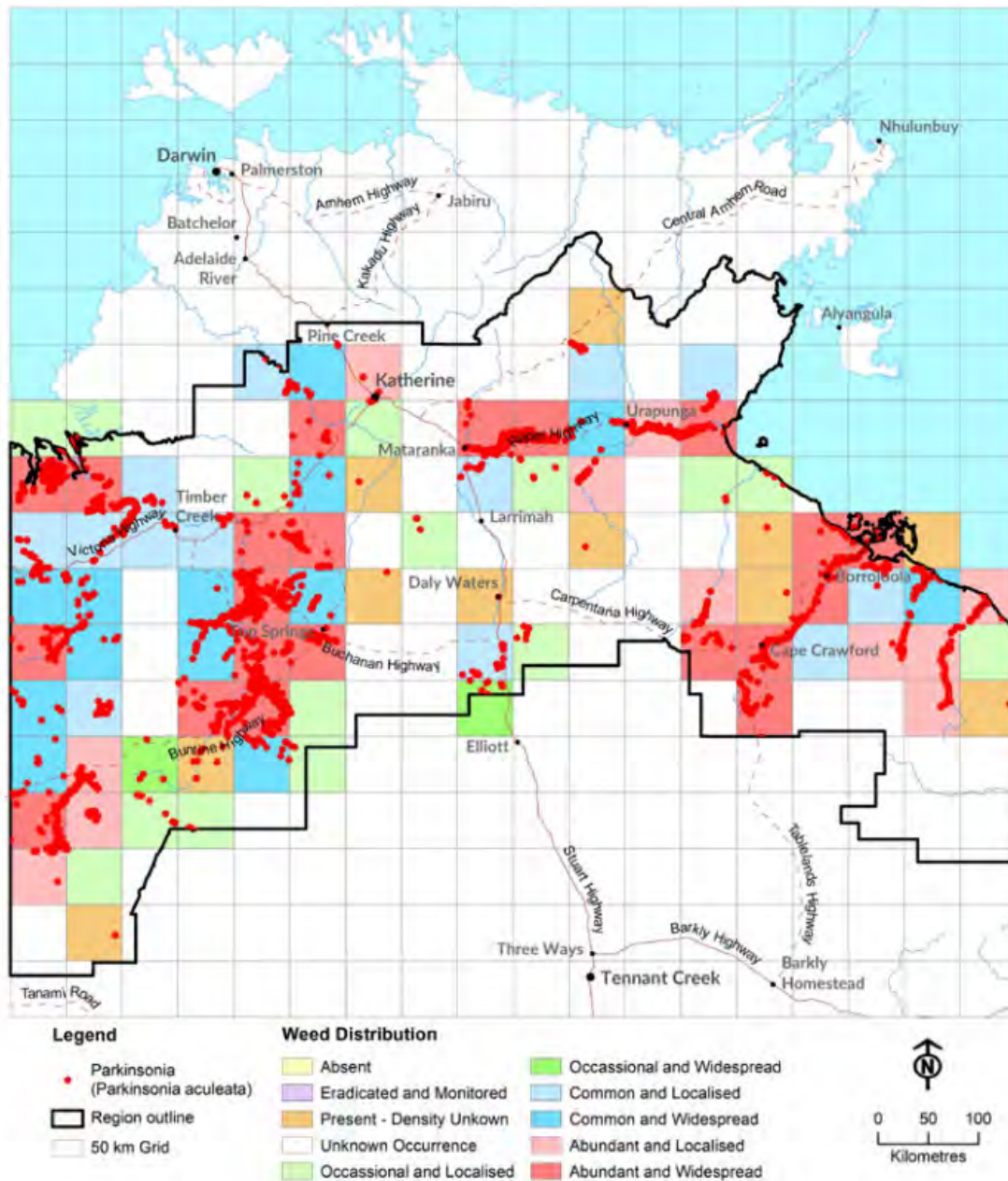


Figure 8-16. Map of Parkinsonia distribution (DEPWS 2021)

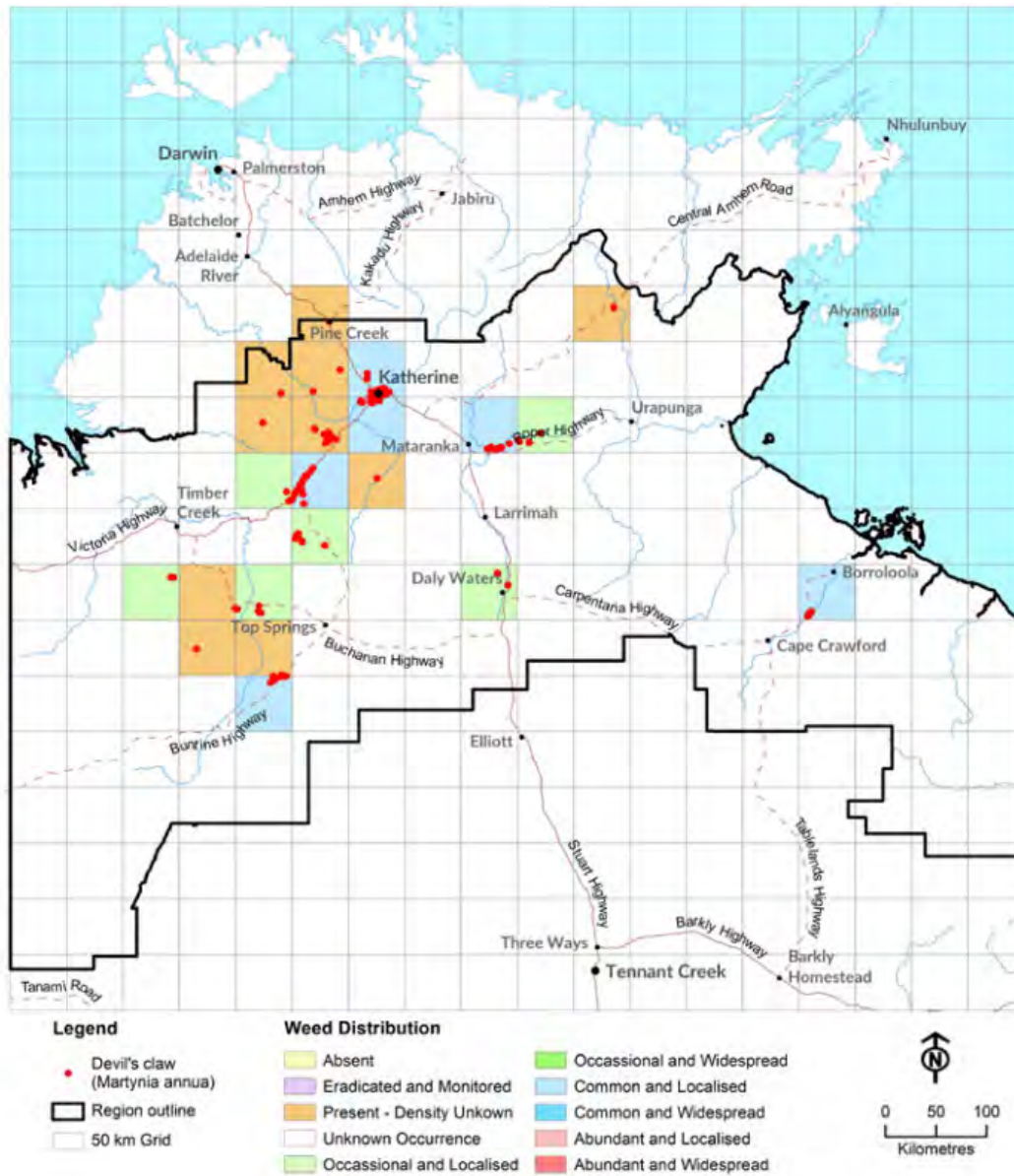


Figure 8-17. Map of Devil's claw distribution (DEPWS 2021)

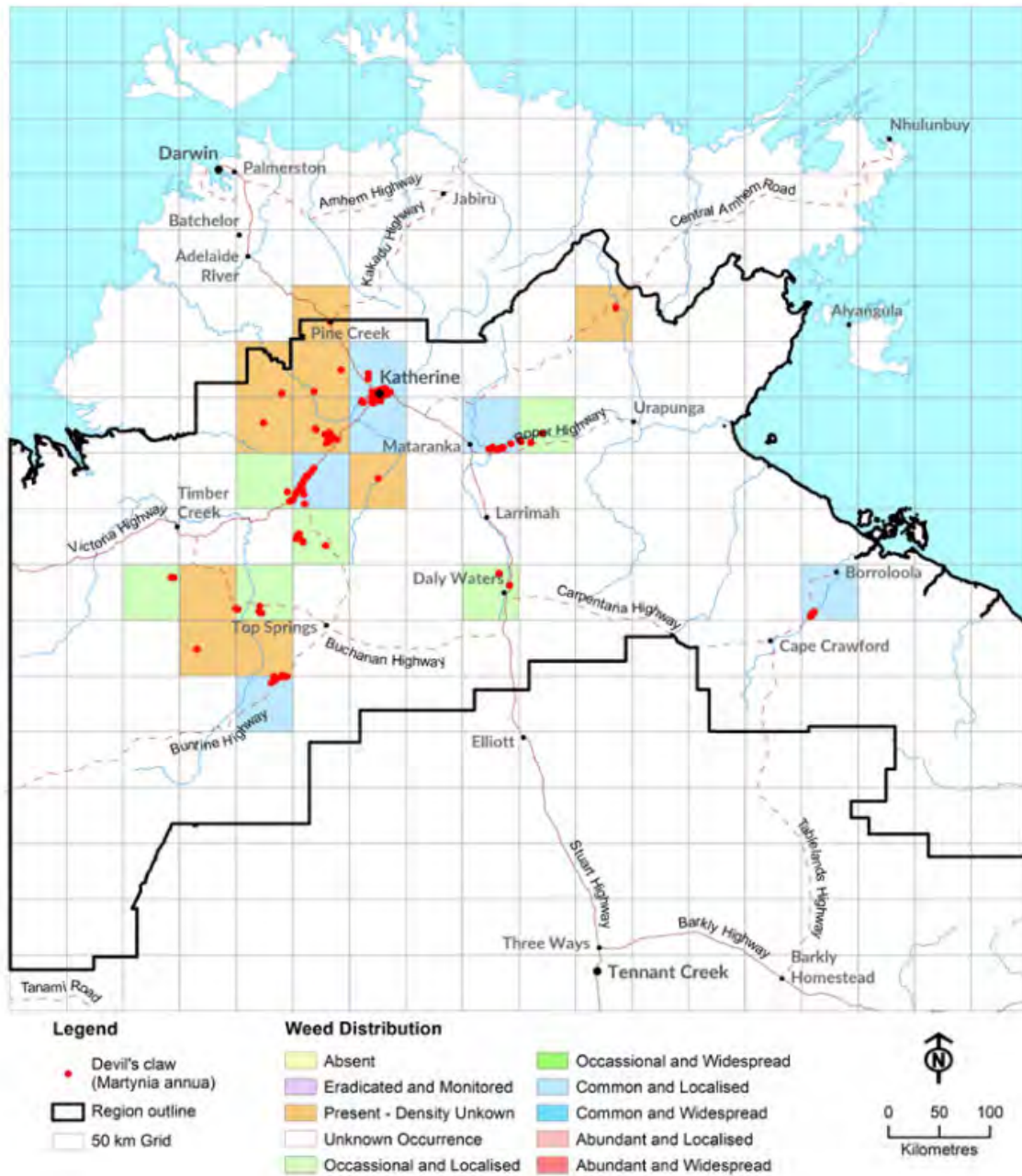


Figure 8-18. Map of Athel pine distribution (DEPWS 2021)

APPENDIX B ENVIRONMENTAL POLICY

APPENDIX 110A

HPPL.RDG.HSE.SP.003 ENVIRONMENTAL MANAGEMENT (HANCOCK)

Relates to Blocks: 1, 2 & 4

CONTEXT AND PURPOSE

Exploration activities have the potential to adversely impact the environment. Hancock Prospecting Pty Ltd. (HPPL) is committed to environmental protection and any potential environmental impacts caused by our activities need to be understood, evaluated and effectively managed.

SCOPE AND APPLICATION

This Standard establishes environmental management expectations for all HPPL controlled exploration activities or activities managed by others in partnership with HPPL.

PERFORMANCE REQUIREMENTS

1. We will not explore in any World Heritage Area, National Park, Protected Areas Categories I-IV, a threatened species habitat (as defined by the World Conservation Union) or in a sub-marine environment.
2. Program Execution Plans will include:
 - A Land Management Plan;
 - Environmental Management Plans for hazardous materials and activities with the potential to cause *material environmental impacts* or to cause impacts to biodiversity;
 - A Water Management Plan;
 - identification of National Parks, Conservation Areas or threatened species habitats where legislation or public sentiment may impact the ability to execute the proposed exploration operation;
 - closure criteria and costed rehabilitation plans; and
 - the expected cost of current and future environmental liabilities.
3. The respective HPPL designated senior *project leader (or assigned delegate)* is responsible for ensuring that HPPL explicitly considers, any significant environmental issues associated with a proposed Exploration, including the potential for the proposed activity to impact local and regional biodiversity, prior to providing approval for the proposed activity.
4. *Environmental baselines*, developed with input of appropriately experienced and knowledgeable environmental consultants, will be established prior to commencing any field activity where:
 - our planned activities will cause ground disturbance or will have the potential impact biodiversity; or
 - there has been previous exploration, mining or other activity that may have caused environmental impacts.
5. Performance against Environmental Management Plans will be monitored by the respective Exploration Manager and or HSE Specialist and reported at the annual Program or Regional Appraisal.
6. Environmental impacts will be monitored and progressively rehabilitated.
7. Waste generation will be measured and records of waste disposal will be retained.
8. Land Disturbance Plans and Registers will be maintained for every operations area. The Land Disturbance Plan will include the process required to gain legal approvals and authorities for any land disturbance.
9. Consumption of natural resources and raw materials and emissions of *prescribed materials* will be recorded for all HPPL activities.
10. A register of *legacy environmental obligations* will be maintained and all environmental commitments will be managed through to completion.

ROLES AND RESPONSIBILITIES

The HPPL designated senior *project leader (or assigned delegate)* are responsible for:

- ensuring that HPPL is aware of potential environmental issues associated with a proposed Exploration program prior to approving funding for the Program; and
- approving Environmental Management Plans contained in a Program Execution Plan.

Program Managers are responsible for:

- approving Project-specific Land Disturbance Plans;
- monitoring performance against Environmental Management Plans; and
- recording and reporting consumption of prescribed material and emissions for the exploration operation.

The HPPL **HSE Specialist** is responsible for:

- establishing and maintaining a system for recording consumption and emissions of prescribed materials; and
- maintaining a register of legacy environmental obligations and reporting.

RELATED DOCUMENTS

- Appraisals and Assurance
- Land Management Plan

DEFINITIONS

Environmental Baselines	means	a documented account of the condition of the ground, plants, animals, water and air in a project area prior to planned exploration activities commencing.
Legacy environmental obligations	means	an obligation to monitor environmental conditions or rehabilitate disturbance that extends beyond the life of an Exploration Program and has not been transferred to an independent operating legal entity.
Material Environmental Impact	means	any disturbance to the ground, plants, animals, water or air that has the potential for an impact comparable to a maximum foreseeable loss of Level 4 or above on the Incident Severity Table
Prescribed materials	means	Any material for which HPPL reporting may be required

APPENDIX C WEED HYGIENE DECLARATION



Weed Hygiene Declaration

This declaration is valid for transport and movement of vehicles and equipment from to (provide locations) and will stay current pursuant to the definition of clean in Definitions.

VEHICLE DESCRIPTION

Make: Registration # or engine number:

Was clean prior to entry to (destination)

Add equipment examined to the Equipment Register

Certifier name

Certifier qualification Qualification date

DECLARATION

I, (name), of (street)
 town state telephone

declare the information I provided in this declaration is true and correct and I have read the accompanying explanatory notes before completion of this declaration.

Signature Date

EXPLANATORY NOTES

This certification process was developed to fulfill one of the stated purposes of the NT *Weed Management Act* and the Qld Land Protection (*Pest and Stock Route Management Act 2002*).

It applies to, as a minimum, all weeds listed as weeds in the relevant jurisdiction and any plants that a stakeholder does not want transported or introduced.

DEFINITIONS

Clean:

- Means that no soil or organic matter is present on vehicles or equipment
- Vehicles and equipment are considered clean if, after certified weed free, it does not touch soil or vegetative material, ie for a vehicle this means it travels on sealed or well-maintained unsealed roads.

Equipment means anything other than a vehicle.

Vehicle includes anything used for carrying a thing or person by land, water or air.

Weed reproductive material means any part of a plant that is capable of producing another plant by sexual or asexual means. This includes seeds, bulbs, rhizomes, tuber, stem, leaf cuttings or a whole plant.

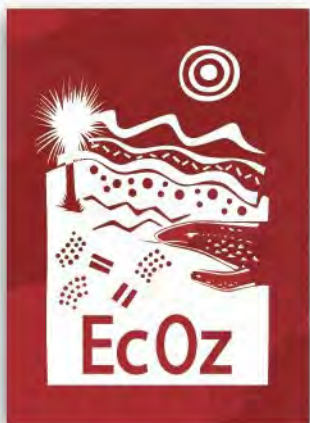
Well-maintained unsealed road means roads that do not have vegetation growing on or encroaching onto the area occupied by traffic.

APPENDIX D WEED CONTROL RECORDING TEMPLATE

Excel interface showing the Weed Branch data entry sheet. The spreadsheet is titled "Weed Branch data entry sheet_Feb19 - Excel". The ribbon includes File, Home, Insert, Page Layout, Formulas, Data, Review, View, Foxit PDF, M-Files, Acrobat, VBM, Tell me what you want to do..., Felicity Watt, and Share.

1	RECORDER:				PROJECT:				LOCALITY:						
2	ORG_NAME:				GPS NAME/MODEL:				RECORDING METHOD:						
3	SITE_ID	DATE_REC	LAT_G84	LONG_G84	WEED_NAME	SIZE_DIA_M	DENS_CAT	SEEDLINGS	JUVENILES	ADULTS	SEED_PRES	PAST_TREAT	TREATMENT	HERBICIDE	COMMENTS
4															
5															
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The spreadsheet has tabs for DEC_DEG, UTM, HELP_LIST, WEED_NAMES, GIS_FORM_DD, and GIS_FORM_UTM. The status bar shows "Ready" and a zoom level of 86%.



EcOz Environmental Consultants

EcOz Pty Ltd.

ABN 81 143 989 039

Level 1, 70 Cavenagh St,
GPO Box 381,
Darwin, NT 0801

T: +61 8 8981 1100

E: ecoz@ecoz.com.au

www.ecoz.com.au



QMS Certification Services



QMS Certification Services



QMS Certification Services

APPENDIX J BUSHFIRE MANAGEMENT PLAN EP144



Bushfire First Responder Actions
<p>Remove yourself and others from potentially dangerous situations Raise the alarm with the Minerals Australia Fire Officer Identify; a. Location b. Immediate threats c. Fire characteristics (what is burning, direction and speed of travel) d. Weather – wind strength and direction If possible, wait in a safe location for directions from the Fire Officer or the Pastoralist and communicate this fact. The Minerals Australia Fire Officer is responsible for alerting the Land Owner, neighboring landholders and Bushfires NT and arranging what response should be taken to the fire</p>

Preparedness planning
<p>On any day rated as having a fire danger of severe, extreme or catastrophic, personnel responsible for bushfire safety must: -Alert all staff to fire rating danger -Ensure all staff, contractors etc know that they must immediately report any form of fire activity, near or far and who to report to. -Staff working away from the Infrastructure Protection Buffer must be aware of heightened fire risk -Regularly monitor NAFI as well as scanning the surrounds for smoke plumes and any other suggestions of fire. -Ensure days' work plans are suitable for current fire rating -Ensure that equipment is stored within the Infrastructure Protection Buffer area -Ensure communication and notification channels are readily available and functioning -Ensure any firefighting equipment is available and functioning</p>

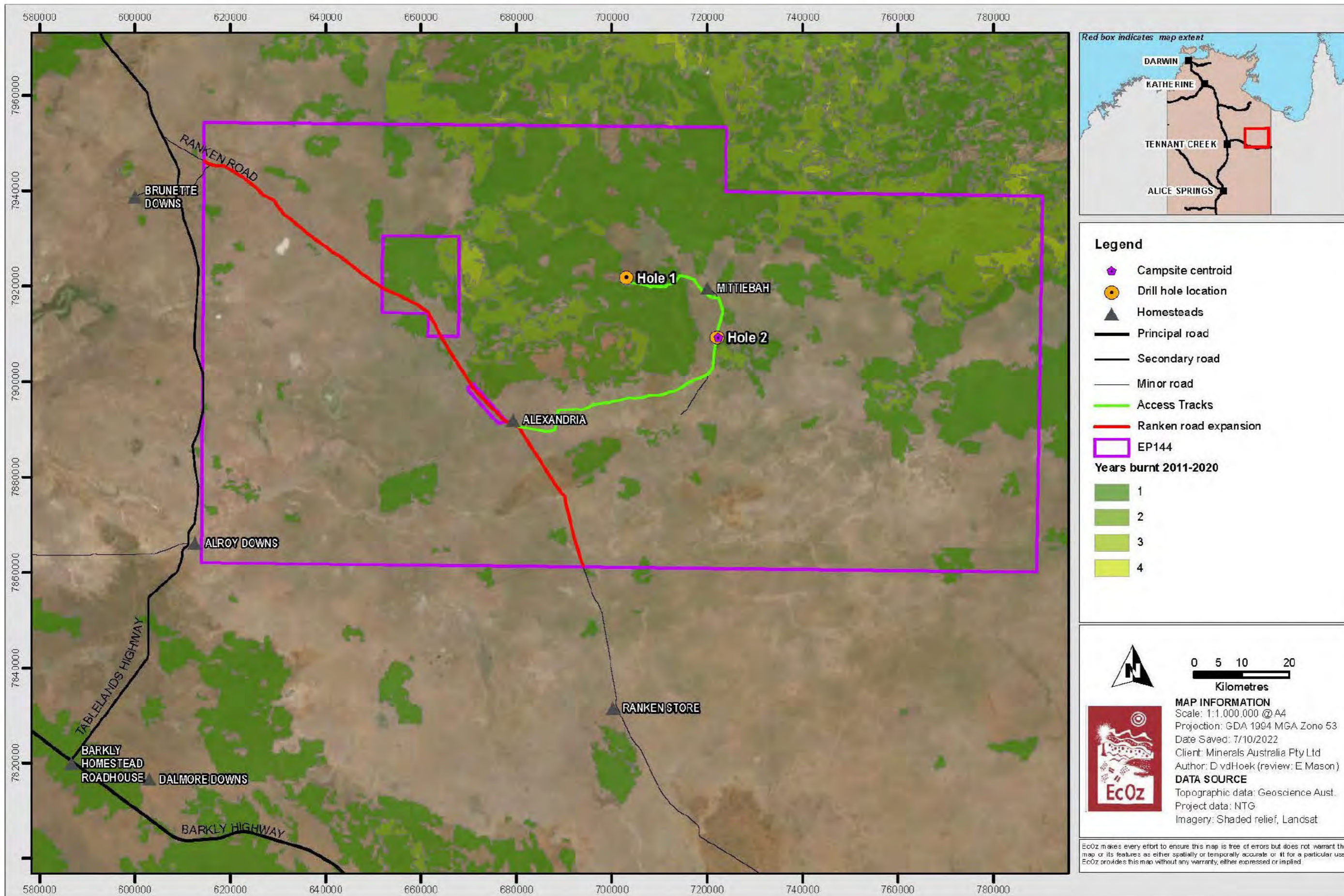
Month	Bush-fire risk	Action	Month	Bush-fire risk	Action
Jan	Low	No fire management activity	Jul	High	Monitor NAFI - check/maintain firebreaks Visually scan horizon for smoke Liaise with property managers/neighbours regarding bushfires Ensure all fire fighting equipment is operational
Feb	Low	No fire management activity	Aug	High	Monitor NAFI Visually scan horizon for smoke Liaise with property managers/neighbours regarding bushfires Ensure all fire fighting equipment is operational
Mar	Low	No fire management activity	Sep	High	Monitor NAFI - check/maintain firebreaks Visually scan horizon for smoke Liaise with property managers/neighbours regarding bushfires Ensure all fire fighting equipment is operational
Apr	Low	Put in breaks around facilities Monitor/control weeds	Oct	High	Monitor NAFI Visually scan horizon for smoke Liaise with property managers/neighbours regarding bushfires Ensure all fire fighting equipment is operational
May	Medium	Monitor/control weeds Monitor NAFI Visually scan horizon for smoke	Nov	Medium	Monitor NAFI - check/maintain firebreaks Visually scan horizon for smoke
Jun	High	Monitor NAFI - check/maintain firebreaks Visually scan horizon for smoke Liaise with property managers/neighbours regarding bushfires Ensure all fire fighting equipment is operational	Dec	Low	No fire management activity

Stakeholder contacts	Phone	Name
Minerals Australia Project Manager	[REDACTED]	Peter Collings, Chief Geologist
Alexandria	[REDACTED]	
Mittiebah	[REDACTED]	
EMERGENCY	000 or 112	
Bushfires NT Alice Springs & Tennant Creek	08 8952 3066 (business hrs only, 000 if out of hrs)	
Wildfire information NAFI—North Australian Fire Information website	www.firenorth.org.au or the NAFI mobile app	
Bushfire Alerts and Warnings	www.securent.nt.gov.au/alerts	
Fire incident map	www.pfes.nt.gov.au/incidentmap/	

Land Use Fire Protection	
Property Land uses	- Primary = Cattle grazing - Secondary = gas exploration
Property aim (Minerals Australia)	- Undertake the seismic exploration activities with minimal impact on primary users - Undertake the drilling activities with minimal impact on primary users
Fire management objectives	- Protect the campsite and associated infrastructure - Coordinate fire management actions with Station landholders. - Prevent any human-induced bushfire ignitions that cause loss of life, property or environmental harm

Fire Management Actions and Mitigation Measures	
Infrastructure Protection Buffer	- Protect infrastructure by maintaining 10 meter bare earth buffer around buildings and facilities
Infrastructure Fire Exclusion	- Ensure all vehicles are fitted with fire extinguishers, and that all firefighting equipment and water supplies are checked regularly. - Ensure all staff / contractors are trained in operation of firefighting equipment and aware of this Plan - Site Supervisor to monitor NAFI regularly and liaise with Station manager if fire threatens infrastructure. - All infrastructure including vehicles and machinery are to be operated and maintained to mitigate risk of ignition
Fire Control	- Every vehicle or piece of equipment has relevant fire extinguisher capacity to extinguish a small fire.
Fire access tracks	- Monitor access roads for weeds, and spray where appropriate
Controlled burns	- No controlled burns will be undertaken as part of this project due to the short time frame of works

Location of EP144 and years burnt in past 10 years



APPENDIX K BUSHFIRE MANAGEMENT PLAN EP154



Bushfire First Responder Actions
<p>Remove yourself and others from potentially dangerous situations Raise the alarm with the Minerals Australia Fire Officer Identify; a. Location b. Immediate threats c. Fire characteristics (what is burning, direction and speed of travel) d. Weather – wind strength and direction If possible, wait in a safe location for directions from the Fire Officer or the Pastoralist and communicate this fact. The Minerals Australia Fire Officer is responsible for alerting the Land Owner, neighboring landholders and Bushfires NT and arranging what response should be taken to the fire</p>

Preparedness planning
<p>On any day rated as having a fire danger of severe, extreme or catastrophic, personnel responsible for bushfire safety must: -Alert all staff to fire rating danger -Ensure all staff, contractors etc know that they must immediately report any form of fire activity, near or far and who to report to. -Staff working away from the Infrastructure Protection Buffer must be aware of heightened fire risk -Regularly monitor NAFI as well as scanning the surrounds for smoke plumes and any other suggestions of fire. -Ensure days' work plans are suitable for current fire rating -Ensure that equipment is stored within the Infrastructure Protection Buffer area -Ensure communication and notification channels are readily available and functioning -Ensure any firefighting equipment is available and functioning</p>

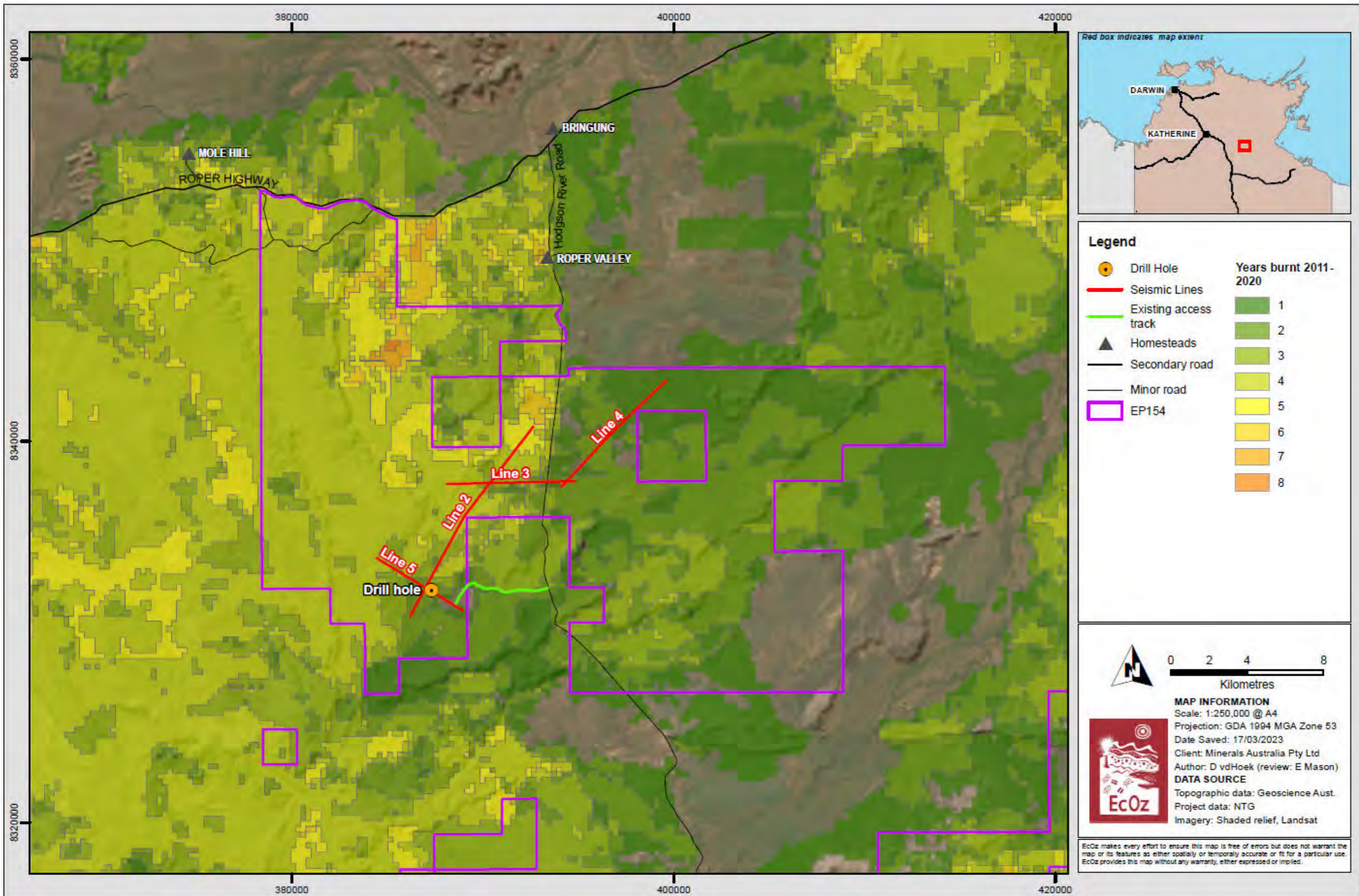
Month	Bush-fire risk	Action	Month	Bush-fire risk	Action
Jan	Low	No fire management activity	Jul	High	Monitor NAFI - check/maintain firebreaks Visually scan horizon for smoke Liaise with property managers/neighbours regarding bushfires Ensure all fire fighting equipment is operational
Feb	Low	No fire management activity	Aug	High	Monitor NAFI Visually scan horizon for smoke Liaise with property managers/neighbours regarding bushfires Ensure all fire fighting equipment is operational
Mar	Low	Put in breaks around facilities Monitor/control weeds	Sep	High	Monitor NAFI - check/maintain firebreaks Visually scan horizon for smoke Liaise with property managers/neighbours regarding bushfires Ensure all fire fighting equipment is operational
Apr	Medium	Monitor/control weeds Monitor NAFI Visually scan horizon for smoke	Oct	High	Monitor NAFI Visually scan horizon for smoke Liaise with property managers/neighbours regarding bushfires Ensure all fire fighting equipment is operational
May	High	Monitor NAFI - check/maintain firebreaks Visually scan horizon for smoke Liaise with property managers/neighbours regarding bushfires Ensure all fire fighting equipment is operational	Nov	Medium	Monitor NAFI - check/maintain firebreaks Visually scan horizon for smoke
Jun	High	Monitor NAFI Visually scan horizon for smoke Liaise with property managers/neighbours regarding bushfires Ensure all fire fighting equipment is operational	Dec	Low	No fire management activity

Stakeholder contacts	Phone	Name
Minerals Australia Project Manager	[REDACTED]	Peter Collings, Chief Geologist
Northern Land Council (NLC) Katherine	(08) 8971 9899	
EMERGENCY	000 or 112	
Bushfires NT Katherine, Gulf and Victoria River District (VRD)	08 8973 8871 or 08 8973 8872 VRD phone: 08 8973 8870 (business hrs only, 000 if out of hrs)	
Wildfire information NAFI—North Australian Fire Information website	www.firenorth.org.au or the NAFI mobile app	
Bushfire Alerts and Warnings	www.securent.nt.gov.au/alerts	
Fire incident map	www.pfes.nt.gov.au/incidentmap/	
Minyerri Police Station	(08) 8975 4365	

Land Use Fire Protection	
Property Land uses	- Primary = Aboriginal Freehold Land - Secondary = gas exploration
Property aim (Minerals Australia)	- Undertake the seismic exploration activities with minimal impact on primary users - Undertake the drilling activities with minimal impact on primary users
Fire management objectives	- Protect the campsite and associated infrastructure - Coordinate fire management actions with Station landholders. - Prevent any human-induced bushfire ignitions that cause loss of life, property or environmental harm

Fire Management Actions and Mitigation Measures	
Infrastructure Protection Buffer	- Protect infrastructure by maintaining 10 meter bare earth buffer around buildings and facilities
Infrastructure Fire Exclusion	- Ensure all vehicles are fitted with fire extinguishers, and that all firefighting equipment and water supplies are checked regularly. - Ensure all staff / contractors are trained in operation of firefighting equipment and aware of this Plan - Site Supervisor to monitor NAFI regularly and liaise with Station manager if fire threatens infrastructure. - All infrastructure including vehicles and machinery are to be operated and maintained to mitigate risk of ignition
Fire Control	- Every vehicle or piece of equipment has relevant fire extinguisher capacity to extinguish a small fire.
Fire access tracks	- Monitor access roads for weeds, and spray where appropriate
Controlled burns	- No controlled burns will be undertaken as part of this project due to the short time frame of works

Location of EP154 and years burnt in past 10 years



APPENDIX L WASTE AND WASTEWATER MANAGEMENT PLAN



Waste and Wastewater Management Plan EP 144 & 154 Exploration Programs Minerals Australia

DOCUMENT CONTROL RECORD

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Author(s)	N.Harvey

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4	Ray Hall	Jeff Richardson	Client	12/10/2022
5	Cameron Jones	Cameron Jones	Client	24/01/2023
6	Cameron Jones	Jeff Richardson	Client	17/03/2023

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EcOz Pty Ltd.
ABN: 81 143 989 039
Level 1, 70 Cavenagh Street
DARWIN NT 0800
GPO Box 381, Darwin NT 0800

Telephone: +61 8 8981 1100
Email: ecoz@ecoz.com.au
Internet: www.ecoz.com.au



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1 INTRODUCTION

1.1 Context

Minerals Australia Pty Ltd (Minerals Australia), a wholly owned subsidiary of Hancock Prospecting, operates exploration permits (EP) 144 and 154. The EP's are subject to an Exploration and Coexistence Deed between Minerals Australia Pty Ltd, Jacaranda Minerals Ltd (a co-shareholder) and the Northern Land Council (NLC).

Minerals Australia proposes the below works programme for the two EP's:

- EP144 - drilling of two exploratory stratigraphic core drill holes to a maximum of approximately 1000m in depth to obtain stratigraphic information.
- EP154 – 43.6 km of two dimensional (2D) seismic survey and the drilling of one stratigraphic core drill hole to 1000 m depth to obtain stratigraphic information.

These works will be regulated through an Environmental Management Plan (EMP) approved by DEPWS. EcOz were engaged to prepare the EMP and associated documents, including this Waste and Wastewater Management Plan.

1.2 Purpose and Scope

Improperly managed wastes are recognised as a hazard with potential negative impact from 2D seismic survey works. This report details the sources of waste and wastewater, and management and monitoring strategies to limit any impacts, as well as assigning responsibilities to ensure these strategies are implemented.

2 RESPONSIBILITIES

Minerals Australia will be responsible for ensuring that project wastes are managed in a manner consistent with Minerals Australia policies and procedures including:

- Development and control of this Waste and Wastewater Management Plan including:
 - Collecting and maintaining an inventory of waste management
 - Developing continual improvement strategies
 - Reporting on compliance with the plan
 - Communicating requirements of the plan to personnel, contractors and authorities, as required
 - Provision of waste awareness training to personnel and contractors.
- Monitoring waste management performance of contractors by undertaking regular audits.
- Ensure all waste management facilities are able to receive the wastes assigned to them.

Project contractors are responsible for ensuring that all types of waste are managed in accordance with this Waste and Wastewater Management Plan including:

- Compliance with Minerals Australia policies and procedures and any other relevant legislative requirements.
- Storage of waste in accordance with this plan.

- Proper management and disposal of waste through provision of waste generation and waste management data.
- Auditing of compliance against this plan.
- Training of staff as required.

3 SOURCES OF WASTE

During the proposed exploration programs, waste will be managed in accordance with the internationally accepted guide for prioritising waste management practices with the objective of achieving optimal environmental outcomes. Waste will be managed in accordance with the following hierarchy principals:

- 1) Avoid: eliminate the generation of wastes through design modification.
- 2) Reduce: reduce unnecessary resource use or substitute a less resource intensive product or service.
- 3) Re-use: reuse a waste without further processing.
- 4) Recycle: recover resources from a waste.
- 5) Treatment: treat the waste to reduce the hazard of the waste prior to disposal.
- 6) Disposal: disposal of waste if there is no viable alternative

The characterisation and separation of waste will be conducted as far as reasonably practicable at the waste source.

3.1 Liquid waste

Liquid waste may be produced in the following ways:

- Parking, refuelling and waste storage areas – used oil, oily waters
- Wastewater management system at campsite on EP144 – Grey water and sewage
- Drilling water/fluids - The drilling fluids consist of industry-standard, non-toxic and biodegradable water-bentonite mixtures to facilitate the lifting of drill cutting from the hole.

3.2 Solid waste

Solid waste will be produced in the following ways:

- General site:
 - Food waste
 - Paper and cardboard
 - Plastics
 - Glass
 - Hazardous waste (e.g. small batteries).
- Supply of materials – plastic and metal containers, packaging material
- Vehicles and mobile plant – used tyres, batteries, waste hydrocarbons, air filters
- First Aid – medical and biological waste.

3.3 Hazardous waste

A material that is an explosive, irritant, flammable, toxic, carcinogenic or corrosive is classed as a hazardous waste. Examples of hazardous waste include oil, chemical containers, explosives, batteries, aerosols, coolants, paint and paint tins, tyres and fluorescent light tubes etc. Due to their hazardous properties, materials in this waste stream must be dealt with separately from other waste and in an approved manner.

Hazardous waste receptacles must display correct and prominent signage. Hazardous wastes, such as fuels, oils, lubricants, batteries and chemicals, are to be contained within a bunded area until being transported using a licensed transporter and disposed of at a licensed facility. Consideration as to whether this storage area should be covered also needs to be made depending on the time of year.

4 WASTE RISK ASSESSMENT

The environmental, heritage and social risks associated with the project activities, specific to wastewater, have been assessed in Appendix E of the EMP, residual risks associated with waste were considered low. Table 4-1 details risk mitigation measures, ALARP rationale, environmental outcomes, performance measures, monitoring and records, reporting and responsibility.

Table 4-1. Risk mitigation measures and implementation summary

Management of waste and wastewater including drilling fluids and waste	
Environmental outcome	<ul style="list-style-type: none"> No adverse impacts on soil, surface water or groundwater caused by wastewater management.
ALARP rationale	<ul style="list-style-type: none"> All waste will be collected, treated and disposed of correctly. This reduces the risk to ALARP as there are no further actions that can be taken to reduce risk. The Code of Practice requires storages of wastewater to meet the 0.1% AEP freeboard requirement. This indicates that industry standard for wastewater management and storage have been adopted, limiting the risk. Drilling sumps and cuttings pits will be designed, constructed and operated with sufficient freeboard to prevent overtopping in a 1 in 1000 rainfall event.
Mitigation measures	<ul style="list-style-type: none"> A Waste Management Plan will be implemented (this document). Designated waste storage area will be located away from sensitive receptors such as waterways or drainage lines. During the wet season, the transport of chemicals and wastewater on unsealed roads will be avoided if possible. If required, roads will be scouted to check it meets the below criteria prior to transport: <ul style="list-style-type: none"> There are no washouts along the track. Track is traversable. The vehicle is suitable to travel in conditions. Driver is skilled and experienced in driving to conditions Wastewater will be treated to the required environmental guidelines for advanced secondary effluent (Class "B") Removal and disposal of hazardous wastes to be in accordance with NT hazardous waste disposal requirements. Sufficient waste receptacles will be provided on site and any work areas. Waste will be segregated for ease of disposal. All staff to be informed of the waste management plan and regular inspections will ensure compliance. A WQMP will be developed to cover well activities. The Project will not commence

Management of waste and wastewater including drilling fluids and waste	
	<ul style="list-style-type: none"> • until a WQMP has been approved • Drilling sumps and cuttings pits will be designed, constructed and operated with sufficient freeboard to prevent overtopping in a 1 in 1000 rainfall event. Freeboard levels to be maintained are: <ul style="list-style-type: none"> ○ EP144 – 0.5 m in dry season and 0.65 m in wet season ○ EP154 – 0.5 m in dry season and 1.2 m in wet season • Sump freeboard will be inspected daily • Drilling sumps and cuttings pits will be designed and constructed with 0.5 m high bunds to prevent water entry from overland flow. • Drilling sumps and cuttings pits will be inspected daily to check integrity. • For stratigraphic drilling chemicals to be used they must have been approved for use in drilling petroleum wells by the Commonwealth Government, Department of Health and listed on the Australian Inventory of Chemical Substances which is maintained under the National Industrial Chemicals Notification and Assessment Scheme. No drilling fluid additives that are used in the process contain benzene, toluene, ethylbenzene or xylene. Error! Reference source not found. outlines the drilling chemicals that will be used.
Environmental Performance Standard (Performance Measure)	<ul style="list-style-type: none"> • No releases of wastewater during transport. • All wastewater treated to the required effluent class. • No exceedance of freeboard in sumps. • No release of wastewater.
Measurement criteria (monitoring and records)	<ul style="list-style-type: none"> • Number of spills of wastewater. • Spill response records • Weekly inspection of wastewater disposal area. • Daily inspections confirm wastewater levels do not exceed freeboard. • Daily inspection of sump and wastewater areas.
Reporting	<ul style="list-style-type: none"> • Spills reporting as needed • Audits of wastewater storage areas • Staff inductions • Annual environmental performance report will be submitted to DEPWS showing above records
Responsibility	<ul style="list-style-type: none"> • Project Manager

5 WASTE MANAGEMENT

Appropriate management of wastes will assist in avoiding solid and liquid waste discharges into the surrounding environment. It is essential that wastes are appropriately stored, collected and disposed of, to minimise the accidental spillage/leakage of potentially harmful products into the environment.

5.1 Handling and segregation of waste

All wastes generated during the day e.g. at the location of exploration activities, is to be conveyed back to the site waste facilities at the end of the day.

Segregating waste at the source increases the efficiency throughout the waste management process, reduces the volume of waste going to landfill and increases the volume of recyclable material by avoiding contamination.

The site will be equipped with skip bins where required and waste will be segregated into the following streams:

- Metals

- Plastics
- Paper and cardboard
- Putrescibles
- Hazardous waste.

Grey water from kitchen and showering facilities at the campsite on EP144 will be managed in accordance with Part 6 of the DoH Code of Practice for On-site Wastewater Management 2014.

The proposed sewage system is a chemical wastewater treatment system (2 x OzziKleen SK10 Sewerage Processing Unit (SPU) and 40,000 L Water Tank Skid or similar) in accordance with Part 4 of the Code of Practice for On-site Wastewater Management 2014. For chemical systems, the contents are proposed to be irrigated. An application for irrigation of recycled water sourced from an approved recycled water system will be submitted to the DoH Environmental Health unit prior to commencing on site (note DoH generally provide approval of applications within 2 weeks of submission). The irrigated system risk to the environment is considered low based on the small volume of wastewater that will be produced from the seismic survey activities. The onsite arrangement will result in no ponding or spray drift that travels beyond the irrigation area. Sufficient storage capacity will be provided in case of an early onset to wet weather.

Two sumps are excavated to contain drilling water/fluids. The drilling fluids consist of industry-standard, non-toxic and biodegradable water-bentonite mixtures to facilitate the lifting of drill cutting from the hole. On completion of drilling, the sumps will be backfilled and any remaining drilling fluids disposed of in a station rubbish disposal site where they will dry and degrade.

5.2 Disposal of waste

The volume of waste produced during the 2D seismic survey is likely to be small. All wastes, specifically listed wastes (as described in Schedule 2 of the *Waste Management and Pollution Control (Administration) Regulations*) generated as part of the regulated activity will be removed from the project area, for disposal or recycling at a licensed facility authorised to receive those wastes (as summarised in the NT Listed Waste Company summary spreadsheet). Table 5-1 below provides the waste disposal methods for the various waste sources.

Table 5-1. Waste management summary

Waste source	Indicative volume	Disposal method
Putrescible waste	<400kg	Disposal: Collected in dedicated waste bins for transport to an approved landfill site.
Paper and cardboard	<300kg	Recycled: Collected in dedicated waste bins for recycling at an off-site facility.
Glass and cans	<100kg	Recycled: Collected in separate waste bins for recycling at an off-site facility.
Scrap metal	<1 tonne	Recycled: Collected in designated skip for recycling at an offsite facility.
Used chemical and fuel drums	<500kg	Recycled: Collected in designated skip for recycling at an offsite facility.
Chemical wastes	<100L	Re-use / disposal: Collected in approved containers for disposal at approved landfill or returned to supplier.
Oily rags, oil/fuel contaminated materials, filters and other hydrocarbon materials	<100kg	Recycled / Disposal: Used oil will be collected in suitable containers for disposal at approved landfill or recycled at a recycling facility
Timber pallets	<500kg	Recycled: Collected in designated skip for recycling at an offsite facility.

Waste source	Indicative volume	Disposal method
Vehicle tyres	<500kg	Recycled / Disposal: Tyres will be collected in skip for disposal at approved landfill site or recycled at a recycling facility
Domestic wastewater – grey water and treated sewage effluent	<900m ³	Recycled: Reticulated collection, on-site treatment and disposal via irrigation
Domestic grey water	<400m ³	Recycled: Reticulated collection, on-site treatment and disposal via irrigation
Domestic sewage	<100m ³	Disposal: Collection and storage on-site, disposal off-site by licensed contractor
Drill water/fluid	<50m ³	Recycled / Disposal: On completion of drilling, the sumps will be backfilled if waste meets required certification as per the Australian Standard Leaching Procedure. If certification cannot be obtained for on-site disposal will be removed from site and disposed of appropriately.

5.3 Monitoring

A monitoring program will be implemented to ensure all waste management actions are conducted in accordance with applicable legislation, International guidelines and company standards. Monitoring will assist in ensuring that Minerals Australia avoid and minimise the risk of pollution due to waste storage, transfer, treatment and final disposal activities, through early detection and therefore early mitigation of potential polluting events.

The following waste monitoring activities will be conducted:

- A waste register/inventory will be kept to assist in identification of excessive wastage. The inventory will detail the number of skips filled, types of waste generated and location of final disposal (e.g. landfill, recycled, etc.).
- Waste storage areas will be inspected at least fortnightly (twice weekly during wet weather). Inspections will analyse integrity of bunds, condition of storage containers/skips, appropriate labelling, and that wastes are properly segregated and covered. Non-compliances and incidents will be documented in the inventory/register along with corrective actions taken to control and minimise environmental harm.
- As per C.6.1, the movement of water and wastewater will be tracked and will include:
 - iv. volumes of water planned to be, and ultimately, reused in petroleum operations including drilling and hydraulic fracturing;
 - v. volumes of water and wastewater used for other purposes including dust suppression and construction water;
 - vii. volumes of any spills of water or wastewater.
- Wastewater tracking will be documented in an auditable chain of custody system and will be in accordance with other legislative requirements such as those imposed under the Waste Management and Pollution Control Act 1998 (NT) and the Radiation Protection Act 2004 (NT).
- Wastewater tracking documentation will be reported to the Minister at least annually.

5.4 Interaction with wildlife, stock and humans

Management and control methods will be implemented to minimise the risk of humans, wildlife and stock, interacting with stored waste. Control measures will include fencing, signage and fauna proof barriers as necessary.

Wastewater treatment tanks, pits, and the surrounding lease area will be monitored during operations to detect any fauna interaction with wastewater.

The risk of interaction is considered low based on the implementation of numerous mitigation measures, including:

- Ensuring wastewater treatment and storage areas are fenced with no clear fauna access points.
- Wastewater treatment and storage areas are fenced off and signage present.
- Installation of fauna ladders in open pits
- Fauna mortality monitored daily during operations and if >7 fauna impacted and/or >1 threatened fauna species impacted, further mitigation measures will be implemented.

APPENDIX M SPILL PREVENTION AND RESPONSE PLAN



Spill Response Management Plan

EP 144 & 154 Seismic survey
and drill programs
Minerals Australia Pty Ltd.

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EcOz Pty Ltd.
ABN: 81 143 989 039
Level 1, 70 Cavenagh Street
DARWIN NT 0800
GPO Box 381, Darwin NT 0800

Telephone: +61 8 8981 1100
Email: ecoz@ecoz.com.au
Internet: www.ecoz.com.au



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1 INTRODUCTION

1.1 Context

Minerals Australia Pty Ltd (Minerals Australia), a wholly owned subsidiary of Hancock Prospecting, operates exploration permits (EP) 144 and 154. The EP's are subject to an Exploration and Coexistence Deed between Minerals Australia Pty Ltd, Jacaranda Minerals Ltd (a co-shareholder) and the Northern Land Council (NLC).

Minerals Australia proposes the below works programme for the two EP's:

- EP144 - drilling of two exploratory stratigraphic core drill holes to a maximum of approximately 1000m in depth to obtain stratigraphic information.
- EP154 – 31.7 km of two dimensional (2D) seismic survey and the drilling of one stratigraphic core drill hole to 1000 m depth to obtain stratigraphic information.

These works will be regulated through an Environmental Management Plan (EMP) approved by DEPWS. EcOz were engaged to prepare the EMP and associated documents, including this Spill Response Management Plan.

1.2 Purpose and scope

Accidental spills of potentially hazardous material may result in contamination of land and water. This Spill Response Management Plan outlines appropriate procedures for reducing the likelihood of spills and the severity of impact from spills.

2 ISSUE AND IMPACT

2.1 Chemicals and wastes stored on site

The chemicals that will be stored onsite include:

- diesel fuel
- lubricating and hydraulic oil for machines
- solvents and degreasers etc
- drilling fluids

Diesel will be used and stored on site. The storage of fuel will be contained within tankers utilising safety features such as double-skins, safety cut-off valves, top accessing or transportable bunding to minimise or eliminate the potential for spills. Drip trays are provided to contain minor drips and spills which may occur during re-fuelling operations. Any uncontained spillage is chemically treated, and the ground ripped.

Lubricants and hydraulic oil will also be used and stored on site in appropriately bunded containers.

Wells are designed to be drilled using water-based muds and drilling fluids. All chemicals to be used have been approved for use in drilling petroleum wells by the Commonwealth Government, Department of Health and listed on the Australian Inventory of Chemical Substances which is maintained under the National Industrial Chemicals Notification and Assessment Scheme. No drilling fluid additives that are used in the process contain benzene, toluene, ethylbenzene or xylene. These chemicals will be used and stored on site in appropriately bunded containers.

Drilling fluids will be managed as per the *Code of Practice for Onshore Petroleum activities within the NT*. Drilling fluids that are expected to be used are outlined in Appendix 1.

During the wet season, the transport of chemicals and wastewater on unsealed roads will be avoided if possible. If required, roads will be scouted to check suitability and condition prior to transport.

All loading, unloading, transfer and refuelling operations are to be undertaken in designated areas, with portable bunding and away from any sensitive receptors. Minerals Australia will ensure access tracks used for transporting fuel are adequate and safe. All transport of fuel is to be carried out during daylight hours only.

Use, storage and handling of fuel, chemicals and oils on site:

- must comply with WHS legislation
- be in accordance with their approved safety data sheet
- must be stored to prevent release to the environment and to contain any spills
- liquid hydrocarbons, whether separated or mixed with other fluids at a concentration greater than 1% by volume, must not be stored in any open top structure or pit

Any hazardous chemicals or those that may cause environmental harm are to be stored within secondary containment.

Secondary containment must meet all of the following:

- sufficient capacity to hold 100% of the volume of the largest container stored in the area plus 10%, unless the container is equipped with individual secondary containment
- permeability able to contain materials or waste until it can be removed or treated
- provide for separation of clean and dirty water
- be compatible with the material or waste stored or used within the containment
- be resistant to physical, chemical and other failure during handling, installation and use
- be maintained in good order at all times
- secondary containment requirements can be met with double-lined or double-walled storage tanks.

Daily inspections of fuel and chemical storage areas will be undertaken, including containment areas and structures, containers and spill kits. If the containment is damaged or compromised, repairs must be carried out as soon as practicable.

Materials that escape from primary containment or are otherwise spilled onto secondary containment shall be removed as soon as possible.

Inspection reports and maintenance records of secondary containment shall be kept.

The likely fluids, chemicals and wastewaters that will be stored, transported and transferred during project activities are summarised below in Table 2-1.

Table 2-1. Chemicals and waste to be stored and transported on site

Chemical	Volume stored on site (maximum)	Storage location	Containment / management measures
Diesel Fuel – Bulk	90,000 L per well pad	Fuel Storage Tanks on camp or well pads	<ul style="list-style-type: none"> • Fuel tanks equipped with secondary containment in double skinned tanks and or temporary bunding. • Spill, leaks and drip trays used to minimise risk associated with refuelling operations. • Any unconsumed fuel will be removed at completion of project.
Hydraulic Oil, Lubricants,	2,000 L per well pad	Hazardous Goods Storage Container or	<ul style="list-style-type: none"> • Original packaging and secondary storage containers/tanks equipped

Chemical	Volume stored on site (maximum)	Storage location	Containment / management measures
solvents and degreasers		in dedicated tanks and drums on camp or well pads	<p>with secondary containment such as double skinned tanks and or temporary bunding.</p> <ul style="list-style-type: none"> • Spill, leaks and drip trays used to minimise risk when carrying out maintenance activities. • Any unconsumed chemicals will be removed at completion of project.
Drilling chemicals (See Appendix 1)	35,000 kg of solids plus 2,000 L of liquids per well pad	Bunded storage tanks and drums on well pads	<ul style="list-style-type: none"> • Transported to site in original containers/packaging and in bunded storage. • Liquid drilling chemicals stored in temporary bunding, with a secondary containment volume greater than 110% of the largest container. • No drilling chemicals or additives will contain benzene, toluene, ethylbenzene or xylene (BTEX) compounds. • Any unconsumed chemicals will be removed at completion of project
Drilling fluids and waste	Approximately 250 m ³ per well	Mud tank system and Pits	<ul style="list-style-type: none"> • Drilling fluid will be predominantly water with remaining components of salts and fluid additives. • Stored and treated in engineered tanks and pits. • Disposal considerations: <ul style="list-style-type: none"> - Drilling fluids evaporated as much as possible; pending the weather window and freeboard requirements with remaining fluid to be appropriately transported and disposed of at a licenced facility. - Drilling cuttings will be in cuttings burial or removed offsite subject to sampling results of cuttings and with approval from DEPWS
Grey water and sewage	5,000 L	The camp will utilise its own mobile wastewater treatment plant to recycle the generated grey and black water. These sewage treatment plants are designed to treat camp generated effluent to the required environmental guidelines for advanced secondary	<ul style="list-style-type: none"> • Secondary containment in double skinned tanks. • Disposed of onsite within a designated wastewater irrigation area at the camp in accordance with the Code of Practice for On-site Wastewater Management.

Chemical	Volume stored on site (maximum)	Storage location	Containment / management measures
		effluent (Class "B"), to enable disposal via evaporation irrigation. The effluent will be piped to an evaporation sump about 50 m outside the camp for evaporation. The pit will be backfilled when no longer required.	

2.2 Spill scenarios

Only limited chemicals and hazardous materials will be used during the seismic survey; however, there remains a risk of contamination as a result of spills from the following sources:

- Spills from chemical and hazardous material handling and storage on site, including:
 - Spills during drill operation
 - In appropriate storage or handling of drilling chemical
 - Fuel spill during refuelling of vehicles and machinery.
 - Diesel fuel leakage.
 - Inappropriate storage or handling of materials used during vehicle maintenance works e.g. lubricant, oil, used batteries etc.
 - Inappropriate storage or handling of paints and solvents used in maintenance of vehicles and equipment.
- Spills relating to chemical transportation off-site, including:
 - Transport spill, partial or total spill due to accident

Spills can result in the contamination of land and water (including groundwater). This in turn can lead to impacts to ecosystem function and health, vegetation death, respiratory disorders, and toxicity to individual organisms (including people).

The steps involved in cleaning up severe or minor spills are very similar. The difference lies in the type and degree of hazard, location of the spill, equipment required to clean up the spill and required personal protective equipment.

It is important to know what you are dealing with, appropriate training to deal with the spill, and the necessary equipment to clean up the spill.

Health and safety comes first. DO NOT attempt to clean up or contain a spill if you do not have the necessary skills and equipment, or you are putting yourself or others at further risk.

Risks associated with spills have been assessed in the EMP. Table 2-2 below provides a summary of spill scenarios and management measures.

Table 2-2. Summary of spill scenarios

Spill scenario	Duration	Mechanisms	Location	Quality	Quantity	Management measures	Monitoring	Receptors
Spills from chemical handling and storage onsite	Duration of works (Approximately 8 weeks)	Rupture of containers Spill during handling	Chemical storage area Re-fuelling area Drill pads	Chemicals listed	<1000L for diesel fuel <100L for other liquid chemicals <1000 kg for solid chemicals	<p>All personnel using chemicals will be trained in their use</p> <p>Any hazardous chemicals or those that may cause environmental harm are to be stored within secondary containment. As described above.</p> <p>Designated storage areas with appropriate segregation of in compatible chemicals.</p> <p>General purpose and hazardous substance spill kits available at appropriate locations (i.e. in close proximity to the storage or use areas of all substances) and able to contain the quantity of chemicals stored onsite.</p> <p>All loading, unloading, transfer and refuelling operations are to be undertaken in designated areas, with portable bunding and away from any sensitive receptors.</p> <p>Ensure access tracks used for transporting fuel are adequate and safe. All transport of fuel to be carried out during daylight hours.</p>	Daily inspections of drill pads, fuel and chemical storage areas will be undertaken, including containment areas and structures, containers and spill kits	Retained on-site

Spill scenario	Duration	Mechanisms	Location	Quality	Quantity	Management measures	Monitoring	Receptors
						<p>Daily inspections of fuel and chemical storage areas will be undertaken, including containment areas and structures, containers and spill kits.</p> <p>Ensure that all personnel are familiar with this spill response plan and site inductions cover transport, storage, refuelling, response and clean-up activities.</p> <p>Hazardous drilling additives onsite are stored in 25kg / litre containers or smaller.</p> <p>Drilling additive liquids will be on temporary bunded storage pallets.</p> <p>Non-liquid drilling additives will be stored on pallets or on a designated chemical trailer / storage area</p> <p>Barite (Drilling fluid additive) located in 1000kg bulkie bags is in powder / crystal form and not harmful to the environment but care taken to prevent spills to the drilling lease.</p>		

Spill scenario	Duration	Mechanisms	Location	Quality	Quantity	Management measures	Monitoring	Receptors
						Earthworks equipment (loader) able to be used to contain spills if required		
Spills from chemical transportation (off-site)	Duration of works (Approximately 8 weeks)	Transport spill, partial or total spill due to accident	Off-site along public roads	Chemicals listed	<90 000L for total loss of diesel fuel <100L for other liquid chemicals <1000 kg for solid chemicals	Transport companies are to be appropriately licenced to transport chemicals and waste including the requirement to detect and respond to spills (Dangerous Goods and Waste Management and Pollution Control Act)	Monitor the performance of contractors engaged	Chemical transport between Site and Alice Springs and Darwin, Queensland or South Australia – roadside environments and communities

2.3 Potential receptors

A description of the environment (for both EP144 and 154), including environmental and cultural sensitivities, with the potential to be impacted by a spill is provided in the EMP. Figure 2-1 and Figure 2-2 illustrate the separation distance from sensitive receptors such as:

- Watercourses
- Communities
- Homesteads
- Heritage places
- Vegetation communities
- Protected areas

Maps regarding Sacred Sites and restricted work areas are also applicable and will be provided to work crews to ensure awareness of these features.

2.4 Risk assessment

The environmental risks associated with the project, and the potential for spills, have been assessed in Appendix E of the EMP. Table 2-3 presents the residual risks of the assessment when considering the controls detailed are implemented, and the risk assessment process is outlined in the EMP document. The risk assessment assesses a worst-case scenario spill.

Table 2-3. Spill risk assessment and ALARP statement

Overall Residual Risk	Consequence: Moderate (3)	Likelihood: Unlikely (B)	Residual Risk: Moderate
Scientific Uncertainty	Spill prevention and response as detailed in this Spill Management Plan is based on the requirements of the Code, as well as standard operating procedures. There are a range of legislation, codes, and standards available to ensure risk of spills caused by the project activities can be effectively mitigated to reduce the impact on the surrounding environment. Additionally, the remote location of the project and the distance to receptors surrounding the EP areas will likely result in lower risk.		Moderate (9)
ALARP Statement	The mitigation measures outlined in the EMP, Risk Assessment Register and this Spill Management Plan meet the determined environmental performance standards for the management of spills and any associated potential environmental impacts. Controls and mitigation measures that have been adopted are best practice, and reduce the risk significantly. As hazardous chemicals/goods are required for the project and have the potential for a moderate consequence, the consequence of a spill cannot be reduced further due to their presence on site. However, the appropriate controls have been installed to reduce the likelihood of a spill occurring, and the mitigation actions to rapidly address any spill that may occur. Therefore, the risk of a spill is considered ALARP.		
	Mitigation measures	Mitigation measures relevant to spills are outlined in the tables below, and have been split into three main categories:	

	<ul style="list-style-type: none"> • Groundwater and soil contamination from spills (Table 2-4) • Camp wastewater spills (Table 2-5) • Waste and wastewater, including drilling fluids, spills (Table 2-6)
Acceptable	<p>Controls implemented to prevent the accidental release, leak or spill of chemicals or hazardous goods are industry standard and no further input is required to reduce the risk further.</p> <p>Chemicals that are being used are required to complete the project, and the implementation of appropriate storage and handling procedures reduces the likelihood of any potential impacts.</p>

Table 2-4. Spill risk mitigation measures and implementation summary

Groundwater and soil contamination from spills	
Environmental outcome	<ul style="list-style-type: none"> • No adverse impacts on soil, surface water or groundwater caused by hazardous substances utilised during the activity
ALARP rationale	<ul style="list-style-type: none"> • Chemicals and hazardous materials will be stored and per industry best practice. • Appropriate spill kits and spill response procedures and materials will be available on site minimising the risk consequence
Mitigation measures	<ul style="list-style-type: none"> • Designated waste storage will be located away from sensitive receptors area such as waterways or drainage lines • All loading, unloading and refuelling operations will take place in designated areas, with portable bunding and away from sensitive receptors • During the wet season, the transport of chemicals and wastewater on unsealed roads will be avoided if possible. If required, roads will be scouted to check suitability and condition prior to transport. • Use, storage and handling of fuel, chemicals and oils on site: <ul style="list-style-type: none"> • must comply with WHS legislation • be in accordance with their approved safety data sheet • must be stored to prevent release to the environment and to contain any spills • liquid hydrocarbons, whether separated or mixed with other fluids at a concentration greater than 1% by volume, must not be stored in any open top structure or pit • Any hazardous chemicals or those that may cause environmental harm are to be stored within secondary containment. • Secondary containment must meet all of the following: <ul style="list-style-type: none"> • sufficient capacity to hold 100% of the volume of the largest container stored in the area plus 10%, unless the container is equipped with individual secondary containment. • permeability able to contain materials or waste until it can be removed or treated. • provide for separation of clean and dirty water. • be compatible with the material or waste stored or used within the containment. • be resistant to physical, chemical and other failure during handling, installation and use. • be maintained in good order at all times. • secondary containment requirements can be met with double-lined or double-walled storage tanks.

Groundwater and soil contamination from spills	
	<ul style="list-style-type: none"> All secondary containment (when in use) shall be inspected weekly, unless being operated through the wet season during which they should be monitored daily. If the secondary containment is damaged or compromised, repairs must be carried out as soon as practicable. Materials that escape from primary containment or are otherwise spilled onto secondary containment shall be removed as soon as possible. In the event of a spill all contaminated material will be collected and disposed of via a licensed waste facility Inspection reports and maintenance records of secondary containment shall be kept. In the event of a spill all contaminated material will be collected and disposed of via a licensed waste facility A spills management plan has been developed that outlines spill prevention, response procedure and spill clean-up processes (Error! Reference source not found.). Materials that escape from primary containment or are otherwise spilled onto secondary containment shall be removed as soon as possible.
Environmental Performance Standard (Performance Measure)	<ul style="list-style-type: none"> No of releases of contaminants resulting in long term contamination of soils No releases of contaminants during transport
Measurement criteria (monitoring and records)	<ul style="list-style-type: none"> Spill report records Daily inspection of fuel and chemical storage areas, including containment areas and structures, containers and spill kits
Reporting	<ul style="list-style-type: none"> Annual environmental performance report will be submitted to DEPWS including: <ul style="list-style-type: none"> Spill reports Daily inspection of fuel and chemical storage areas, including containment areas and structures, containers and spill kits
Responsibility	<ul style="list-style-type: none"> Project Manager

Table 2-5. Camp wastewater risk mitigation measures and implementation summary

Wastewater from camp/accommodation	
Environmental outcome	<ul style="list-style-type: none"> No adverse impacts on soil, surface water or groundwater caused by wastewater management
ALARP rationale	<ul style="list-style-type: none"> All waste will be collected, treated and disposed of correctly. This reduces the risk to ALARP as there are no further actions that can be taken to reduce risk.
Mitigation measures	<ul style="list-style-type: none"> Designated waste storage/irrigation area will be located away from sensitive receptors area such as waterways or drainage lines. Wastewater will be treated to the required environmental guidelines for advanced secondary effluent (Class "B") A Waste Management Plan will be implemented (Appendix L).
Environmental Performance Standard (Performance Measure)	<ul style="list-style-type: none"> All wastewater treated to the required effluent class. No release of wastewater.
Measurement criteria	<ul style="list-style-type: none"> Weekly inspection of wastewater disposal area

Wastewater from camp/accommodation	
(monitoring and records)	
Reporting	<ul style="list-style-type: none"> Annual environmental performance report will be submitted to DEPWS
Responsibility	<ul style="list-style-type: none"> Project Manager

Table 2-6. Waste and wastewater including drilling fluids risk mitigation measures and implementation summary

Management of waste and wastewater including drilling fluids	
Environmental outcome	<ul style="list-style-type: none"> No adverse impacts on soil, surface water or groundwater caused by wastewater management.
ALARP rationale	<ul style="list-style-type: none"> All waste will be collected, treated and disposed of correctly. This reduces the risk to ALARP as there are no further actions that can be taken to reduce risk. The Code of Practice requires storages of wastewater to meet the 0.1% AEP freeboard requirement. This indicates that industry standard for wastewater management and storage have been adopted, limiting the risk. Drilling sumps and cuttings pits will be designed, constructed and operated with sufficient freeboard to prevent overtopping in a 1 in 1000 rainfall event.
Mitigation measures	<ul style="list-style-type: none"> A Waste Management Plan will be implemented (Error! Reference source not found.). Designated waste storage area will be located away from sensitive receptors such as waterways or drainage lines <p>During the wet season, the transport of chemicals and wastewater on unsealed roads will be avoided if possible. If required, roads will be scouted to check it meets the below criteria prior to transport:</p> <ul style="list-style-type: none"> Track is traversable and has not been impacted by increased rainfall, such as; <ul style="list-style-type: none"> There are no washouts along the track. There are no bogs or ponding water. Personnel are familiar with spill response procedures and the appropriate spill response materials are available. Wastewater will be treated to the required environmental guidelines for advanced secondary effluent (Class "B") Removal and disposal of hazardous wastes to be in accordance with NT hazardous waste disposal requirements. Sufficient waste receptacles will be provided on site and any work areas. Waste will be segregated for ease of disposal. All staff to be informed of the waste management plan and regular inspections will ensure compliance. A Well Operations Management Plan (WOMP) will be developed to cover well activities. The Project will not commence until a WOMP has been approved Drilling sumps and cuttings pits will be designed, constructed and operated with sufficient freeboard to prevent overtopping in a 1 in 1000 rainfall event. Freeboard levels to be maintained are: <ul style="list-style-type: none"> EP144 – 0.5 m in dry season and 0.65 m in wet season EP154 – 0.5 m in dry season and 1.2 m in wet season Sump freeboard will be inspected daily Drilling sumps and cuttings pits will be designed and constructed with 0.5 m high bunds to prevent water entry from overland flow. Drilling sumps and cuttings pits will be inspected daily to check integrity. For stratigraphic drilling chemicals to be used they must have been approved for use in drilling petroleum wells by the Commonwealth Government, Department of

Management of waste and wastewater including drilling fluids	
	Health and listed on the Australian Inventory of Chemical Substances which is maintained under the National Industrial Chemicals Notification and Assessment Scheme. No drilling fluid additives that are used in the process contain benzene, toluene, ethylbenzene or xylene. Error! Reference source not found. outlines the drilling chemicals that will be used.
Environmental Performance Standard (Performance Measure)	<ul style="list-style-type: none"> • No releases of wastewater during transport. • All wastewater treated to the required effluent class. • No exceedance of freeboard in sumps. • No release of wastewater.
Measurement criteria (monitoring and records)	<ul style="list-style-type: none"> • Number of spills of wastewater. • Spill response records • Weekly inspection of wastewater disposal area. • Daily inspections confirm wastewater levels do not exceed freeboard. • Daily inspection of sump and wastewater areas. •
Reporting	<ul style="list-style-type: none"> • Spills reporting as needed • Audits of wastewater storage areas • Staff inductions • Annual environmental performance report will be submitted to DEPWS showing above records
Responsibility	<ul style="list-style-type: none"> • Project Manager

2.5 Management measures

Measures to manage spills associated with exploration activities are provided in the EMP and summarised in Table 2-2.

2.6 Safety Data Sheets

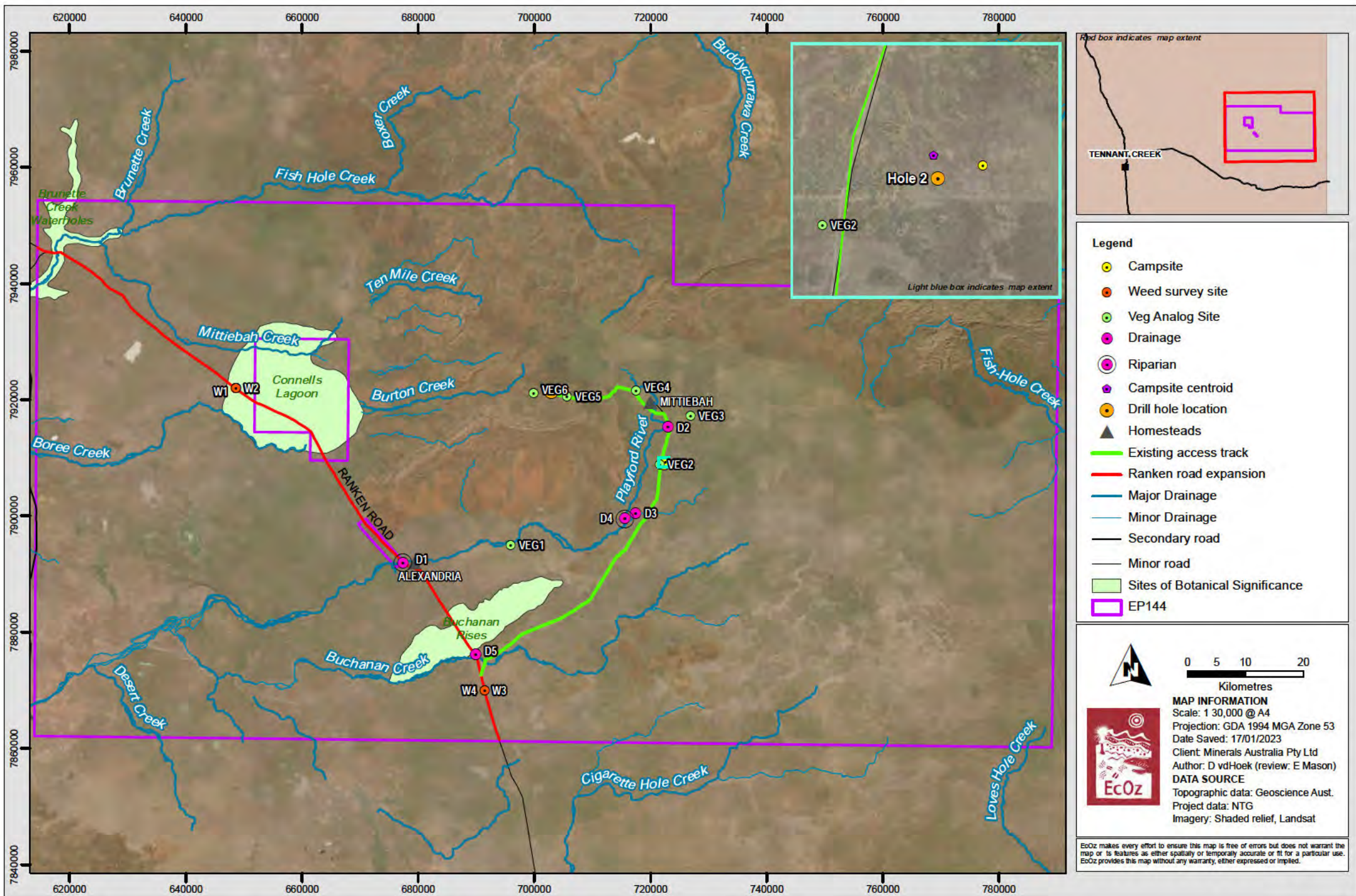
Safety Data Sheets (SDS) information should be used in spill response planning and preparation, and reviewed when substances are delivered to site, to identify the type of substance being used, storage segregation requirements and the required equipment necessary to contain a spill of that substance, as well as any PPE requirements in the event of a spill.

It is important to know what you are dealing with, the appropriate training required to deal with the spill, and the necessary equipment to clean up the spill, prior to the event of a spill Health and safety comes first. DO NOT attempt to clean up or contain a spill if you do not have the necessary skills and equipment, or you are putting yourself or others at further risk.

SDS are to be kept in areas used to store or handle hazardous materials or in the site managers office. These forms contain the following important information:

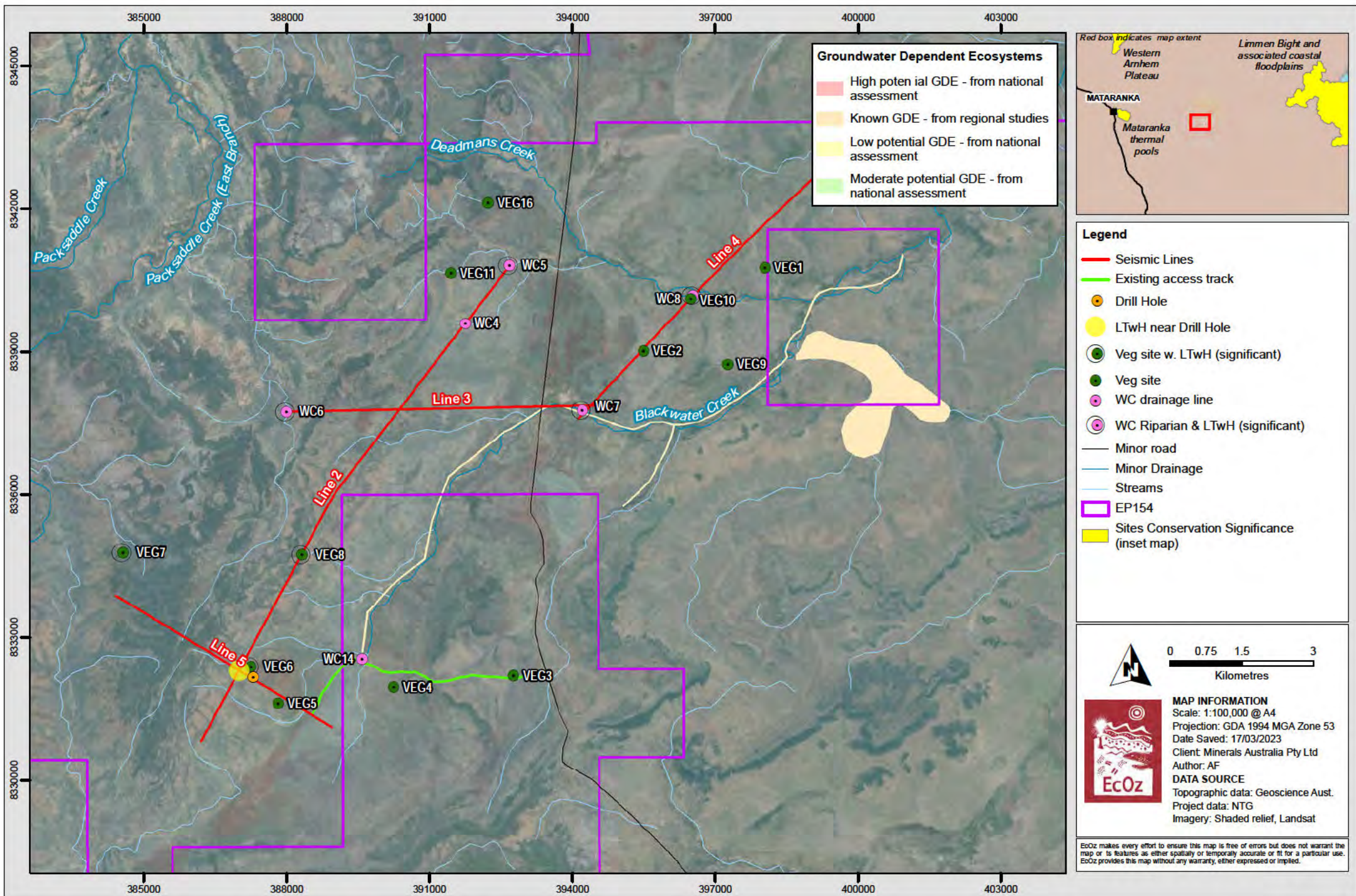
- The identity of the chemical product and its ingredients
- The hazards of the chemical including health hazards, physical hazards and environmental hazards
- Physical properties of the chemical, like boiling point, flash point and incompatibilities with other chemicals
- Workplace exposure standards for airborne contaminants
- Safe handling and storage procedures for the chemical

- What to do in the case of an emergency or spill
- First aid information
- Transport information
- Personal Protective Equipment (PPE) requirements.



Path: Z:\01 EcOz_Documents\04 EcOz_Vantage GIS\NZ10101 - Hancock - EMP EP144\01 Project Files\Report maps\Figure X-X map of important landforms and values.mxd

Figure 2-1. Map of sensitive areas for EP144



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ19103 - Hancock - EMP EP154\01 Project Files\Report Maps\Figure X-X - Map of important landforms.mxd

Figure 2-2. Map of sensitive areas for EP154

3 SPILL RESPONSE PROCEDURE

Spill response procedures follow the basic priority of (depending on the nature and extent of the spill):

ASSESS > SECURE > CONTROL > ABSORB > DISPOSE > REPORT

3.1 Assess

Assess the spill by determining:

- Type of substance
- Location of the spill
- Source of the spill and whether it can be isolated
- Can the spill be controlled / contained
- What is required to deal with the spill – personal protective equipment etc.

The severity of the spill can be assessed using Table 3-1 and Table 3-2.

3.1.1 Severity of the spill

Table 3-1. Assessing severity ranking of spill

Minor	Reversible and localised impact on the environment. OR Environmental impact requires a programmed commitment of time and/or money to remediate, OR would take less than 2 years to recover naturally. OR Damage to Company's reputation with a single or small group of organisations or individuals
Moderate	Significant but reversible, OR irreversible and localised, impact on the environment. OR Environmental impact requires a programmed commitment of moderate time and/or money to remediate, OR would take 2-10 years to recover naturally. OR Local / regional damage to Company's reputation. Negative press coverage at a local or regional scale
Major severe	Significant AND irreversible impact on the environment. OR Environmental impact requires emergency commitment of significant time and/or money to remediate, OR would take more than 10 years to recover naturally. OR National / international damage to Company's reputation. Negative press coverage at a national or international scale.

In terms of volume, Table 3-2 can be used as a guideline for determining severity.

Table 3-2. Volume of spill to determine severity

Minor	>100L to inland waters/land
Moderate	100 – 1500L to inland waters/land
Major / severe	>1500L to inland waters/land

It is important to consider Table 3-2 in the context of Table 3-1 when determining severity of a spill.

3.2 Secure the spill

If safe to do so, the spill should be immediately secured. Personnel working in or near the area are to be notified of the spill occurrence immediately. Eliminate any ignition sources (e.g. open flames, internal combustion engines etc.). The area is to be secured by means of barricading, signage or danger tape around the spill area to prevent personnel from accessing the area unnecessarily. In the case of a severe or life threatening spill, immediately call emergency services. Any spill identified as 'severe' is to be reported to the authorities as soon as possible (within 24 hours) by the nominated Manager.

3.3 Control the spill

If safe to do so, the source of the spill is to be isolated to prevent the spill from becoming larger and/or entering the receiving environment, particularly waterways/drainage systems. The spill is to be contained by appropriate means which may include using sand bags or earthen bunds to construct a bund wall, use of absorbent material, temporary sealing of cracks or leaks in containers and use of geotextile or silt fencing.

3.4 Absorb the spill

Spills are to be cleaned up by means of absorption. This will convert a liquid spill into a solid and enable more effective clean-up. General purpose and hazardous substance spill kits are available at appropriate locations (i.e. in close proximity to the storage or use areas of all substances). Various absorbent materials are supplied in the spill kits including absorbent booms, absorbent pads, granular absorbents, disposable bags and ties.

Spill response training is available and will be delivered to all personnel, to educate personnel on the appropriate material to use for various spill scenarios. Do not attempt to clean-up a spill unless you have received the relevant training or you are unsure of methods to use. Personal protection equipment MUST be worn.

3.5 Dispose of contaminated materials

The method of disposal will be dependent upon the nature and extent of the spill. Advice should be sought from the relevant authorities to determine the appropriate disposal method for a particular spill.

Used absorbent material including granular absorbent, boom and pads shall be put into disposable bags, tied and placed in regulated waste bins. Bags should be clearly labelled.

Small quantities of contaminated soils may be disposed of in regulated waste bins or contaminated soil bins if available. On-site disposal of contaminated waste must be co-ordinated and approved by the Minerals Australia Site Manager.

Large scale spills may have the contaminated material and soil placed in designated skip bins / trucks to be transported for disposal at an approved designated facility.

3.6 Report the spill

All spills are to be reported to Minerals Australia Site Manager who will notify land owners within 24 hours. Management personnel will review the circumstances of the spill and implement or modify controls to prevent further occurrence of a similar nature. Notifications will include as a minimum;

- Time, date, nature, duration and location of the incident
- Location of the place where incident has occurred
- Nature, the estimated quantity or volume and the concentration of any pollutants involved
- Circumstances in which the incident occurred and cause of the incident, if known
- Action taken or proposed to be taken to deal with the incident
- Failure to complete the required notifications will be considered a system non-conformance.

3.6.1 Reportable incident

In accordance with the Petroleum (Environment) Regulations 2016, Minerals Australia must give the Minister notice of a reportable incident. A reportable incident is defined as an incident, arising from a regulated activity, that has caused or has the potential to cause material environmental harm or serious environmental harm.

Minerals Australia will notify the Minister in writing or oral as soon as practicable but no later than 2 hours after the incident first occurred or if the incident was not detected at the time it first occurred, then within 2 hours (if orally notified a written notification must be provided within 24 hours).

The notification report must outline the following:

- contact details of the interest holder
- all material facts and circumstances
- information about any action taken to avoid or mitigate material environmental harm or serious environmental harm
- information about the corrective action that has been taken or is proposed to be taken.

Once confirmed as a reportable incident, a written report will be provided to the Minister within three days after the reportable incident first occurs. The reportable incident report will contain:

- the results of any assessment or investigation of the incident that caused or contributed to the occurrence, including an assessment of the effectiveness of the designs, equipment, procedures and management systems that were in place to prevent the occurrence of an incident of that nature
- the nature and extent of the material environmental harm or serious environmental harm
- details of any actions taken, or proposed to be taken, to clean up or rehabilitate an area affected
- detail any actions taken, or proposed to be taken, to prevent a recurrence of an incident of a similar nature, including a root cause analysis.

A final report is to be provided within 30 days after the clean up or rehabilitation of the area affected by the reportable incident. Progress or interim reports are to be provided to the Minister no greater than every 90 days while clean up and rehabilitation activities are conducted.

3.6.2 Recordable incident

A recordable incident is a breach of an environmental outcome or environmental performance standard as outlined in the EMP, A report about recordable incidents must be reported to DEPWS within 15 days after the end of the reporting period (90 days unless otherwise advised by the Minister) and must relate to each reporting period for the regulated activity.

A recordable incident report will include:

- A record of all recordable incidents that occurred within the reporting period
- All material facts and circumstance about the recordable incidents that the operator knows or is reasonably able to find out
- Any actions taken to avoid or mitigate any negative environmental impacts caused by the recordable incidents
- The corrective action that has been taken, or will be taken, to prevent similar incidents.

4 RESPONSIBILITIES

It is the responsibility of all Minerals Australia employees and contractors on site who witness a spill to report it to the Minerals Australia Site Manager, who will report the spill to Station owners within 24 hours, as per the reporting requirements detailed in Section 3.6 above.

Minerals Australia are committed to responsible management of spills and will ensure that appropriate spill response procedures are implemented and that all spills cleaned up and any resultant contamination remediated appropriately.

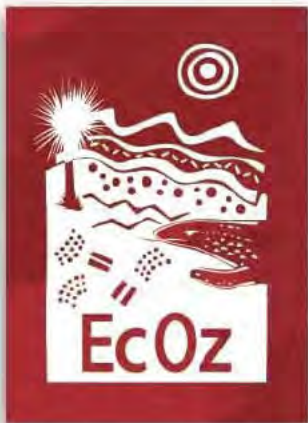
APPENDIX 1 SDS REGISTER

HAZARDOUS SUBSTANCES REGISTER Date: 16th December 2022

#	Substance Name	Chemical Name	Chemwatch #	Supplier	SDS Issue Date	Hazardous Goods	Dangerous Goods	Physical state	Use	Quantity and Storage	Environmental Concerns	Location	Hazard Statements	Comments
1	BARITE	NA	5454-66	MUDLOGIC Fluid Solutions	25/02/2021	Non Hazardous	Non Dangerous	Divided Solid	Drilling Fluid additive	1000kg bulker bag - Undercover, Avoid reaction with oxidising agents, bases and strong reducing agents. Avoid strong acids, acid chlorides, acid anhydrides and chloroformates. 10 x 1000kg bags = 10,000kgs	Environmental friendly	Lease - On site / Workshop.	NA	Environmentally Friendly Sodium and sulfates are essential to all living organisms and their intracellular and extracellular concentrations are actively regulated.
2	CITRIC ACID	citric acid	100685	MUDLOGIC Fluid Solutions	30/03/2022	Hazardous Goods	Non Dangerous	Divided Solid	Drilling Fluid additive	25kg sack - Store locked up. Store in a well-ventilated place. Keep container tightly closed. 8 x 25kg bags = 200kgs	Environmental friendly	Lease - On site / Workshop.	H315- Causes skin irritation. H318 - Causes serious eye damage. H335 - May cause respiratory irritation.	The toxicity of citric acid to other environmentally relevant species has not been determined. Based on the available data, citric acid is not judged to be a substance that presents a hazard to the environment.
3	DRILL DET ULTRA	NA	5453-77	MUDLOGIC Fluid Solutions	25/02/2021	Non Hazardous	Non Dangerous	Liquid	Drilling Fluid additive	25 LT drum 16 x 25 Lt drums= 400ltrs	DO NOT discharge into sewer or waterways	Lease - On site / Workshop.	NA	
4	FLOC BLOC	NA	5453-84	MUDLOGIC Fluid Solutions	25/02/2021	Non Hazardous	Non Dangerous	Solid	Floccuant.	3 KG per box 1 box = 3kgs	DO NOT discharge into sewer or waterways	Lease - On site / Workshop.	NA	
5	FRACSEAL	NA	5453-99	MUDLOGIC Fluid Solutions	2/03/2021	Hazardous Goods	Non Dangerous	Divided Solid	Drilling Fluid additive	25 lb bag - Store locked up Store in a well-ventilated place. Keep container tightly closed. 40 x 25lb= 1000lbs	DO NOT discharge into sewer or waterways	Lease - On site / Workshop.	H335 - May cause respiratory irritation.	Use only outdoors or in a well-ventilated area. Avoid breathing dust/fumes.
6	GEL EXTRA	NA	5452-54	MUDLOGIC Fluid Solutions	23/09/2021	Hazardous Goods	Non Dangerous	Divided Solid	Additive, drilling fluid additive.	25 KG sack 60 x 25kg = 1,500kg	NA	Lease - On site / Workshop.	H350 -May cause cancer. H373 - May cause damage to organs through prolonged or repeated exposure. P201 - Obtain special instructions. H315 - Causes skin irritation.	Silica.
7	GP CEMENT	NA	5452-56	MUDLOGIC Fluid Solutions	2/03/2021	Hazardous Goods	Non Dangerous	Divided Solid	Binder, binder in concrete, cement, concrete additive.	20 KG sack 448 x 20kg = 8960kgs	DO NOT discharge into sewer or waterways	Lease - On site / Workshop.	H318 - Causes serious eye damage. H335 - May cause respiratory irritation. H317 - May cause an allergic skin	
8	HY SEAL	NA	5452-64	MUDLOGIC Fluid Solutions	4/03/2021	Hazardous Goods	Non Dangerous	Divided Solid	Drilling Fluid additive	10 kg - Store locked up Store in a well-ventilated place. Keep container tightly closed. 5 x 10kg = 50kgs	DO NOT discharge into sewer or waterways	Lease - On site / Workshop.	H335 - May cause respiratory irritation.	Cellulose LOW (LogKOW = -5.1249) Use in well ventilated area.
9	LFR	NA	5450-94	MUDLOGIC Fluid Solutions	22/06/2021	Non Hazardous	Non Dangerous	Liquid	Liquid friction reducer.	20 LT drum 16 x 20ltr = 320ltrs	DO NOT discharge into sewer or waterways	Lease - On site / Workshop.	NA	
10	LIQUID SPERSE	NA	5450-96	MUDLOGIC Fluid Solutions	22/06/2021	Non Hazardous	Non Dangerous	Liquid	Drilling Fluid additive	25 KG drum 16 x 25kg = 400kgs	NA	Lease - On site / Workshop.	NA	

11	MAGMA FIBER - course and fine	NA	5450-99	MUDLOGIC Fluid Solutions	15/08/2022	Non Hazardous	Non Dangerous	Solid	Industrial applications.	13.60 kg Course 6 x 13.6kg = 81.6kgs 11.34 kg Fine 6 x 11.34kg = 68.04kgs	DO NOT discharge into sewer or waterways	Lease - On site / Workshop.	NA	
12	PAC L ULTRA	NA	5456-07	MUDLOGIC Fluid Solutions	15/06/2021	Non Hazardous	Non Dangerous	Divided Solid	Drilling fluid additive, Viscosifier.	25 KG sack 100 x 25kgs - 250kgs	DO NOT discharge into sewer or waterways	Lease - On site / Workshop.	NA	
13	PAC R ULTRA	NA	5456-08	MUDLOGIC Fluid Solutions	15/06/2021	Non Hazardous	Non Dangerous	Divided Solid	Drilling Fluid additive	25 KG sack 100 x 25kgs - 250kgs	Environmental friendly	Lease - On site / Workshop.	NA	
14	POTASSIUM CHLORIDE	NA	5451-47	MUDLOGIC Fluid Solutions	23/06/2021	Non Hazardous	Non Dangerous	Divided Solid	Inhibitor.	25 KG bag 416 x 20kgs = 8320kgs	DO NOT discharge into sewer or waterways	Lease - On site / Workshop.	Repeated exposure may cause skin dryness and cracking.	
15	POZZOLITH	NA	5451-48	MUDLOGIC Fluid Solutions	25/02/2021	Non Hazardous	Non Dangerous	Liquid	Cement retarder. Friction reducer.	20 LT drum 10 x 20ltrs = 200ltrs	Hazardous to the Aquatic Environment Acute Hazard Category 3	Lease - On site / Workshop.	Harmful to aquatic life.	
16	RIG WASH ULTRA	NA	5451-52	MUDLOGIC Fluid Solutions	25/02/2021	Non Hazardous	Non Dangerous	Liquid	Industrial cleaning reagent. Vehicle wash. Washing detergent.	25 LT drum 16 x 25ltrs = 400ltrs	NA	Workshop	NA	
17	SODA ASH	sodium carbonate	5451-61	MUDLOGIC Fluid Solutions	2/03/2021	Hazardous Goods	Non Dangerous	Divided Solid	Chemiplas applications. Industrial applications.	25 KG sack 48 x 25kgs = 1200kgs	DO NOT discharge into sewer or waterways	Lease - On site / Workshop.	H315 - Causes skin irritation. H318 - Causes serious eye damage. H335 - May cause respiratory irritation. H332 - Harmful if inhaled.	

18	SODIUM BICARBONATE	NA	5457-19	MUDLOGIC Fluid Solutions	4/03/2021	Non Hazardous	Non Dangerous	Divided Solid	Industrial applications.	25 KG sack 20 x 25kgs = 500kgs	DO NOT discharge into sewer or waterways	Lease - On site / Workshop.	NA	
19	TRIPLE 4	NA	5457-01	MUDLOGIC Fluid Solutions	20/08/2021	Hazardous Goods	Non Dangerous	Liquid	Road film remover.	20 LT drum 16 x 20ltrs = 320ltrs	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. DO NOT discharge into sewer or waterways.	Lease - On site / Workshop.	H315 - Causes skin irritation. H317 - May cause an allergic skin reaction. H318 - Causes serious eye damage.	Transport Labels required <u>9</u> > Marine Pollutant sign.



EcOz Environmental Consultants

EcOz Pty Ltd.

ABN 81 143 989 039

Level 1, 70 Cavenagh St,
GPO Box 381,
Darwin, NT 0801

T: +61 8 8981 1100
E: ecoz@ecoz.com.au

www.ecoz.com.au



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APPENDIX N EMERGENCY RESPONSE PLAN



Emergency Response Plan EP 144 & 154 Seismic survey and drill programs Minerals Australia Pty Ltd.

DOCUMENT CONTROL RECORD

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Author(s)	N. Harvey and Minerals Australia

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3	Cameron Jones	Cameron Jones	Client	25/01/2023

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

EcOz Pty Ltd.
ABN: 81 143 989 039
Level 1, 70 Cavenagh Street
DARWIN NT 0800
GPO Box 381, Darwin NT 0800

Telephone: +61 8 8981 1100
Email: ecoz@ecoz.com.au
Internet: www.ecoz.com.au



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1 INTRODUCTION

1.1 Context

Minerals Australia Pty Ltd (Minerals Australia), a wholly owned subsidiary of Hancock Prospecting, operates exploration permits (EP) 144 and 154. The EP's are subject to an Exploration and Coexistence Deed between Minerals Australia Pty Ltd, Jacaranda Minerals Ltd (a co-shareholder) and the Northern Land Council (NLC).

Minerals Australia proposes the below works programme for the two EP's:

- EP144 - drilling of two exploratory stratigraphic core drill holes to a maximum of approximately 1000m in depth to obtain stratigraphic information.
- EP154 – 31.7 km of two dimensional (2D) seismic survey and the drilling of one stratigraphic core drill hole to 1000 m depth to obtain stratigraphic information.

These works will be regulated through an Environmental Management Plan (EMP) approved by DEPWS. EcOz were engaged to prepare the EMP and associated documents, including this Emergency Response Plan (ERP).

The location of EP144 and 154 project areas are shown in Figure 1-1 and Figure 1-2.

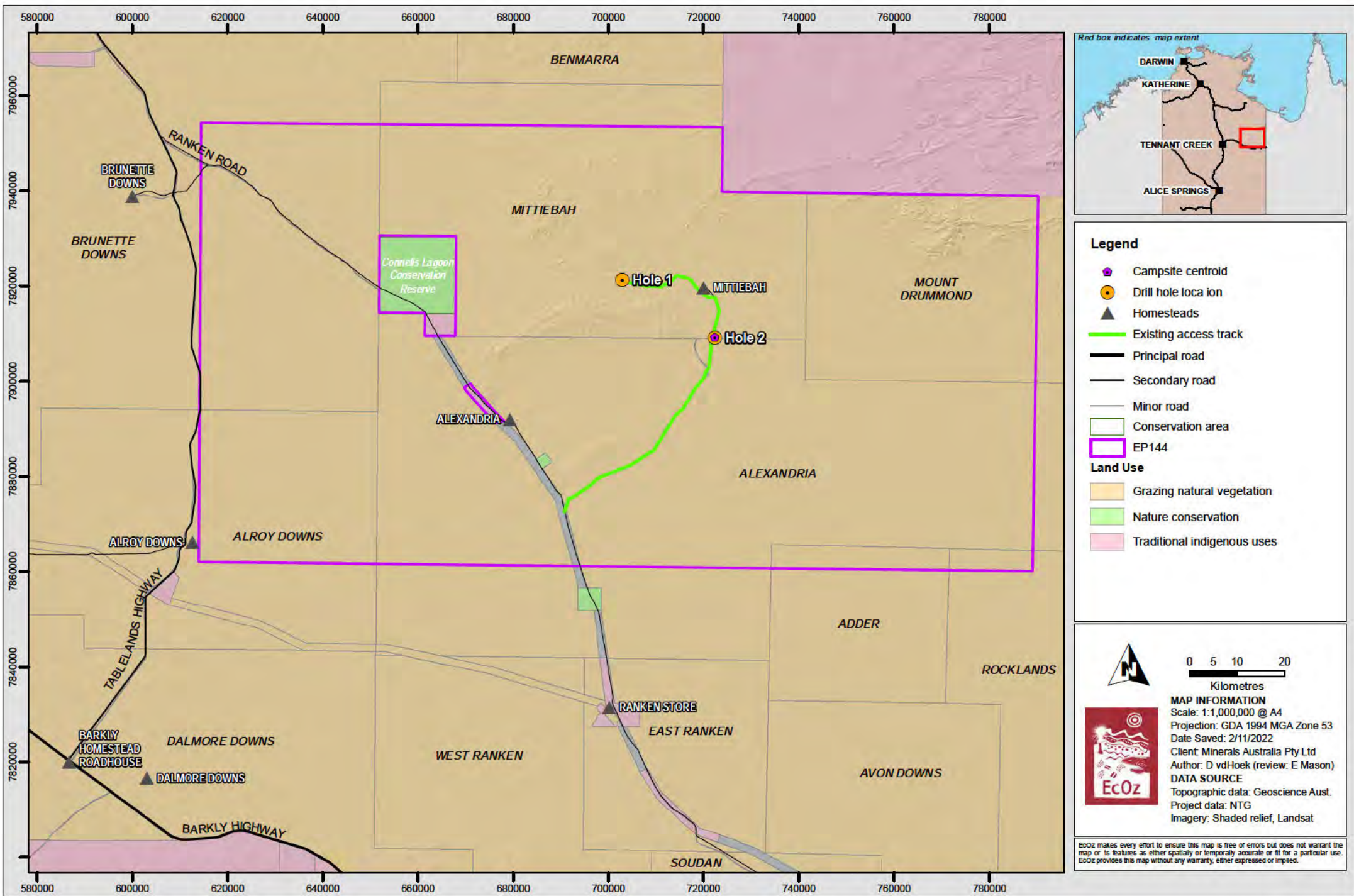
1.2 Purpose and scope

This ERP describes the processes to be followed by Minerals Australia in the event of an emergency during the exploration program activities on EP144 and 154.

The purpose of the ERP is to provide clear, precise and effective guidelines for personnel responsible for the management of emergency events and to ensure that those persons are kept well informed and capable of performing these and other necessary duties. This plan provides an organisational and procedural framework for the management of emergency events on EP144 and 154.

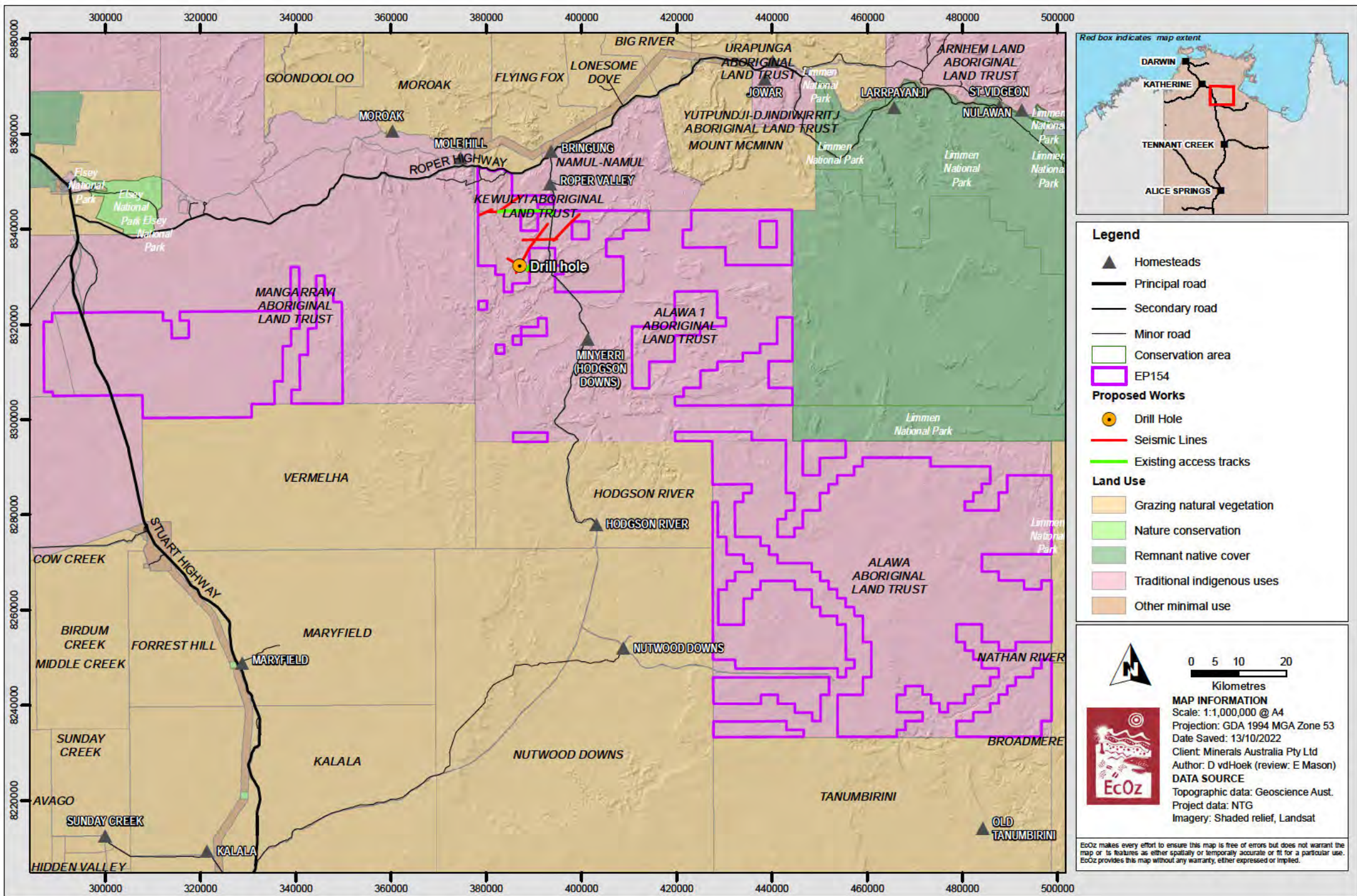
This ERP will be used in conjunction with Site specific Bushfire Management Plans and Spill Response Plans as well as the EMP.

This ERP applies to all Minerals Australia employees, contractors and visitors on EP144 and 154 during the exploration program activities.



Path: Z:\01 EcoZ_Documents\04 EcoZ Vantage GIS\VEZ18181 - Hancock - EMP EP144\01 Project Files\Report maps\Figure 1.1 - Map of the location of EP144, the proposed exploratory works and surrounding land use.mxd

Figure 1 1. Map of the location of EP144, the proposed exploratory works and surrounding land use



Path: Z:\Q1 EcoZ_Documents\04 EcoZ Vantage GIS\VEZ\9193 - Hancock - EMP EP154\01 Project Files\Report Maps\Figure 1.2. Map of the location of EP154, the proposed exploratory works and surrounding land use.mxd

Figure 1 2. Map of the location of EP154, the proposed exploratory works and surrounding land use

2 DEFENITION OF A SITE EMERGENCY

An emergency is defined as an unplanned event within a specific site, facility, field or area, accidentally or deliberately caused, which requires a response to normalise the activity and which may result in an incident such as:

- Death, injury or near miss to people
- Environmental harm or damage
- Uncontrolled release of substance to air, land or water
- Loss or damage to physical assets
- Loss of reputation
- Loss of business
- Loss of control of any health, safety environment or community related incident

3 ROLES AND RESPONSIBILITIES

Specific Individual responsibilities are outlined below in Table 3-1; however, general management responsibilities with respect to this manual are as follows:

- It is the responsibility of Minerals Australia Site Manager to ensure that personnel and contractors within the project area are familiar with the location of this manual and all on-site copies. In order for this to be achieved the site manager /Supervisor needs to be informed of all staff and contractor movements within the area.
- Minerals Australia Site Manager must also ensure that personnel and contractors within the exploration area are familiar with the relevant action plans outlined in this ERP.
- It is the responsibility of all staff and contractors to inform the Site Manager or Exploration Manager of any new hazard that could result in a potential emergency situation that is not adequately covered in this plan.

The emergency management team will consist of:

- Emergency Response Coordinator (Site Manager)
- Incident Controller (delegate of the Site Manager)
- Other onsite staff and contractors

Table 3-1. Roles and Responsibilities

Title	Position Summary	During incident	Post incident
Emergency Response Coordinator (Site Manager)	The Emergency Response Coordinator is the site manager or the delegate in charge, of handling and controlling any emergency situation that may occur in and around the project area. On site responsibilities may be delegated, however, the Emergency Response Coordinator must ensure that the person delegated	<ul style="list-style-type: none"> • Initiating response by Minerals Australia personnel • Controlling and co-ordinating the emergency response effort • Nominating personnel to assist with Emergency Control activities (Incident Controller, • Communications/Information officer, Logistics, Muster point controllers) 	<ul style="list-style-type: none"> • Inspecting incident site • Obtaining statements from witnesses to the incident • Informing next of kin, as required • Organising crisis counselling, if required • Nominating a person as spokesperson for

Title	Position Summary	During incident	Post incident
	<p>these responsibilities understands and is capable of performing them.</p>	<ul style="list-style-type: none"> • Monitoring team members for sign of distress or fatigue and to replace affected members accordingly • Acquiring and allocating both internal and external resources • Controlling the movement of personnel, equipment and resources to and from the emergency location • Standing down personnel and equipment as necessary • Determining whether the emergency constitutes a crisis • Notifying the Managing Director, or the Directors delegate, in the event of a crisis • Notifying external emergency services and co-ordinating their response • Providing regular status reports downwards to the Incident Controller and upwards to Managing Director if required • Making continuous notes on the events and communications during emergency and maintaining an accurate log of events (document all activities and communications) • Preparation for media inquiries (Media response will be via the Managing Director) • Declaring emergency situation and response over 	<ul style="list-style-type: none"> • media • Facilitating debrief once the emergency has concluded • Nominating persons for salvage and clean-up activities • Nominating persons for investigation team • Organising counsellors if needed • Providing information to work groups on the emergency situation and investigation outcomes • Identifying improvement areas in emergency response if evident and initiate appropriate • corrective action
<p>Incident Controller (delegate of the Site Manager)</p>	<p>The Incident Controller will travel to the emergency site, ensuring that they remain contactable during any required travel. Other staff and contractors may be called upon to perform activities and should remain contactable and ready to assist when requested.</p> <p>Responsibilities may be delegated; however, the Incident Controller must ensure that the person delegated these</p>	<ul style="list-style-type: none"> • Establishing a Forward Control Centre • Acting as the Incident Controller • Providing regular status reports to the Emergency Response Coordinator • Advising the Emergency Response Coordinator of resources required • Making continuous notes on the events and communications during emergency and maintaining an accurate log of events 	<ul style="list-style-type: none"> • Preventing personnel from removing equipment or items from the scene of the incident and disturbing the scene • Posting a sentry at the scene to ensure area is not interfered with • Assisting the investigation team as necessary • Participating in debrief • Prepare

Title	Position Summary	During incident	Post incident
	responsibilities understands and is capable of performing them.	(document all activities and communications) <ul style="list-style-type: none"> • Ensuring that all personnel within the area have been accounted for • Liaising closely with the Emergency Response Coordinator and any Third-party emergency services at the scene • Ensuring incident scene is barricaded off and access is restricted to emergency personnel only • Acting as the central communication point at the emergency scene and maintain open lines of communication with the Emergency Response Coordinator and Third-Party emergency services at the scene • Providing technical advice to the Emergency Response Coordinator and Third-Party emergency services • Monitoring team members for sign of distress or fatigue, replace accordingly • Maintaining register of personnel who leave the site who may need to be contacted • Communicating to the Emergency Response Coordinator when emergency is over 	documentation and records of equipment loss or damage
Other onsite staff and contractors	If requested by the Emergency Response Coordinator or the Incident Controller, the relevant personnel should locate to the site of the emergency and assist.	<ul style="list-style-type: none"> • Providing technical information to the Emergency Response Co-ordinator • Assisting with roll calls • Communicating all information back to the to the Emergency Response Co-ordinator on developments as they occur • Providing any other resources that are within their capabilities • Remaining at the site and awaiting instructions • Assisting with the Incident Controller if requested 	<ul style="list-style-type: none"> • Providing resources for salvage and clean up • Participating in debrief • Assisting with the identification of personnel who may need counselling

4 RESPONSE SCENARIOS

To ensure that Minerals Australia are capable to respond to and prepare for Emergency situations, it is important that each project site undertake a site-based risk assessment. This risk assessment will identify potential emergency events which will in turn, support the site emergency management requirements.

Table 4-1 below describes some emergency response scenarios and recommended response actions/procedures.

Table 4-1. Emergency response scenarios

Category	Response actions / procedures
General emergency	<ul style="list-style-type: none"> • Remove yourself and others from danger • Raise the alarm – Notify Site Manager / Supervisor • Stop all work and make sure the area is safe • Activate emergency shutdown devices/isolate equipment as necessary if safe to do so • Provide First Aid to any injured persons (DRSABCD) • Account for people • Call emergency services if required • Follow the directions of emergency services or response personnel and assist as required if you feel safe and capable to do so • Notify appropriate Minerals Australia contacts • Determine the recovery strategy and resources required: <ul style="list-style-type: none"> ○ Check for equipment integrity, ○ Ensure all protection systems are restored, ○ Replenish, replace or return emergency equipment
Bushfire	<ul style="list-style-type: none"> • If in a life-threatening situation and it is safe to do so, cease activities, shut down plant, and flee the area. • Raise the alarm – Notify Site Manager / Supervisor • If the fire is in the distance or in close proximity, contact Bushfire NT to report the fire unless the Site Manager / Supervisor has already been advised of the fire • Account for people • Be on the alert for spot-fires • Evacuate if and when advised. • Return to the Site only when cleared by the emergency services. • Coordinate the clean-up and begin site remediation if needed
Snakebite	<ul style="list-style-type: none"> • Check the immediate area for danger to yourself or the injured person • Calm the person and keep them still • Notify Site Manager / Supervisor • Call for medical assistance • Do not wash or suck the bite or use a tourniquet • If bitten on a limb, apply a pressure bandage, or cloth approximately 10-15cm wide upwards from the fingers or toes, firm but not too tight

Category	Response actions / procedures
	<ul style="list-style-type: none"> • Keep the limb still by using a splint • If able to do so mark the area of the bandage where you think the bite occurred – this will assist medical staff • Leave the splint or bandage on until reaching the hospital • Follow Minerals Australia Incident Reporting and Investigation Procedure
Vehicle accident	<ul style="list-style-type: none"> • Check the immediate area for danger to yourself or the injured person • If the vehicle is in contact with power lines, stay clear and advise occupants to stay in the vehicle • Raise the alarm – Notify Site Manager / Supervisor (report location, type and extent of incident) • Request assistance of Emergency Services as required • Switch off vehicle ignition • Assess vehicle and site damage; take relevant actions to secure the accident scene • Do not try to remove casualties from the vehicle until you can be sure other dangers are not present • When possible, remove trapped/injured personnel, provide medical aid (as qualified)
Spill response	<ul style="list-style-type: none"> • Notify Site Manager / Supervisor • Implement Spill Response Plan • All necessary action should be taken to minimise the size and any adverse effects of the release • If adequate resources are not available to contain the release and if it threatens public health, property or the environment, the state fire brigades should be contacted for emergency assistance - phone 000 • Always pay attention to fire and health hazards • Activate containment operations immediately to prevent the spill from reaching a surface watercourse or groundwater • Clean up spill
Missing persons	<ul style="list-style-type: none"> • Notify Site Manager / Supervisor • After being notified of a missing or overdue person, • Obtain information on time and location of the last sighting • Attempt to establish communication with the missing person via mobile phone and SMS contact and if possible, UHF, VHF, Satellite phone • If possible, contact the destination point, e.g. hotel/motel/camp to determine if the person has arrived • If possible and safe to do so (i.e. weather conditions) dispatch other nearby employees to look for the missing person • After a period of time without contact (as determined collaboratively by the Site Supervisor / Site Manager) notify the police of the missing person
Weather (flood/cyclone)	<ul style="list-style-type: none"> • Initiate Medical Emergency Response if required

Category	Response actions / procedures
	<ul style="list-style-type: none"> • Account for all personnel • Take shelter as necessary • Notify Site Manager / Supervisor • Monitor weather alerts and radio stations • Never cross a flooded creek, road or causeway

5 RESPONSE COMMUNICATION

The management of information flow and communications is vital to effective emergency response. The emergency response communication and reporting relationships for the sites are illustrated in Figure 5-1.

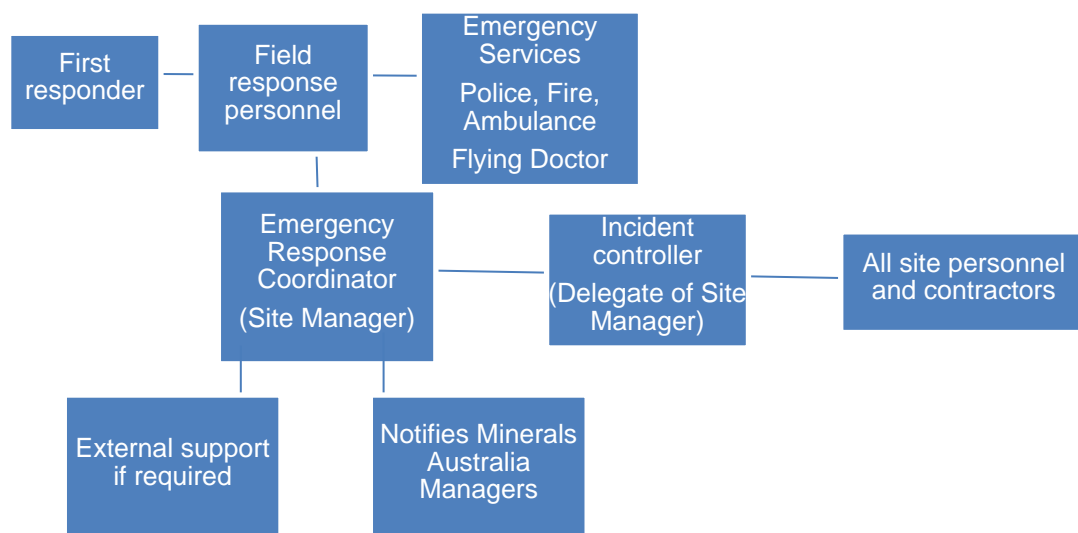


Figure 5-1. Communication flowchart

The primary method of voice communication during emergencies will be via radios (in each site vehicle) or satellite phones where available.

5.1 Regulatory notification

A regulatory notifiable incident is an incident or non-compliance with an External Mandatory Obligation or External Voluntary Obligation that requires notification or reporting to a Regulator as prescribed by applicable Laws and Regulations. HSE regulatory notifiable incidents required to be reported to a regulator are listed in Appendix A.

5.2 Stakeholder communication

The Site Manager may be required to liaise with relevant stakeholders (such as land occupiers/owners, neighbours, local regulatory authorities etc) that could potentially be impacted by the incident/emergency situation. Initial information to be provided should include state/type of the emergency, possible cause, effects/consequences, likely duration, and potential impacts.

5.3 Media enquiries

During an emergency event, media attention may occur at the affected site. If personnel receive an enquiry from a journalist or reporter, whether in person or by phone and are asked about Minerals Australia, they should say:

“I am not in a position to comment but if you give me your name and phone number I will organise for the most appropriate person to call you.”

Always ask for:

- the journalist / reporter’s name;
- publication / media outlet;
- contact phone number and / or email, and
- publication deadline.

Report the enquiry to the Site Manager, who will advise the Minerals Australia Project Manager on call at the earliest opportunity. It is important to remember that there is no such thing as “off the record”. Even if you are speaking informally, you could be quoted at any time.

6 INCIDENT NOTIFICATION

All personnel will be required to report all incidents or near-misses to the Site Manager. The Site Manager is responsible for ensuring that all reported incidents and near-misses are promptly reported to Minerals Australia Project Manager and are investigated and that appropriate corrective actions have been completed.

Appendix A details the Incident Notification information. An example of the information required to be gathered during an incident includes;

- Name of the person calling in the incident and receiver name
- Names of the personnel involved in the incident, if not known, the number of people involved in incident
- Coordinates or landmarks of incident
- Clear directions on how to get to the incident site
- Incident type and description i.e. Injury, explosion, vehicle accident, fire, missing personnel
- Description of the incident including; time incident occurred, cause of incident if known, any actions taken on-site and emergency required
- Details on the incident size including area, height, volume, description of injury, number of people involved, preliminary assessment of medical assistance required
- Status of the incident, i.e., has the incident or potential of the incident to cause more damage or injury stopped, level of emergency response required, first aid applied to date and level of controls in place, environmental situation (wind, rain, etc.).

7 EMERGENCY RESPONSE EQUIPMENT AND PERSONNEL

All emergency response equipment, such as first aid kits, fire extinguishers, PPE and spill kits will be kept in strategic places around the Site. Equipment will be inspected on a scheduled basis.

The equipment and resources required for an emergency will be dependent on the circumstances of the situation. Equipment and plant available at the Sites is limited to light vehicles (4wd utilities and wagons) and those vehicles and plant brought on site by contractors to fulfil exploration-related contracts.

All personnel will complete an induction on arrival at the Site. The induction will identify emergency response actions and muster point locations. A Personnel On-Site Register is maintained at Site, recording each person's name, company and whether they are on Site or off Site. In the event of an emergency or incident, the Site Manager or Site Supervisor is responsible for accounting for every person on site.

The Site Manager shall ensure that emergency access and egress are established and maintained at the Site.

The Site Manager shall ensure that the muster points at the Site are identified to all personnel during their induction.

All primary muster points are clearly signposted with secondary muster points available. All muster points can be reached unimpeded during an emergency.

In all instances, personnel shall become familiar with the safest route from their work area to the designated assembly areas.

All persons shall remain at the designated muster point until further instructions or the "all-clear" is given.

8 EXTERNAL EMERGENCY SUPPORT

In an emergency situation the Emergency Response Coordinator or delegate, will be responsible for:

- contacting the appropriate local emergency service agencies to initiate external response;
- delegating responsibilities and authorities to help the emergency services once they have arrived on site, as appropriate; and
- providing local emergency services with specialist advice regarding plant/equipment operating requirements and hazards.

The Site Manager will ensure the Emergency services have a precise location for the Site at which the incident has occurred, including coordinates and a guide map. The Site Manager will stay up-to-date with local Emergency services and community authorities on their:

- Availability
- Capabilities
- Distances and modes of transport
- Communication requirements
- Vested interest in any onsite Incident.

The Site Manager will also provide relevant information to the local Emergency service relating to:

- The standard of medical care available on site
- Hazardous substances list
- Safety Data Sheets

9 RECOVERY ACTIONS

The Site Manager will declare the emergency ended when the Site has been returned to a safe condition, all personnel have been accounted for and injured personnel have been stabilised and /or evacuated.

On standing down from an emergency, the Site Manager is to:

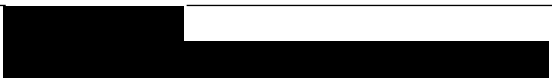
- Review the emergency response and identify any areas for improvement
- Identify any necessary improvements for this plan and related procedures
- Secure incident site and do not disturb area until the investigation has been completed
- Organise for a full incident investigation and analysis
- Collect any evidence that may assist in the investigation (e.g., testimonies, records of actions taken, photographs, etc.)
- Compile and file away all documents relating to the response
- Check equipment and infrastructure to see what, if any impact has occurred
- Replenish, replace, or return emergency equipment
- debriefing all personnel (including people currently relieved or stood down)
- Ensure personnel impacted by the incident receive the required counselling, or information to continue with safe operations
- Assess for potential decontamination needs
- Repair or replace damaged equipment and test for safe functionality
- Attend to commissioning and site reinstatement
- Revise ERP and implement changes or training as required

10 TRAINING

The Site Manager shall ensure that all personnel are trained in the use and functions of this ERP. Training will be provided in various forms including; practical drills, desktop exercises, simulated exercises, competency-based training, toolbox meetings and resource and equipment checks. The simulated exercises shall be specific emergency scenarios addressing identified risks specific to the exploration programs activities.

11 EMERGENCY CONTACT DETAILS

Minerals Australia

Name	Title	Contact information
TBA	Managing Director	
Peter Collings	Project Manager	
TBA	Site Manager	

Seismic Contractors

Name	Title	Contact information
TBA		

Drilling Contractors

Name	Title	Contact information
TBA		

Government and Stakeholders

Name	Contact information
Department of Environment, Parks and Water Security (DEPWS) General Environmental enquiries Executive and Business Services	08 8924 4218 08 8999 5511
Department of Industry, Tourism and Trade (DITT) Petroleum Operations	08 8999 6030 After hours: 1300 935 250
Pollution hotline	1800 064 567
Onshore gas non-compliance	1800 413 889
NT WorkSafe	1800 019 115
Northern Land Council (NLC) Katherine	(08) 8971 9899
Alroy Downs	TBA
Alexandria	██████████
Mittiebah	██████████
Brunette Downs	TBA
Mount Drummond	TBA

Other

Name	Contact information
Police	000 Or 131 444 for non emergency situations
Tennant Creek Police Station (non-emergency)	8962 0944
Mataranka Police Station (non-emergency)	8975 4511
Tennant Creek Hospital	8962 4399
Katherine Hospital	8973 9211
Royal Flying Doctors Service	For 24 hour medical and emergency help in central NT call

Name	Contact information
HF Radio Satellite Telephone Alice Springs base Darwin base	1800 1MRACC (1800 167 222) 4010kHz, 6890kHz or 8165kHz 08 8648 9555 8958 8600 8998 9940
Bushfires NT Katherine, Gulf and Victoria River District (VRD)	08 8973 8871 or 08 8973 8872 VRD phone:08 8973 8870 (business hrs only, 000 if out of hrs)
Bushfires NT Alice Springs & Tennant Creek	08 8952 3066 (business hrs only, 000 if out of hrs)
Mataranka Police Station (EP154)	08 8975 4511
Minyerri Health Clinic (EP154)	08 8975 9959
Avon Downs Police (EP144)	08 8964 5555

12 REVIEW

The Site Manager is responsible for ensuring the suitability and maintenance of this document. The Project Manager is responsible for any changes to this ERP.

The ERP will be reviewed / revised when there is a significant change in the operations that are covered by this ERP. If applicable, the ERP will be modified as a result of changes to the emergency response process, otherwise the ERP will be reviewed annually.

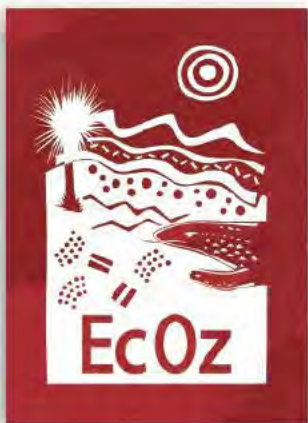
APPENDIX A INCIDENT NOTIFICATION GUIDELINES

NT Worksafe	
<ul style="list-style-type: none"> • Death • Serious injury or illness <ul style="list-style-type: none"> ○ Immediate treatment as an in-patient in a hospital ○ Immediate treatment for the amputation of any part of the body ○ Immediate treatment for a serious head injury ○ Immediate treatment for a serious eye injury ○ Immediate treatment for a serious burn ○ Immediate treatment for the separation of skin from an underlying tissue (such as de-gloving or scalping) ○ Immediate treatment for a spinal injury ○ Immediate treatment for the loss of a bodily function ○ Immediate treatment for serious lacerations ○ Medical treatment within 48 hours of exposure to a substance • Dangerous incidents <ul style="list-style-type: none"> ○ An uncontrolled escape, spillage or leakage of a substance ○ An uncontrolled implosion, explosion or fire ○ An uncontrolled escape of gas or steam ○ An uncontrolled escape of a pressurised substance ○ Electric shock: <ul style="list-style-type: none"> examples of electrical shock that are not notifiable: <ul style="list-style-type: none"> ▪ shock due to static electricity ▪ 'extra low voltage' shock (i.e. arising from electrical equipment less than or equal to 50V AC and less than or equal to 120V DC) ▪ defibrillators are used deliberately to shock a person for first aid or medical reasons examples of electrical shocks that are notifiable <ul style="list-style-type: none"> ▪ minor shock resulting from direct contact with exposed live electrical parts (other than 'extra low voltage') including shock from capacitive discharge • The fall or release from a height of any plant, substance or thing • The collapse, overturning, failure or malfunction of, or damage to, any plant that is required to be design or item registered under the Work Health and Safety Regulations, for example a collapsing crane • The collapse or partial collapse of a structure • The collapse or failure of an excavation or of any 	<p>The Site Manager will notify NT WorkSafe immediately after becoming aware of a 'notifiable incident'</p> <p>1800 019 115 or ntworksafe@nt.gov.au</p> <p>An incident site must not be disturbed, other than the immediate response to assist injured people, recover a body or make the area safe, until an inspector arrives at the site or directs otherwise (whichever is earlier)</p>

shoring supporting and excavation	
DITT	
<ul style="list-style-type: none"> • An incident involving death or serious injury (reports shall be in addition to, and not take precedence over reports required by NT WorkSafe). A serious injury is one which requires immediate attention by a medical practitioner • An incident involving serious damage (other than Environmental Harm) including loss, destruction or damage to property exceeding \$50k or when any person dies or suffers serious injury • An incident involving or could potentially involve the injury to a person or serious damage to property that is professionally considered to have been caused by an event that is not in the normal or ordinary course of an operation (Potentially Hazardous event) • An incident where damage to property occurs that is not serious damage to property, but which results in a significant loss of structural integrity or load bearing capacity in the property damaged or results in some other significant unsafe condition • An incident that is considered to be an emergency 	<p>The Site Manager will notify DITT immediately after becoming aware of a 'notifiable incident'</p> <p>08 8999 6030 After hours: 1300 935 250</p>
<p>Applicable to ON TENURE SPILLS (note Off tenure spills under Waste Management and Pollution Control Act 1998)</p> <p>Reportable Incident: An incident, arising from a regulated activity, that has caused or has the potential to cause material environmental harm or serious environmental harm.</p> <p>Material environmental harm means, harm that:</p> <ol style="list-style-type: none"> a) Is not trivial or negligible in nature; b) Consists of an environmental nuisance of a high impact or on a wide scale; c) Results, or is likely to result, in not more than \$50k or the prescribed amount (whichever is greater) being spent in taking appropriate action to prevent or minimise the environmental harm or rehabilitate the environment; or d) Results in actual or potential loss or damage to the value of not more than \$50k or the prescribed amount (whichever is greater). 	<p>The Site Manager will notify DITT:</p> <ul style="list-style-type: none"> • As soon as practicable (not later than 2 hours after the incident) • <24 hours after oral notice (written notification) • 3 days after the incident (initial report) • 90 days intervals from the date of the initial report (interim reports) • 30 days after clean up or rehabilitation (final report) <p>08 8999 6030 After hours: 1300 935 250</p>
<p>Recordable Incident: An incident that has resulted in an environmental impact or environmental risk not specified in the current plan for the activity; or has resulted in the contravention of an environmental performance standard specified in the current plan for the activity; or is inconsistent with an environmental outcome specified in the current plan for the activity; and is not a reportable incident.</p>	<p>The Site Manager will notify DITT 15 days after each 90 day period after then day on which the environmental management plan is approved.</p> <p>08 8999 6030 After hours: 1300 935 250</p>
<ul style="list-style-type: none"> • A reportable incident that involves: <ul style="list-style-type: none"> ○ Death or serious injury (or the potential to cause) ○ Significant damage to a pipeline (or potential to cause) 	<p>The Site Manager will notify DITT as soon as practicable</p> <p>08 8999 6030</p>

<ul style="list-style-type: none"> ○ Immediate investigation ● A significant pipeline accident event that: <ul style="list-style-type: none"> ○ Is connected with work carried out on or in relation to a pipeline ○ Causes, or has the potential to cause human death 	<p>After hours: 1300 935 250</p>
DEPWS	
<ul style="list-style-type: none"> ● An incident arising from a regulated activity that has caused, or has the potential to cause, material environmental harm, or serious environmental harm as defined under cl.117AAB(1) the Petroleum Act 	<p>The Site Manager will notify DEPWS as soon as practicable, but no later than 2 hours after the first occurrence of the incident or after the time Minerals Australia becomes aware of the incident</p> <p>Pollution hotline: 1800 064 567 Onshore gas non-compliance: 1800 413 889</p>
<p>Duty to notify of incidents causing or threatening to cause pollution. Applicable to off tenure related spills (note ON tenure spills under Petroleum (Environment) Regulations): 1) Where: a) an incident occurs in the conduct of an activity; and b) the incident causes, or is threatening or may threaten to cause, pollution resulting in material environmental harm or serious environmental harm, the person conducting the activity must notify the NT EPA in accordance with subsection (3) as soon as practicable after (and in any case within 24 hours after) first becoming aware of the incident or the time he or she ought reasonably be expected to have become aware of the incident.”</p> <p>An incident that causes, or is threatening or may threaten to cause, pollution resulting in material environmental harm or serious environmental harm. Refer to the definition of material and serious environmental harm provided in DITT section above.</p> <p>Pollution means: a) A contaminant or waste that is emitted, discharged, deposited or disturbed or that escapes, or b) A contaminant, effect or phenomenon, that is present in the environment as a consequence of an emission, discharge, deposition, escape or disturbance of a contaminant or waste.</p> <p>This does not apply to incidents confined within petroleum activities land (including air and water above or below) – see the EMP for the area of petroleum activities land</p>	<p>The Site Manager will notify DEPWS as soon as practicable after (and in any case within 24 hours after) first becoming aware of the incident</p> <p>Pollution hotline: 1800 064 567 Onshore gas non-compliance: 1800 413 889</p>
<p>Unable to control a fire on the land</p>	<p>The Site Manager will notify DEPWS (Bushfires NT) and applicable land holders, following the fact.</p> <p>See above Emergency Contact details tables for phone numbers as it is dependent on location of fire.</p>

DAWE	
Incidents considered to have an impact to Matters of National Environmental Significance	<p>The Site Manager will notify DAWE within 5 business days of becoming aware of the breach</p> <p>Department of Agriculture, Water and the Environment (02) 6274 1372 or 1800 110 395 environment.compliance@awe.gov.au</p>
NT EPA	
Alteration of action in such a manner that the environmental significance of the proposed action may be changed	<p>The Site Manager will notify NT EPA as soon as practicable</p> <p>8924 4218 ntepa@nt.gov.au</p>
NT Heritage Council	
Discovery of archaeological places and objects	<p>The Site Manager will notify NT Heritage Council as soon as practicable (within 7 days of discovery)</p> <p>8999 5039 heritage.branch@nt.gov.au</p>
NT Weed Management Branch	
Identifying a declared weed that has not previously been, or known to have been, present on the land.	<p>The Site Manager will notify NT Weed Management Branch within 14 days of becoming aware</p> <p>Darwin: 08 8999 4567 Katherine: 08 8973 8857 Tennant Creek: 08 8962 4322 Alice Springs: 08 8951 9210 weedinfo@nt.gov.au</p>



EcOz Environmental Consultants

EcOz Pty Ltd.

ABN 81 143 989 039

Level 1, 70 Cavenagh St,
GPO Box 381,
Darwin, NT 0801

T: +61 8 8981 1100
E: ecoz@ecoz.com.au

www.ecoz.com.au



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APPENDIX O REHABILITATION PLAN



Rehabilitation Plan EP 144 & 154 Seismic survey and drill programs Minerals Australia Pty Ltd.

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EcOz Pty Ltd.
 ABN: 81 143 989 039
 Level 1, 70 Cavenagh Street
 DARWIN NT 0800
 GPO Box 381, Darwin NT 0800

Telephone: +61 8 8981 1100
 Email: ecoz@ecoz.com.au
 Internet: www.ecoz.com.au



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1 INTRODUCTION

1.1 Context

Minerals Australia Pty Ltd (Minerals Australia), a wholly owned subsidiary of Hancock Prospecting, operates exploration permits (EP) 144 and 154. The EP's are subject to an Exploration and Coexistence Deed between Minerals Australia Pty Ltd, Jacaranda Minerals Ltd (a co-shareholder) and the Northern Land Council (NLC).

Minerals Australia proposes the below works programme for the two EP's:

- EP144 - drilling of two exploratory stratigraphic core drill holes to a maximum of approximately 1000m in depth to obtain stratigraphic information.
- EP154 – 31.7 km of two dimensional (2D) seismic survey and the drilling of one stratigraphic core drill hole to 1000 m depth to obtain stratigraphic information.

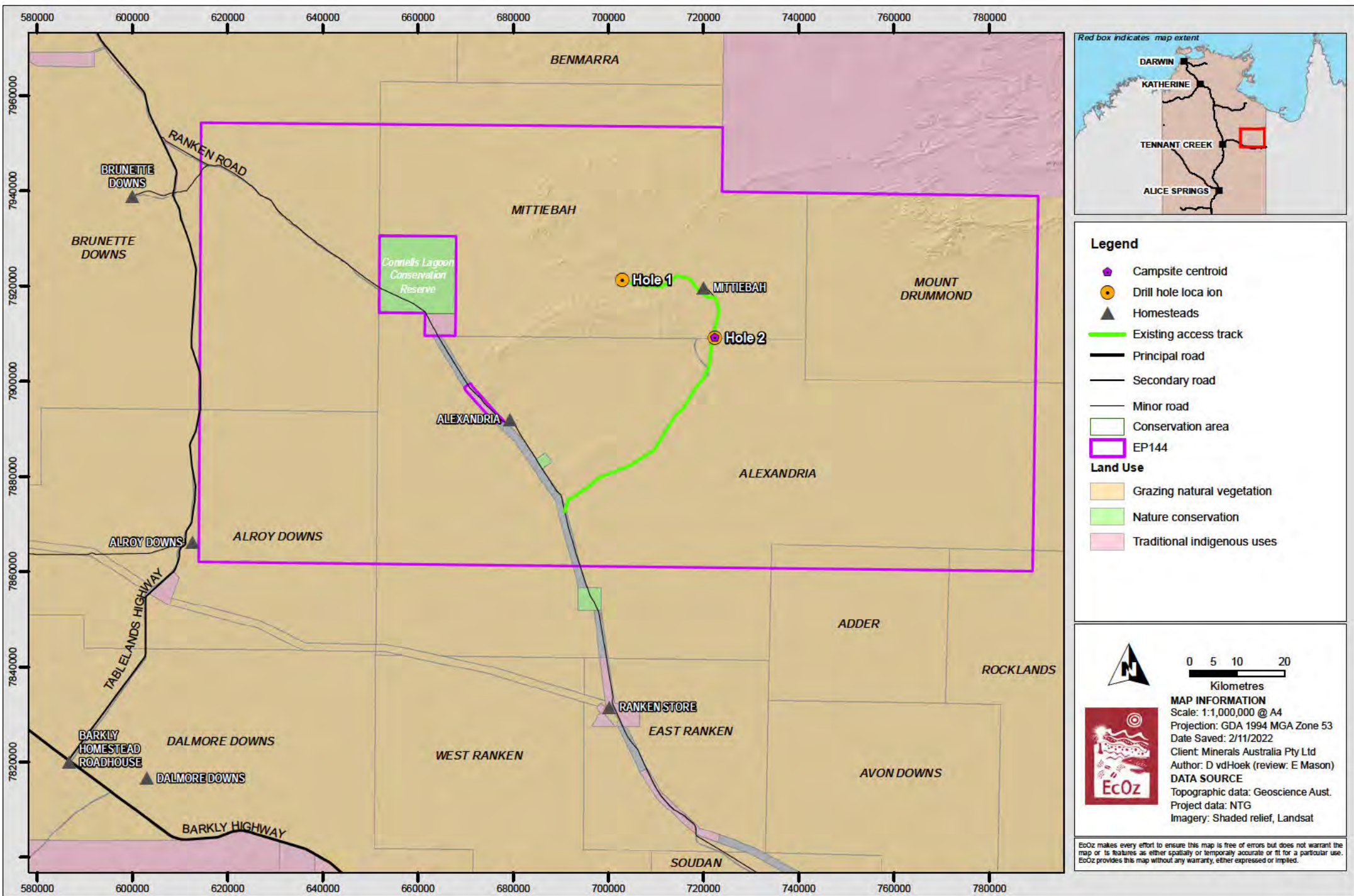
These works will be regulated through an Environmental Management Plan (EMP) approved by DEPWS. EcOz were engaged to prepare the EMP and associated documents, including this Rehabilitation Plan.

The location of EP144 and 154 project areas are shown in Figure 1-1 and Figure 1-2.

1.2 Purpose and scope

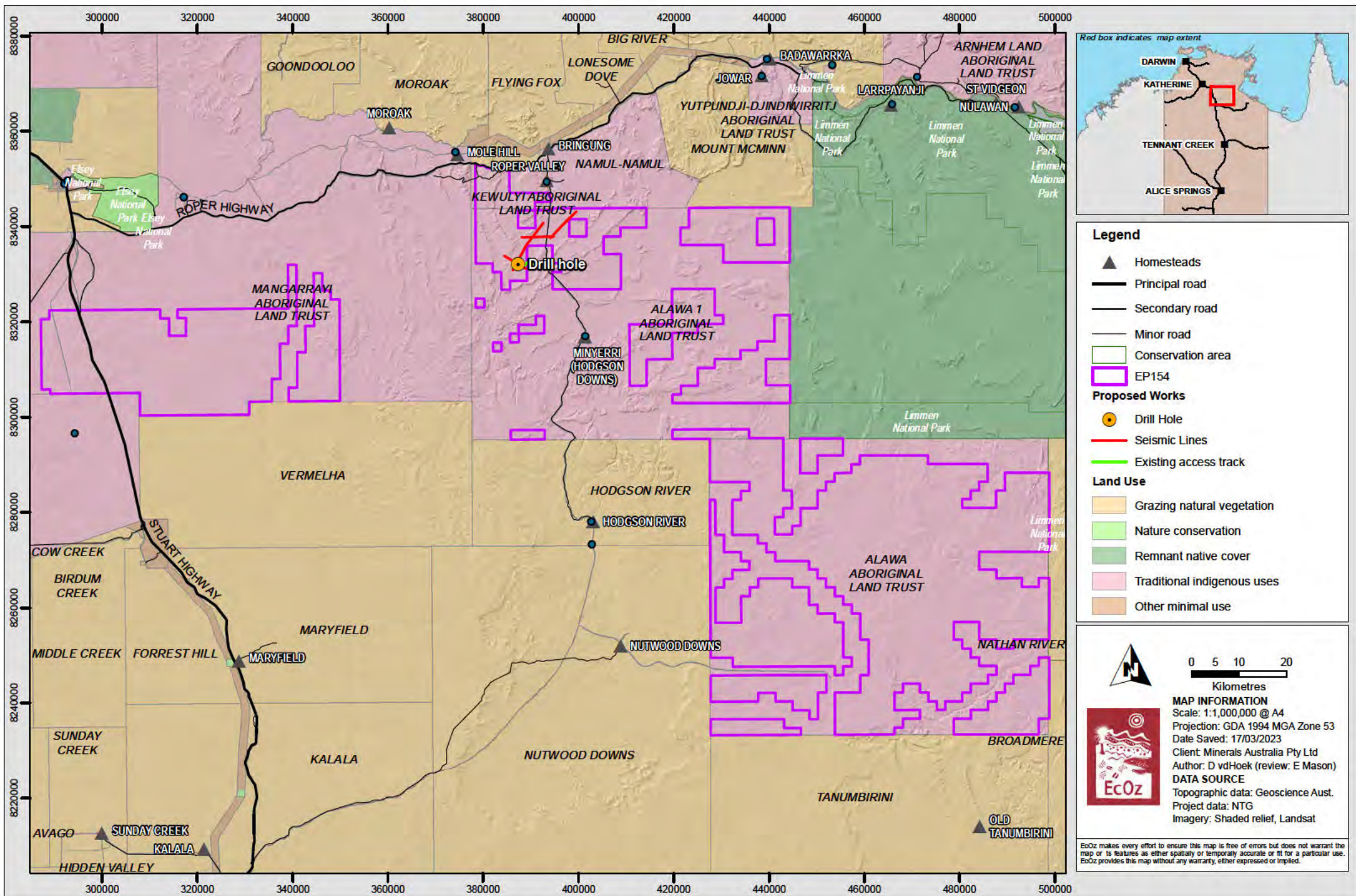
Rehabilitation is the process of returning disturbed land to a stable, self-sustaining land form that is similar to pre-existing and adjacent vegetation communities and/or land forms. Success of rehabilitation is a critical component of this project, and failure of rehabilitation a major risk. All significantly disturbed land will be rehabilitated.

This report will detail rehabilitation methods, monitoring procedures and define rehabilitation success criteria.



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ10181 - Hancock - EMP EP144\01 Project Files\Report.maps\Figure.1 1 Map of the location of EP144, the proposed exploratory works and surrounding land use.mxd

Figure 1-1. Map showing the location of EP144



Path: Z:\01 EcOz_Documents\04 EcOz_Vantage GIS\NZ10103 - Hancock - EMP EP154\01 Project Files\Report Maps\Figure 1 2. Map of the location of EP154, the proposed exploratory works and surrounding land use.mxd

Figure 1-2. Map showing the location of EP154

2 REHABILITATION STRATEGY

2.1 Rehabilitation objectives

Minerals Australia will ensure that rehabilitation is:

- Stable and self-sustaining.
- Safe for the land users and wildlife.
- Returned to close-to pre-disturbance level that requires little or no ongoing management.
- Complementary to the adjoining landscape.
- Re-instated to reflect the natural ecosystem/s, or establish an alternative outcome that is commiserate with the surrounding land use e.g. vegetation growing, cropping, etc.

2.2 Rehabilitation strategy

The proposed rehabilitation approach is assisted natural regeneration in areas that have been cleared, and natural regeneration for the seismic line areas. Wherever practicable, vegetation will not be cleared, and vehicles will traverse over or around the vegetation instead. This approach is most suitable for open lightly wooded areas and grasslands and will result in minimal ground disturbance and rehabilitation efforts.

Rehabilitation of the seismic lines will be carried out in a progressive manner, following behind with the completion of each survey line. This will ensure that land is stabilised as soon as possible after disturbance to reduce the occurrence of erosion, sedimentation, loss of topsoil and weed invasion.

Methods for final rehabilitation are discussed in more detail in Section 3.

2.3 Outcomes

The land will be rehabilitated to pre-disturbance condition.

Rehabilitation requirements and objectives will be determined on a case-by-case basis, but will be compatible with the safety, landform, vegetation cover and soil stability of the surrounding area and methods developed in this plan. All significantly disturbed land will be rehabilitated.

3 REHABILITATION METHODS

3.1 Vegetation clearing

Cleared vegetation is to be pushed to one side of the 2D seismic lines, to assist in future rehabilitation works. Cleared vegetation may also be used in erosion and sediment control structures. Retention of green waste can assist in creation of micro-habitats for seed germination, promote retention of soil moisture, and provide habitat for fauna.

In areas of high weed occurrence, cleared vegetation should be flagged so that it is not used in rehabilitation works. Vegetation clearing is to avoid clearing all large trees, notably:

- Trees with a trunk diameter >25 cm at 1.3m above ground level will be avoided to minimise any potential impacts to breeding habitat for EPBC-listed Gouldian Finches, and other species.
- All large old hollow bearing trees along the waterways (e.g., Coolibah) or woodland environments will be avoided.

3.2 Natural regeneration

Where clearing is required (e.g. within dense vegetation on 2D seismic lines), cleared vegetation will be stockpiled to be respread following the works. The topsoil will contain a natural seedbank. Spreading of cleared vegetative matter over disturbed areas provides micro-habitats and slows run-off during rainfall events, thus enhancing infiltration. This is proposed to be implemented progressively at the end of the 2D seismic exploration activities for each line.

3.3 Assisted natural regeneration

Assisted natural regeneration combines natural regeneration with soil preparation and weed control. If monitoring demonstrates that natural regeneration is unsuccessful, additional soil preparation combined with reseeded using local provenance seed shall be carried out.

3.4 Erosion and sediment control

The following erosion and sediment control measures can be used to protect rehabilitated areas. Further information is available in the project Erosion and Sediment Control Plan.

- Rehabilitation will be undertaken in a progressive manner to limit erosion risk.
- Inspections, following heavy rainfall, of areas prone to concentration of surface water flows.
- Erosion and sediment control structures are to be installed prior to land disturbance, and maintained in place until after rehabilitation is complete.
- All erosion and sediment control devices are to be constructed with consideration of the IECA Best Practice Erosion and Sediment Control Guidelines 2008.
- Construct, improve or repair drainage control measures to reduce water movement.

3.5 Weed management

Vehicles moving to and from the rehabilitation area/s are to be free from weed seed. Weed hygiene is to be carried out prior to access into areas undergoing rehabilitation e.g. vehicle weed inspections and cleaning.

Weed control is required for at least 12-months post rehabilitation, to remove any emerging weeds within the rehabilitated area/s.

All materials and equipment used during rehabilitation are to be clean and free from dirt that may contain weed seed.

Species specific management will be developed if identified as required.

3.6 Maintenance and monitoring

Following rehabilitation works, vehicular access should be limited except where required for maintenance or monitoring work. Regular monitoring will be carried out to ensure:

- Vegetation re-establishment is on track and consistent with success criteria and surrounding land.
- Erosion and sediment control measures are effective.
- Weed species are controlled.
- Landforms remain stable.

Further maintenance work may be required in areas not showing the above features. For example, additional weed control, erosion control measures and planting may be required. Regular maintenance will be undertaken during and after the program to ensure that rehabilitated areas do not degrade or stall.

3.7 Access tracks

Established main roads and access tracks will be used on site. General maintenance of tracks may be required prior to, during and following project activities, undertaken in agreement with Station owner. This may include grading, patching and watering.

To minimise damage to access tracks works will cease if there is a forecast for 50 mm of rain or more within the next 48 hours.

3.8 2D seismic lines

2D seismic lines will result in minimal impact, so it is expected that most areas will regenerate naturally. More heavily impacted areas will be treated using assisted regeneration methods, with light surface scarification and ripping. Rip lines are to be spaced such that movement of soil is limited. Direct seeding will be used where required.

3.9 Accommodation camp

No campsite will be required for works on EP154, accommodation will be organised off site.

The campsite on EP144 will be approximately 1 ha.

Any areas that have potentially contaminated soils will have those soils removed prior to rehabilitation. Rehabilitation of these area will be by assisted natural regeneration.

3.10 Drill pads, holes and sumps

Approximately 2.25 ha will be cleared to accommodate the 150 x 150m drill pad for each of the drill holes. Two sumps will be excavated for each drill hole, one to contain water only and one for drilling fluids. Sumps will be filled in after use and the top soil with seed bank re spread on top to assist in natural regeneration. Any remaining drilling fluid in the sumps will be disposed of at an approved waste facility as per the EMP. Drill holes will be plugged and sealed. Drill pads will be proactively treated, e.g. ripped, to assist natural regeneration.

4 SUCCESSFUL REHABILITATION CRITERIA

The following, quantifiable criteria has been established so that it is possible to assess the success of rehabilitation. The success criteria are performance objectives and/or standards against which rehabilitation success can be measured. Using these criteria, it should also be possible to assess rehabilitation trends, to ensure it is moving towards a safe, stable and sustainable ecosystem.

Rehabilitation will be deemed successful when the following conditions have been met:

- Safe for the land users and wildlife.
- Returned to a close-to pre-disturbed level that requires little or no ongoing management.
- Complementary to the adjoining landscape.
- Re-instated to reflect the natural ecosystem/s, or establish an alternative outcome that is commiserate with the surrounding land use e.g. vegetation growing, cropping, etc.
- No signs of erosion, sedimentation, loss of topsoil or weed invasion.
- Rehabilitation is stable and self-sustaining.

Accommodation camp and all other significantly disturbed areas must be rehabilitated to the following condition (at minimum), in comparison to surrounding land use:

- Greater than, or equal to, 70 % native groundcover species richness
- Greater than, or equal to total percent of groundcover
- Less than, or equal to, percent species richness in introduced plant species

Analogue sites are to be surveyed to determine levels of species composition and richness, and to assist in reaching the specified rehabilitation success criteria. Due to the linear nature of the 2D seismic lines clearing, it may be necessary to establish several analogue sites along each line.

Analogue sites for rehabilitation monitoring will be established within 3 months prior to development project activities at each EP. This approach has been taken to ensure that the analogue data reflects the conditions at the time of project initiation.

All of the analogue sites will need to have a description of the analogue sites, including location, GPS coordinates and photos. This information is located in the ecological assessment for each EP. See below for a summary of vegetation communities within the project footprint.

Vegetation and dominant flora species have been described as part of the environmental site assessments for both EP144 and 154 (Appendix A and B of the EMP), which include site specific flora descriptions and a general flora species list from the survey.

The vegetation communities are closely linked to landform types. The main vegetation types for EP144 are shown below in Table 4-1 The main vegetation types for EP154 are shown below in Table 4-2.

Table 4-1. Summary of the land systems relevant to the project footprint

Land System	Landform	Soil	Vegetation
Clay plains			
Barkly 1	Level to gently undulating clay plains (black soil plains); cracking clay soils. Up to 20% contains gravelly rises	Vertosols	<i>Astrebla</i> tussock grassland
Barkly 2	Level to gently undulating clay plains (black soil plains); cracking clay soils. Up to 20-60% contains gravelly or stony rises		
Barkly 3	Level to gently undulating clay plains (black soil plains); cracking clay soils. Over 60% contains gravelly or stony rises		Mixed species tussock grassland
Sandstone plains and rises			
Yelvertoft	Undulating terrain	Skeletal soils and truncated gravelly lateritic red earths	Dominated by <i>Eucalyptus brevifolia</i> or <i>E. dichromophloia</i> woodlands

Table 4-2. Summary of the land systems relevant to the project footprint

Land System	Landform	Soil	Vegetation
Sandstone plain and rises			
Arnold	Very gently sloping pediplains, pediments, colluvial slopes and some alluvium, rarely sedentary.	Yellow earths, yellow podzolics, and other soils with hard, mottled B horizons.	Low open woodland of <i>Melaleuca citrolens</i> with some <i>E. pruinosa</i> .
Emmerugga	Undulating to rolling low hills on mainly argillaceous sediments	Lithosols and shallow yellow earths	Mid-high open woodland of <i>C. latifolia</i> , <i>C. grandifolia</i> , <i>E. tectifera</i> , <i>C. confertiflora</i> , <i>Erythrophleum chlorostachys</i> over <i>Chrysopogon fallax</i> , <i>Themeda triandra</i> , <i>Sorghum plumosum</i> .
Kangaroo	Gently undulating to undulating rises on mainly argillaceous sediments	Shallow yellow earths and yellow podzolics	Mid-high open woodland of <i>E. tectifera</i> , <i>C. terminalis</i> , <i>Erythrophleum chlorostachys</i> , <i>Terminalia platyphylla</i> , <i>Brachychiton diversifolius</i> over <i>Chrysopogon fallax</i> , <i>Sorghum plumosum</i> , <i>Heteropogon triticeus</i> .
McLeod	Gently undulating plains and low plateaux with frequent steeply incised valleys on sub-horizontally bedded massive sandstones and siltstones	Leptic Tenosols and Rudosols	Mid-high open woodlands of <i>E. tetradonta</i> , <i>Callitris intratropica</i> , <i>C. ferruginea</i> , <i>Erythrophleum chlorostachys</i> , <i>E. miniata</i> over <i>Plectrachne pungens</i> , <i>Eriachne obtusa</i> , <i>Aristida hygrometrica</i> .

Land System	Landform	Soil	Vegetation
Patterson	Low hills, rises and undulating area on reddish platy sandstones and siltstones, often micaceous	Leptic Rudosols and Leptic Tenosols, shallow red and brown Kandosols	Mid-high open woodland of <i>E. leucophloia</i> , <i>Acacia shirleyi</i> , <i>E. tectifera</i> , <i>C. grandifolia</i> , <i>C. ferruginea</i> over very sparse grass cover (<i>Plectrachne pungens</i> , <i>Eriachne obtusa</i> , <i>Chrysopogon fallax</i>).
Seigal	Gently undulating to undulating rises with abundant, often linear rocky outcrops	Lithosols, minor siliceous and earthy sands	Mid-high open woodland of <i>E. miniata</i> , <i>E. tetradonta</i> , <i>C. ferruginea</i> , <i>C. dichromophloia</i> , <i>Callitris intratropica</i> over <i>Plectrachne pungens</i> , <i>Sorghum plumosum</i> .
Rugged quartz sandstone plateaux and hills			
Bukalara	Rugged rocky plateaux and steep, linear ridges, on massive sandstones such as the Bukalara and Kombolgie Sandstones	Lithosols and shallow siliceous sands	Mid-high open woodland of <i>C. dichromophloia</i> , <i>E. miniata</i> , <i>E. tetradonta</i> , <i>Erythrophleum chlorostachys</i> over <i>Plectrachne pungens</i> , <i>Chrysopogon fallax</i> , <i>Eriachne obtusa</i> .
Lateritic plains and rises			
Langdon	Gentle colluvial slopes, mainly below areas of argillaceous rocks with some poorly drained depressions	Yellow Kandosols, some Chromosolic Redoxic Hydrosols and Aquic Vertosols	Mid-high open woodland of <i>E. tectifera</i> , <i>Erythrophleum chlorostachys</i> , <i>Brachychiton diversifolius</i> , <i>C. latifolia</i> , <i>C. confertiflora</i> over mid-dense grass cover (<i>Chrysopogon fallax</i> , <i>Sorghum plumosum</i> , <i>Sehima nervosum</i>).
Basalt plains and rises			
Nutwood	Plains and low rises on basalt and associated basic igneous rock	Brown, grey and red Vertosols, red Ferrosols and brown and red Kandosols	Mid-high open woodland of <i>Lysiphyllum cunninghamii</i> , <i>C. terminalis</i> , <i>C. confertiflora</i> , <i>E. pruinosa</i> , <i>E. patellaris</i> , <i>Erythroxylum ellipticum</i> over mid-dense grass cover (<i>Chrysopogon fallax</i> , <i>Aristida latifolia</i> , <i>Panicum</i> spp.).
Basalt hills			
Cliffdale	Gentle undulating to hilly terrain on basalt, dolerite, agglomerate and tuff, some dolerite; mostly rock outcrop with surface stone pockets of clayey soils	Leptic Rudosols, red Dermosols and black Vertosols	Mid-high open woodland of <i>E. pruinosa</i> , <i>E. tectifera</i> , <i>C. terminalis</i> , <i>Erythrophleum chlorostachys</i> , <i>Brachychiton diversifolius</i> over <i>Chrysopogon fallax</i> , <i>Sehima nervosum</i> , <i>Sorghum plumosum</i> .
Alluvial floodplains			
Lindsay	Floodplains and terraced, some lower slopes and small swamps, drainage floors and flats, with fine sandy materials	Yellow and brown Kandosols and Chromosolic and Kandosolic Redoxic Hydrosols	Low open woodland of <i>M. viridiflora</i> , <i>Grevillea pteridifolia</i> , <i>Brachychiton diversifolius</i> over <i>Chrysopogon fallax</i> , <i>Eriachne obtusa</i> , <i>Sorghum plumosum</i> .
McArthur	Broad or narrow fluvial corridors conducting regional drainage across various land systems towards the coast	Grey and brown clays, red and yellow earths and siliceous sands	Mid-high open woodland of <i>C. terminalis</i> , <i>E. microtheca</i> , <i>Excoecaria parvifolia</i> , <i>Lysiphyllum cunninghamii</i> , <i>C. papuana</i> over <i>Chrysopogon</i> spp., <i>Eulalia fulva</i> , <i>Iseilema vaginiflorum</i> .

When analogue sites are being set up and surveyed, a description of the vegetation type will be recorded, along with canopy and ground cover percentages. This will then be used to set the final rehabilitation success criteria for the vegetation types.

Table 4-3 defines the rehabilitation success criteria.

Table 4-3. Rehabilitation success criteria

Rehabilitation success criteria	
Canopy cover (%)	<ul style="list-style-type: none"> • At least 70% of canopy cover at rehabilitation analogue sites
Ground cover (%)	<ul style="list-style-type: none"> • To be confirmed once analogue sites are established • Greater than or equal to 70% groundcover species richness • Greater than or equal to total % of groundcover • Less than or equal to % species in introduced plant species
Creek/drainage line crossings	<ul style="list-style-type: none"> • All crossings are reinstated to the original topography of the bed following seismic survey
Erosion	<ul style="list-style-type: none"> • Less than 5 % erosion should be evident after the first 12 months and no subsidence or erosion should be evident for at least 5 years after completion of the rehabilitation.
Weeds	<ul style="list-style-type: none"> • No establishment of weed species declared under the Northern Territory Weeds Management Act
Hazardous materials and waste	<ul style="list-style-type: none"> • All hazardous material and waste removed from site upon completion of works to licensed landfill facilities or recycling facilities.
Safety for humans and wildlife	<ul style="list-style-type: none"> • Rehabilitation of disturbance areas should be similar in landform to the surrounding area. No steep slopes or barriers to remain on site that endanger either wildlife or humans. • Removal of all surface facilities including fencing (star pickets/fencing wire).

5 MONITORING

Monitoring will assess the following parameters:

- Percent plant cover – canopy, sub-canopy and shrub layers
- Percent groundcover
- Percent weed species
- Number of large trees present
- Species richness – tree, shrub, grass and forb
- Presence of debris – woody, leaf litter etc.
- Total vegetative ground cover
- Signs of erosion.

Large areas (e.g. accommodation camp and drill pads) where practical will have 100 x 4 m transects, roughly one every hectare. Linear sites (e.g. seismic lines) will have smaller plots measured within each vegetation type, nominally 1 m x 1 m, the number of sites will depend on the size of the vegetation assemblage, but should be a minimum of two per assemblage.

5.1 Frequency of monitoring

Rehabilitation success will be monitored annually during and after the program. This annual assessment should occur after rainfall for a period of at least five years. Annual inspections are required to be undertaken until comparison with the analogue sites indicates successful rehabilitation criteria have been met (see Table 5-1).

Table 5-1. Rehabilitation monitoring schedule

Rehabilitation stage	Rehabilitation surveys	Method	Measurable attributes	Corrective actions
Prior to works commencing	Establish analogue sites	<ul style="list-style-type: none"> • Identify permanent analogue sites. • Establish monitoring transects. Linear sites will have more smaller transects 1 x 1 m, and other sites where practical will have 100 x 4 m transects, roughly one every hectare. • Complete preliminary vegetation survey. • Include high-resolution aerial imagery of the disturbance and rehabilitated area using digital aerial photography or 	<ul style="list-style-type: none"> • Ground cover (%) • Perennial cover (%) • Dominant species (%) • Community structure (%) • Site stability using land function analysis • Erosion (qualitative – photo evidence of scarring, rill/sheet erosion) • Weeds (%) • Fire (frequency and intensity) 	

Rehabilitation stage	Rehabilitation surveys	Method	Measurable attributes	Corrective actions
		UAV imagery		
Preliminary assessment (Six to nine months)	Select a time soon after the first significant rainfall (minimum 10mm) hopefully between six and nine months post rehabilitation works	<ul style="list-style-type: none"> Establish permanent monitoring transects in rehabilitated areas. Establish photo monitoring points in rehabilitation areas. Areas should be adequately signed for ease of identification. Collect 1 x 1 m ground cover quadrats every 10 m, along randomly selected transects. Transects will be marked with star pickets at the start and end. Complete survey in rehabilitated area and analogue sites 	<ul style="list-style-type: none"> Ground cover (%) Perennial cover (%) Dominant species (%) Community structure (%) Site stability using land function analysis Erosion (qualitative – photo evidence of scarring, rill/sheet erosion) Weeds (%) Fire (frequency and intensity) 	<ul style="list-style-type: none"> Infill seeding Soil amelioration Pest management Erosion remediation Weed management
Early rehabilitation (Years 1 to 3)	Annual inspections preferably during April or May, yearly for the first three years post rehabilitation works	<ul style="list-style-type: none"> Monitoring to be undertaken using permanent transects. Collect data from analogue sites and rehabilitation areas as per preliminary methods. Compare results from previous assessment to determine if corrective actions are required (e.g. seeding, stabilisation etc.). Review success criteria. 	<ul style="list-style-type: none"> Ground cover (%) Perennial cover (%) Dominant species (%) Community structure (%) Site stability using land function analysis Erosion (qualitative – photo evidence of scarring, rill/sheet erosion) Weeds (%) Fire (frequency and intensity) 	<ul style="list-style-type: none"> Erosion remediation Plant thinning or infill direct seeding Weed management Fire management Pest management
Long-term rehabilitation (Years 4 onwards)	Annual inspections preferably during April or May until successful rehabilitation criteria have been	<ul style="list-style-type: none"> Monitoring to be undertaken using permanent transects. Collect data from analogue sites 	<ul style="list-style-type: none"> Ground cover (%) Perennial cover (%) Dominant species (%) Community 	<ul style="list-style-type: none"> Plant thinning or infill direct seeding Weed management Fire management

Rehabilitation stage	Rehabilitation surveys	Method	Measurable attributes	Corrective actions
	met and signed off by the Project Manager	and rehabilitation areas as per preliminary methods. <ul style="list-style-type: none"> • Compare results from previous assessment to determine if corrective actions are required (e.g. seeding, stabilisation etc.). • Review success criteria. 	structure (%) <ul style="list-style-type: none"> • Site stability using land function analysis • Erosion (qualitative – photo evidence of scarring, rill/sheet erosion) • Weeds (%) • Fire (frequency and intensity) 	

6 REPORTING AND RESPONSIBILITIES

6.1 Data management and reporting

Any rehabilitation works carried out will be recorded by the Site Manager. This information will be given to the Project Manager who will compile a report for senior management.

All monitoring data collected by staff or contractors will be provided to the Site Manager and stored in a database, for inclusion in final reporting.

All data and reports will be kept by Minerals Australia for a minimum of five years.

6.2 Roles and responsibilities

Project employees and/or contractors will undertake rehabilitation works and monitoring under the direction of the Site Manager.

The Site Manager will compile monitoring data and information on rehabilitation works undertaken, and provide these to the Project Manager. The Site Manager will compile the final rehabilitation report under the direction of the Project Manager, for submission to relevant authority.

6.3 Reporting

Minerals Australia will provide an annual Rehabilitation Report to DEPWS 90 days after the anniversary of the approval date each year. The annual Rehabilitation report will:

- summarise progressive rehabilitation progress,
- summarise the outcomes of annual rehabilitation monitoring of cleared areas against reference sites,
- summarise maintenance activities and corrective actions taken to improve rehabilitation outcomes, and
- include geospatial files for areas under rehabilitation.

7 PLAN TO A PAGE SUMMARY

Minerals Australia & Jacaranda Minerals Pty Ltd.
EP144 and 154 Seismic Survey 2023
Rehabilitation plan to a page

Plan prepared by: 

Plan to be read in conjunction with the main Rehabilitation Plan and the EMP.

Rehabilitation contacts	Contact details	Name
Minerals Australia Project Manager	[REDACTED]	Peter Collings
Rehabilitation Manager	TBC	
Post activity rehabilitation aim and objectives		
Site management aim	The aim is to rehabilitate any part of the land affected by the regulated petroleum activity to a safe condition consistent with industry standards. Existing tracks utilised for seismic surveys on all stations are to be reinstated to a safe trafficable condition.	
Rehabilitation objective	The rehabilitation objective is to; provide a stable and self-sustaining land form; that is safe for land users and wildlife; has been returned to close to pre-disturbance level that requires little or no ongoing management; is complementary to the adjoining landscape; and has been re-instated to reflect the natural ecosystem/s, or establish an alternative outcome that is commiserate with the surrounding land use.	

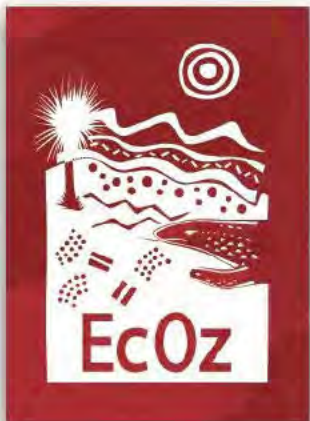
Rehabilitation stage	Rehabilitation surveys	Method	Measurable attributes	Corrective actions
6 to 12 months prior to commencement of rehabilitation	Establish analogue sites	<ul style="list-style-type: none"> Identify permanent analogue sites. Establish monitoring transects. Linear sites will have more smaller transects 1 x 1 m, and other sites where practical will have 100 x 4 m transects, roughly one every hectare. Complete preliminary vegetation survey. Include high-resolution aerial imagery of the disturbance and rehabilitated area using digital aerial photography or UAV imagery 	<ul style="list-style-type: none"> Ground cover (%) Perennial cover (%) Dominant species (%) Community structure (%) Site stability using land function analysis Erosion (qualitative – photo evidence of scarring, rill/sheet erosion) Weeds (%) Fire (frequency and intensity) 	
Preliminary assessment (Six to nine months)	Select a time soon after the first significant rainfall (minimum 10mm) hopefully between six and nine months post rehabilitation works	<ul style="list-style-type: none"> Establish permanent monitoring transects in rehabilitated areas. Establish photo monitoring points in rehabilitation areas. Areas should be adequately signed for ease of identification. Collect 1 x 1 m ground cover quadrats every 10 m, along randomly selected transects. Transects will be marked with star pickets at the start and end. Complete survey in rehabilitated area and analogue sites 	<ul style="list-style-type: none"> Ground cover (%) Perennial cover (%) Dominant species (%) Community structure (%) Site stability using land function analysis Erosion (qualitative – photo evidence of scarring, rill/sheet erosion) Weeds (%) Fire (frequency and intensity) 	<ul style="list-style-type: none"> Infill seeding Soil amelioration Pest management Erosion remediation Weed management
Early rehabilitation (Years 1 to 3)	Annual inspections preferably during April or May, yearly for the first three years post rehabilitation works	<ul style="list-style-type: none"> Monitoring to be undertaken using permanent transects. Collect data from analogue sites and rehabilitation areas as per preliminary methods. Compare results from previous assessment to determine if corrective actions are required (e.g. seeding, stabilisation etc.). Review success criteria. 	<ul style="list-style-type: none"> Ground cover (%) Perennial cover (%) Dominant species (%) Community structure (%) Site stability using land function analysis Erosion (qualitative – photo evidence of scarring, rill/sheet erosion) Weeds (%) Fire (frequency and intensity) 	<ul style="list-style-type: none"> Erosion remediation Plant thinning or infill direct seeding Weed management Fire management Pest management
Long-term rehabilitation (Years 4 onwards)	Annual inspections preferably during April or May until successful rehabilitation criteria have been met and signed off by the Project Manager	<ul style="list-style-type: none"> Monitoring to be undertaken using permanent transects. Collect data from analogue sites and rehabilitation areas as per preliminary methods. Compare results from previous assessment to determine if corrective actions are required (e.g. seeding, stabilisation etc.). Review success criteria. 	<ul style="list-style-type: none"> Ground cover (%) Perennial cover (%) Dominant species (%) Community structure (%) Site stability using land function analysis Erosion (qualitative – photo evidence of scarring, rill/sheet erosion) Weeds (%) Fire (frequency and intensity) 	<ul style="list-style-type: none"> Plant thinning or infill direct seeding Weed management Fire management

*Note that vegetation community and rehabilitation zone maps and photos will be included in this document when the analogue sites are established. Analogue sites will be established within 6 to 12 months prior to commencement of rehabilitation.

Rehabilitation Risks	
Key Risks	Controls
Drought — impacting the establishment of rehabilitated vegetation	<ul style="list-style-type: none"> Time rehabilitation actions to coincide with the beginning of the wet season, to ensure access to the site and maximise the establishment period of vegetation over the wet season Re-spread topsoil across the site to utilise the local seed bank Ongoing monitoring to identify if further seed inputs are required Collection of seed from the local area to ensure seed stock is suited to the climatic conditions of the site
Fire — impacting revegetation	<ul style="list-style-type: none"> Dependent on rehabilitation area; establish a mix of perennial and annual grass species Dependent on rehabilitation area; establish a mix of re-sprouter (e.g. Eucalypt spp. and re-seeder species e.g. Acacia spp.) Ongoing monitoring to determine fire impacts on revegetation. Ongoing monitoring to determine if further seed inputs are required
Grazing — impacting revegetation	<ul style="list-style-type: none"> Dependent on rehabilitation area; establish a mix of perennial and annual grass species Ongoing monitoring to determine grazing impacts on revegetation. Ongoing monitoring to determine if further seed inputs are required Ongoing monitoring to determine if fencing is required
Exposed Ground — leading to an increase in weed establishment and/or erosion	<ul style="list-style-type: none"> Remove windrows and topsoils Respread of topsoil and vegetated matter across the site Annual weed surveys of rehabilitated areas once rehabilitation is established Control of any weed incursions

Site Environmental Summary				
Vegetation community	Survey Sites	Description	Canopy cover (%)	Ground cover (%)
TBA - Analogue sites will be established within 6 to 12 months prior to commencement of rehabilitation				

Rehabilitation strategy		
Parameters	Methods	Objectives
Vegetation	<ul style="list-style-type: none"> Implement progressive rehabilitation of seismic lines as soon as data recording is completed to reduce exposed soils and minimise runoff from first flush events. Implement rehabilitation of field camp upon cessation of use. Disturbed areas to be allowed to naturally regenerate or revegetate on completion of regulated activity. All compacted areas to be ripped and scarified to promote regeneration of vegetation, this may require assistance through spread of native seed stock. Where possible, native seed stock would be supplied by local Indigenous suppliers. 	<ul style="list-style-type: none"> Establish vegetation to be consistent to adjacent vegetation (species richness, cover and structure). The type of ground cover applied to completed earthworks to be compatible with the anticipated long-term land use, environmental risk, and site rehabilitation measures.
Ground cover	<ul style="list-style-type: none"> Previously removed vegetation and topsoil will be uniformly re-spread over disturbed area to assist with rehabilitation process through agencies of increased infiltration and return of seed-bearing topsoil, as well as reducing erosion. If required, additional native seed mix from the area could be respread to speed up rehabilitation process. 	
Landform stability	<ul style="list-style-type: none"> All windrows and whoa boys are to be removed as soon as practicable after line stabilisation. 	



EcOz Environmental Consultants

EcOz Pty Ltd.

ABN 81 143 989 039

Level 1, 70 Cavenagh St,
GPO Box 381,
Darwin, NT 0801

T: +61 8 8981 1100
E: ecoz@ecoz.com.au

www.ecoz.com.au



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APPENDIX P STAKEHOLDER ENGAGEMENT LOGS



Stakeholder Engagement for EP 144 & 154 Minerals Australia Pty Ltd.

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EcOz Pty Ltd.
ABN: 81 143 989 039
Level 1, 70 Cavenagh Street
DARWIN NT 0800
GPO Box 381, Darwin NT
0800

Telephone: +61 8 8981 1100
Email: ecoz@ecoz.com.au
Internet:
www.ecoz.com.au



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Stakeholder engagement

Minerals Australia has established and continues developing relationships with the stakeholder groups in EP144 and EP154.

For the exploration program and the development of this EMP Minerals Australia initiated contact with the affected stakeholders with the objective to ensure that they were engaged in the planning of the proposed activities and that specific issues could be considered and addressed.

Contact with stakeholders has been ongoing since approximately 2012.

All relevant correspondence regarding the EP areas is outlined below. No objections were raised during the engagement process. Some written responses were received regarding access and logistics, and these have been summarised in the Stakeholder Engagement Discussion table, and a copy provided in the appendices relevant to each EP.

EP144 stakeholders

The identified stakeholders for EP144 are;

- Traditional owners
- Northern Land Council as the representative and agent of traditional Aboriginal owners in accordance with the Aboriginal Land Rights (Northern Territory) Act 19076 (Cth), whose functions in accordance with section 23 of the Act include ascertaining and expressing the wishes and opinions of Aboriginals living in the area as to the management of the land, to protect the interests of traditional Aboriginal owners and to consult with traditional Aboriginal owners with respect to any proposal relating to the use of that land
- Pastoral Lease holders

Traditional owner engagement EP144

The Traditional Owners (TO's) of the work program area are represented by the Northern Land Council (NLC). All Minerals Australia contact with the TO's has consistently been through meetings arranged by the NLC. Representatives from Minerals Australia have attended all of the meetings where not restricted by Covid 19.

The initial meeting for EP144 was to approve the Exploration and Coexistence Deed negotiated by the NLC on behalf of the TO's. Under the Deed annual meetings are required to explain proposed exploration programs and to seek approval for those from the TO's. Prior to such meetings Minerals Australia submits a formal work program to the NLC containing details of all proposed exploration in EP144 for the year in question.

The most recent meeting was held in 2016 prior to the moratorium and enquiry into hydraulic fracturing and subsequent Covid 19 restrictions. The work program approved at that meeting is exactly the same as the work program subject to this EMP.

Traditional Owner Engagement during preparation of this EMP for EP144

Prior to the conduct of field work for the preparation of this EMP the NLC was contacted to nominate appropriate TO's to act as monitors during the surveys. Monitors were identified but could not commit to being available for the EcOz field survey. The senior TO nominated agreed that monitors were not necessary for surveys along existing station roads.

Pastoral Lease Holder engagement for EP144

EP144 covers a number of pastoral properties on the Barkly Tableland. However, the work program applicable to this EMP is confined entirely to two pastoral leases over Alexandria and Mittiebah

stations both of which are owned by the North Australian Pastoral Company (NAPCO and/or subsidiaries) headquartered in Brisbane.

Details of planned exploration were provided to NAPCO and a draft Land Access Agreement was negotiated with NAPCO during 2016 but was not executed at that time due to the imposition of the moratorium on on-shore petroleum exploration. Subsequently a Land Access and Compensation Agreement was executed in October 2019 between NAPCO and Minerals Australia and Jacaranda Minerals, with updated information regarding the exploration programme provided.

This agreement was modified by mutual agreement in December 2021 to extend its term to December 2023. The LACA was consequently accepted for registration by the Minister for Mining and Industry.

Engagement during preparation of this EMP for EP144

During the preparation of this EMP NAPCO was kept fully informed of planned field activities by EcOz and requested that EcOz contact station managers direct to notify their timing and activities.

Subsequently Minerals Australia provided NAPCO with a copy of the EcOz weed survey report for their use on the relevant properties.

EP154 stakeholders

EP154 is entirely over Aboriginal Land Rights (ALRA) freehold land held by the Mangarrayi, Kewulyi, and Alawa 1 Aboriginal Land Trusts all of which are represented by the Northern Land Council (NLC). All Minerals Australia contact with the TO's has consistently been through meetings arranged by the NLC. Representatives from Minerals Australia have attended all of the meetings where not restricted by Covid 19

The initial meeting for EP154 was held in 2012 at Minyerri to seek approval by the TO's for the NLC negotiate an Exploration and Coexistence Deed on behalf of the TO's . A second meeting was held in May 2013 to seek approval of the Deed negotiated by the NLC with the title holders. Significant sites surveys were completed by the NLC in 2013 (for tenements to be granted over ALRA land all significant sites in the application area must first be identified).

TO's also have the right to request areas from the EP application area be placed under moratorium. The grant of EP154 in 2015 thus excluded 51% of the original application area.

Under the Deed annual meetings are required to explain proposed exploration programs and to seek approval for those from the TO's. Prior to such meetings Minerals Australia submits a formal work program to the NLC containing details of all proposed exploration in EP144 for the year in question. The work program approved in 2016 and again in 2019 is exactly the same as the work program subject to this EMP.

The key stakeholder discussions, as well as the full log of stakeholder communications, and ongoing stakeholder engagement are outlined below.

Stakeholder contact details						
Permit	Key stakeholder	Primary Contact	Company/agency	Position	Phone	email
EP154	Northern Land Council	Greg McDonald	NLC	Manager-Minerals & Energy	([REDACTED]	
EP154	Traditional Owners		NLC			
EP154	Mineral exploration licence holders					
EP144	North Australian Pastoral Co.(NAPCO)	Lachlan Reed	NAPCO	Land Development Manager	[REDACTED]	
EP144	Mittiebah station	Marty Doyle	NAPCO	Manager	[REDACTED]	
EP144	Alexandria station	Steve Drury	NAPCO	Manager	[REDACTED]	
EP144	Northern Land Council	Greg McDonald	NLC	Manager-Minerals & Energy	([REDACTED]	
EP144	Mineral exploration licence holders					

EP144 key meetings					
Permit	Date	Location	Purpose	Attendees	Outcome
EP144	March 2013	Barkly Roadhouse 300 km east of Tennant Creek	Negotiate exploration and coexistence deed	NLC mining officer, anthropologist and lawyer; TO's Peter Collings (MAPL) & Bill Fraser (JML)	Deed executed EP144 granted
EP144	May 2015	Corella Downs 150 km north of the Barkly Roadhouse	Work program approval meeting	NLC mining office and, anthropologist ; TO's Peter Collings (MAPL)	Tentative approval
EP144	May 2015		Significant site surveys	NLC anthropologist	completed
EP144	July 2016	Tennant Creek High School	Work program approval meeting	Greg McDonald, Joel Moss (NLC lawyer) Mat (Anthropologist), Peter Collings, David Armstrong	Approved
EP144	May 2021	Tennant Creek High School	Work program approval meeting	NLC	Approved
EP144	July 2021	email trail- NLC, EcoZ, MAPL	Cultural monitors for EP144 EMP field work	Michael Egan (NLC) Ruth Marr (EcoZ) Peter Collings (MAPL)	Cultural monitors not available but TO's agreed monitors were not needed for these surveys

EP154 key meetings					
Permit	Date	Location	Purpose	Attendees	Outcome
EP154	May 2012	Minyerri	Meeting to approve the negotiation of agreement	NLC mining officer, Peter Collings, Bill Fraser	Approved
EP154	May 2013	Minyerri	Negotiate exploration and coexistence deed	NLC mining officer, anthropologist and lawyer; TO's Peter Collings (MAPL) & Bill Fraser (JML)	Approved and executed
EP154	July 2013		Significant site surveys	NLC anthropologist	completed
EP154	March 2014	Mataranka	Work program approval meeting	NLC mining officer, anthropologist ; TO's Peter Collings (MAPL)	Approved
EP154	July 2016	Flying Fox station	Work program approval meeting	NLC mining officer, anthropologist and lawyer; TO's Peter Collings (MAPL) David Armstrong (MAPL)	Request for additional site surveys- completed by AAPA certificate survey
EP154	October 2019	Minyerri	Work program approval meeting	NLC	approved
EP154	July 2021	email from Michael Egan NLC	NLC to nominate cultural monitors for EcOzEP154 EMP field work		NLC unable to sign up appropriate cultural monitors for EP154.
EP154	July 2021	Phone and email Flying Fox station	EcOz organise accommodation and site access for surveys	Flying Fox Station and Ruth Marr (EcOz)	Approved
EP154	July 2021	Phone and email NLC	Ecoz organise Cultural Monitors for site surveys through NLC	Flying Fox Station and Ruth Marr (EcOz)	Approved

EP154	September 2021	email from Michael Egan NLC	NLC to nominate cultural monitors fEP154 EMP archaeological field work		Two monitors nominated and employed
EP154	September 2021	Kewulyi community, Jilkminggan community and Minyerri	Traditional Owner consultation for heritage assessment and onboarding survey participants	Raymond Daniell (Earthsea Pty Ltd) & NLC nominated Traditional Owners/Site custodians: Bradley Farrar and Trevor Willie	NLC nominated site custodian onboarded for heritage assessments
EP154	Sep/Oct - 2021	EP154 Project Areas	Archaeological field assessment	Richard Woolfe & Raymond Daniell (Earthsea Pty Ltd) & Bradley Farrar and Trevor Willie (NLC nominated site custodians)	Surveyed all EP154 Project Areas from 28 Sept to 2 Oct 2021. Cultural significance assessments were recorded

Stakeholder engagement discussions							
Permit No.	Stakeholder	Information provided	How	Date	Objections	Discussion/objections	Data/Images provided
144	NAPCO	Details of gravity survey using helicopter for access	email	1/09/2015	Nil	Seeking agreement for ground gravity survey	Gravity survey crew/points
144	NAPCO	Numerous email exchanges with NAPCO	email	Sept 2015 - May 2016	Nil	negotiating mutually acceptable access agreement	
144	NAPCO	Exploration program for EP144 in 2016	email	8/02/2016	Nil	Seeking agreement for 2016 exploration work program	Holes sites and seismic equipment details
144	NAPCO	Postponement of exploration program	email	24/10/2016	Nil	Moratorium caused postponement of exploration program	
144	NAPCO	Weed surveys	email	12/11/2019	Nil	Weed survey delayed because wrong time of year	
144	NAPCO	Weed survey and COVID	email	22/07/2020	Nil	Weed survey postponed due to COVID	
144	NAPCO	New petroleum regulations	email	2/03/2021	Nil	Provided required Form 52	Locations maps
144	NAPCO	Access for weed survey (EcOz)	email	18/02/2021	Nil	Advising NAPCO of requirement for access for weed survey	Access requests
144	NLC	Exploration work program for 2016	email	23/09/2016	Nil	NLC conditions of work for EP144	
144	NLC	Covering letter for 2016 program			Nil	NLC conditions of work for EP144	
144	NLC	Exploration work program 2019 (re-submitted the 2016	email	1/09/2019	Nil	Exploration work program for approval	
144	NLC	Acceptance of work program by NLC	email	26/09/2019	Nil	Program approved; seek input on TO employment opportunities	
144	NLC	Response to NLC re employment opportunities	email	1/10/2019	Nil	Difficult to provide employment opportunities at this very preliminary stage	Revised work program
144	AAPA	Authority Certificate	email	8/12/2020	Nil		
144	Traditional owners	Work program approval meetings		2013-2021	Nil	Four work program meeting have been held, the most recent in 2021	
144	NAPCO	Updated drill hole locations and revised work program	email	27/01/2023		Informing NAPCO of the minor changes to drill hole locations	Revised work program, data of new hole locations
154	Traditional owners	Work program approval meetings		2012-2019	Nil	Six work program meeting have been held the most recent in 2019	
154	NLC	Work program for 2014	email	1/04/2015	Nil	EP154 Exploration Work Program rev1.	
154	NLC	Work program approval for 2014	email	25/04/2015	Nil	Approval from NLC for 2014 work program	
154	NLC	Authority Certificate for exploration program	email	27/04/2015	Nil	Authority certificate issued by NLC for this work program	
154	NLC	Work program for 2019-2020	email	1/09/2019	Nil	Work program in the EMP is un-changed from this	Revised work program
154	AAPA	Authority Certificate for exploration program	email	28/07/2021	Nil	Authority Certificate for work program	
154	NLC	Weed and archaeological surveys	email	22/10/2019	Nil	Arrange cultural monitors for field surveys-subsequently postponed by COVID	
154	NLC	Cultural monitors for weed survey 2021	email	12/07/2021	Nil	NLC failed to be able to organise monitors	
154	NLC	Cultural monitors for archaeological survey	email	22/09/2021	Nil	Details and costs of cultural monitors	
154,144	Traditional owners	Requested NLC confirmation of approvals process	email	5/08/2022	Nil	NLC provided a summary of what has taken place with exploration approvals	
154	NLC	Updated drill hole location and revised work program	email	27/01/2023		Informing NLC of the minor changes to drill hole locations	Revised work program, data of new hole location

Stakeholder engagement communication log

Date	EP	Stakeholder	Contact with	method	Objections	Subject
1/09/2015	144	NAPCO	Sam Harburg	email	no	helicopter geophysical survey
2/09/2015	144	NAPCO	Sam Harburg	email	no	consult with NAPCO to fit in with operations
3/09/2015	144	NAPCO	Sam Harburg	email	no	General enquiry about NAPCO stations
4/09/2015	144	NAPCO	Sam Harburg	email	no	Details of station operations during survey
5/09/2015	144	NAPCO	Sam Harburg	email	no	Property GIS details of paddocks
7/09/2015	144	NAPCO	Sam Harburg	email	no	Acknowledge receipt of property GIS details
15/09/2015	144	NAPCO	Sam Harburg	email	no	Follow up on draft access agreement
21/09/2015	144	NAPCO	Sam Harburg	email	no	Confirm sending draft agreement
8/02/2016	144	NAPCO	Sam Harburg	email	no	Notify NAPCO of intended exploration program in 2016
15/03/2016	144	NAPCO	Joe Banks	email	no	Confirm sending draft access agreement for 2016
31/03/2016	144	NAPCO	Joe Banks	email	no	Confirm receipt of NAPCO revisions to draft
31/03/2016	144	NAPCO	Joe Banks	email	no	Provided further information of planned activities
5/04/2016	144	NAPCO	Joe Banks	email	no	Revised access agreement to NAPCO
9/06/2016	144	NAPCO	Joe Banks	email	no	Further discussion on access agreement
15/01/2019	154	NLC	Malcolm Hauser	email	no	Amending work program
22/02/2019	154	NLC	Ann Grattidge	email	no	Arrange meeting with NLC in Darwin to discuss work programs
28/02/2019	144	NLC	Greg McDonald	email	no	Confirm requirements discussed to update work programs
28/02/2019	154	NLC	Greg McDonald	email	no	Confirm that work program for EP154 was submitted 4ed 1 December 2018.
17/04/2019	154,144	NLC	Greg McDonald	email	no	Submitted up-dated work programs; requested confirmation of acceptance
20/05/2019	154,144	NLC	Ann Grattidge	email	no	Revision to drill hole coordinates
27/05/2019	144	NAPCO	Lachlan Reed	email	no	Re-contact after Moratorium re 2016 access agreement
27/05/2019	144	NAPCO	Lachlan Reed	email	no	Confirm we will pay NAPCO legal costs
27/05/2019	144	NAPCO	Lachlan Reed	email	no	Inform NAPCO of requirements for EMP weed surveys
18/06/2019	154,144	NLC	Greg McDonald	email	no	Request for dates for on country work program approval meetings
23/07/2019	154	NLC	Greg McDonald	email	no	Confirm requirement for entry permit for helicopter born weed survey
24/07/2019	154	NLC	Ann Grattidge	email	no	NLC provided detailed input into requirements for weed surveys
29/07/2019	154	NLC	Ann Grattidge	email	no	Feedback from NLC on policy on entry permits for weed surveys
6/08/2019	144	NLC	Greg McDonald	email	no	Discussion about disputes between TO groups in EP144
6/08/2019	144	NLC	Greg McDonald	email	no	Information on anthropologists' input about internal TO disputes in EP144
7/08/2019	154	NLC	Ann Grattidge	email	no	NLC request for information for planning of on country meeting
27/08/2019	144	NLC	Sarah Arblaster	email	no	Further discussion on situation with internal TO disputes in EP144
13/09/2019	154	NLC	Ann Grattidge	email	no	NLC suggestions of information to be provided at on country meeting
23/09/2019	144	NLC	Sarah Arblaster	email	no	Final revision of work program for EP144
1/10/2019	144	NLC	Sarah Arblaster	email	no	Confirm acceptance of work program for EP144
1/10/2019	144	NLC	Sarah Arblaster	email	no	Revised work program -Minor adjustment to drill hole location in EP154
8/10/2019	144	NAPCO	Lachlan Reed	email	no	NAPCO provided contact details for stations
9/10/2019	144,154	NLC	Greg McDonald	email	no	Sent references to AAPA Authority Certificate applications
21/10/2019	154	NLC	Greg McDonald	email	no	Ask NLC to organise cultural monitors for weed surveys
21/10/2019	144,154	NLC	Greg McDonald	email	no	NLC confirmation of NLC contacts for work programs
21/10/2019	154	NLC	Ann Grattidge	email	no	NLC has a comprehensive list of cultural monitors for EMP field surveys
22/10/2019	154	NLC	Ann Grattidge	email	no	Seek confirmation of any follow-up required for EP154 site surveys
22/10/2019	144	NLC	Greg McDonald	email	no	Request to expedite approvals meeting for EP144 work program
22/10/2019	154	NLC	Ann Grattidge	email	no	Transit entry permits only are required for EMP field work
28/10/2019		NLC	Greg McDonald	email	no	Request status of discussions between NLC & AAPA about Authority Certs.
12/11/2019	144	NAPCO	Lachlan Reed	email	no	Notify delay in weed survey to lateness in season
13/11/2019		AAPA	Sophie Creighton	email	no	Explanation of AAPA process and cooperation with NLC
13/11/2019	154,144	AAPA	Sophie Creighton	email	no	Follow up on meeting in Darwin to confirm how AAPA will proceed with Authority Certificate applications
17/02/2020	144	NLC	Sarah Arblaster	email	no	Confirmed tentative on country meeting in July for EP144
24/02/2020	144	NAPCO	Lachlan Reed	email	no	Weed survey scheduled for March 2020
28/02/2020	144	NLC	Sarah Arblaster	email	no	Tentative confirmation of on country meeting in April in Tennant Creek
16/03/2020	154	NLC	Greg McDonald	email	no	Postponement of EP154 meeting due to Covid biosecurity
17/03/2020	144	NAPCO	Lachlan Reed	email	no	Weed survey postponed due to Covid restrictions
23/03/2020		NLC	Greg McDonald	email	no	Up-date on NLC Covid restrictions
26/04/2020		NLC	Greg McDonald	email	no	NLC request for our input into review of NLC business case
7/05/2020	154,144	NLC	Sarah Arblaster	email	no	Information on Security Bonds due.
11/05/2020	154,144	NLC	Sarah Arblaster	email	no	Calculation methodology of security bonds

15/06/2020		NLC	Greg McDonald	email	no	Clarification of payment of security bonds
22/07/2020	144	NAPCO	Lachlan Reed	email	no	Request up-date on NAPCO Covid policy
22/07/2020	144	NAPCO	Lachlan Reed	email	no	Confirm we will not proceed until Covid restriction ease
10/09/2020	144	NAPCO	Lachlan Reed	email	no	NAPCO confirm allowing limited third party access
22/09/2020	154	NLC	Sarah Arblaster	email	no	Confirmation Right to Negotiate application is compliant
28/10/2020	154	NLC	Greg McDonald	email	no	Request of NLC guidelines on Right to Negotiate applications
14/01/2021	154	NLC	Ian Harris	email	no	Follow up on NLC requirements for Consent to Negotiate for moratorium EPAs
18/02/2021	144	NAPCO	Lachlan Reed	email	no	Confirm weed survey planned for March; results to be provided to NAPCO
2/03/2021	144	NAPCO	Lachlan Reed	email	no	Notify and explain new Form 52 requirements to NAPCO
2/03/2021	144	NLC	Michael Egan	email	no	Confirmation that I have already sent the NLC the final version of the work program
16/03/2021	144	NAPCO	Lachlan Reed	email	no	Confirm NAPCO details for Form 52
22/03/2021	144	NAPCO	Lachlan Reed	email	no	Confirm DITT accepted Form 52 as correct
27/04/2021	144	NLC	Michael Egan	email	no	Postponement of meeting for EP144
28/04/2021	154	NLC	Michael Egan	email	no	Discussion about NLC providing appropriate cultural monitors for weed survey in EP154
29/04/2021	144	NLC	Michael Egan	email	no	Confirmation that TOs have agreed to work program meeting on 19 May 202
15/07/2021	154	AAPA	Sophie Creighton	email	no	Query about time taken to review an application for Authority Certificate
26/07/2021	154,144	NLC	Michael Egan	email	no	NLC details about failures to provide cultural monitors and proposed longer-term solution
9/08/2021	154	NLC	Michael Egan	email	no	Some details about 12 month signing up cultural monitors for field surveys
20/09/2021	154	NLC	Michael Egan	email	no	NLC asked for approval for payment to cultural monitors for archaeological surveys
4/10/2021	144	NAPCO	Lachlan Reed	email	no	Inform NAPCO of requirement to register the executed LAC with the Minister
30/11/2021	154	NLC	Ian Harris	email	no	Details of NLC requirements for Consent to Negotiate applications for moratorium EPAs
7/12/2021	144	NAPCO	Lachlan Reed	email	no	NAPCO confirm agreement with registration
21/12/2021	144	NAPCO	Lachlan Reed	email	no	Confirm receipt and payment of NAPCO legal fees
6/04/2022	154	NLC	Michael Egan	email	no	NLC has no meetings planned for moratorium EPAs in EP154
13/06/2022	144	NAPCO	Lachlan Reed	email	no	Confirm EcOz will send NAPCO copy of weed survey report
18/07/2022	154,144	NLC	Michael Egan	email	no	Discussion about NLC providing confirmation that approvals for work programs are in place
5/08/2022	154,144	NLC	Michael Egan	email	no	NLC confirmation that all required processes for approvals for work programs have been completed
1/09/2022	154	NLC	Michael Egan	email	no	Confirmation that 2021 application for Right to Negotiate on moratorium EPAs is compliant

Ongoing stakeholder engagement	
Stakeholder	Ongoing Engagement
NAPCO	NAPCO will be given at least one month advance notice of any field activities in 2023.
	When field activities commence NAPCO station managers will be informed of progress of activities on a weekly basis.
	NAPCO will be advised well in advance of the completion of activities and any actions required by NAPCO cattle operations will be implemented
NLC	The NLC will be notified in advance of the commencement of field operations with sufficient time to arrange appropriate cultural monitors nfor all aspects of the activities.
	They will also be notified of any temporary indigenous employment opporunities which may arise during field activites.
Mineral title holders	The NLC will be advised as early as possible of field activities planned for 2024 so the NLC has sufficient time to organise on country approvals meeting.
	Any holders of mineral titles effected by field activities will be notified a month prior to commencement of such activities

Stakeholder information provision

During stakeholder engagement a range of information was provided to stakeholders outlining the proposed works, and informing stakeholders of any changes or updates to information. As this process was iterative, only the most up to date versions of information has been in the attached appendices.

Note the work programs for each EP currently dated as 2019-2020 as this is when the documents were created and provided to the stakeholders. These are the most up to date versions (as per the date of issue in 2023), however the title of the document has not changed.

APPENDIX 1 - EP144 INFORMATION PACK

EP 144
BARKLY REGION NT
EXPLORATION WORK PROGRAMME FOR 2019-2020

Prepared by
Peter Collings – Chief Geologist
Minerals Australia Pty Ltd
for
Minerals Australia Pty Ltd and Jacaranda Minerals Pty Ltd
January 2023

Document: NLC-EP144-HEMS0002

Rev	Date	Reason for issue	Author	Checked
Rev 6	27/01/2023	Issued to the Northern Land Council	PSC	PSC

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1. DOCUMENT CONTROL

This Exploration Work Programme is a controlled document. Should the recipient (user) become aware of any changes or corrections that are required please photocopy the relevant page(s) to be changed, note the corrections and deliver them to:

Peter Collings

Chief Geologist

Minerals Australia Pty Ltd

PO Locked Bag 2

West Perth WA 6972

[REDACTED]

[REDACTED]

2. INTRODUCTION

EP144 was granted to Minerals Australia Pty Ltd and Jacaranda Minerals Ltd on 21st May 2013. EP144 is located over pastoral leases approximately 100 km northeast of the Barkly Roadhouse on the Barkly Highway, NT (Figure 1). A detailed location map of EP144 is shown in Figure 2 and a topographic map is shown in Figure 3.

Figure 1: Location map of EP144

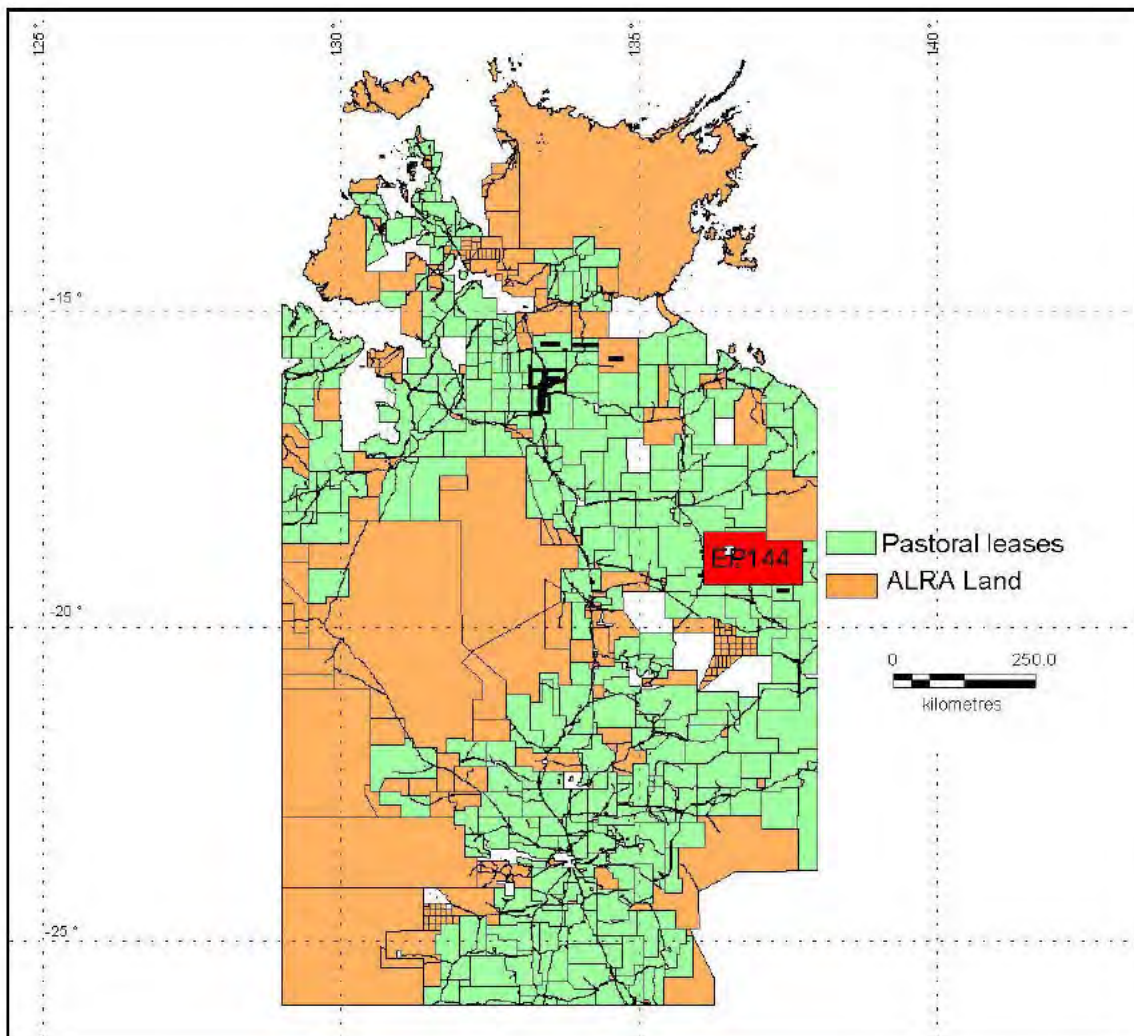


Figure 2: EP144 - detailed location map

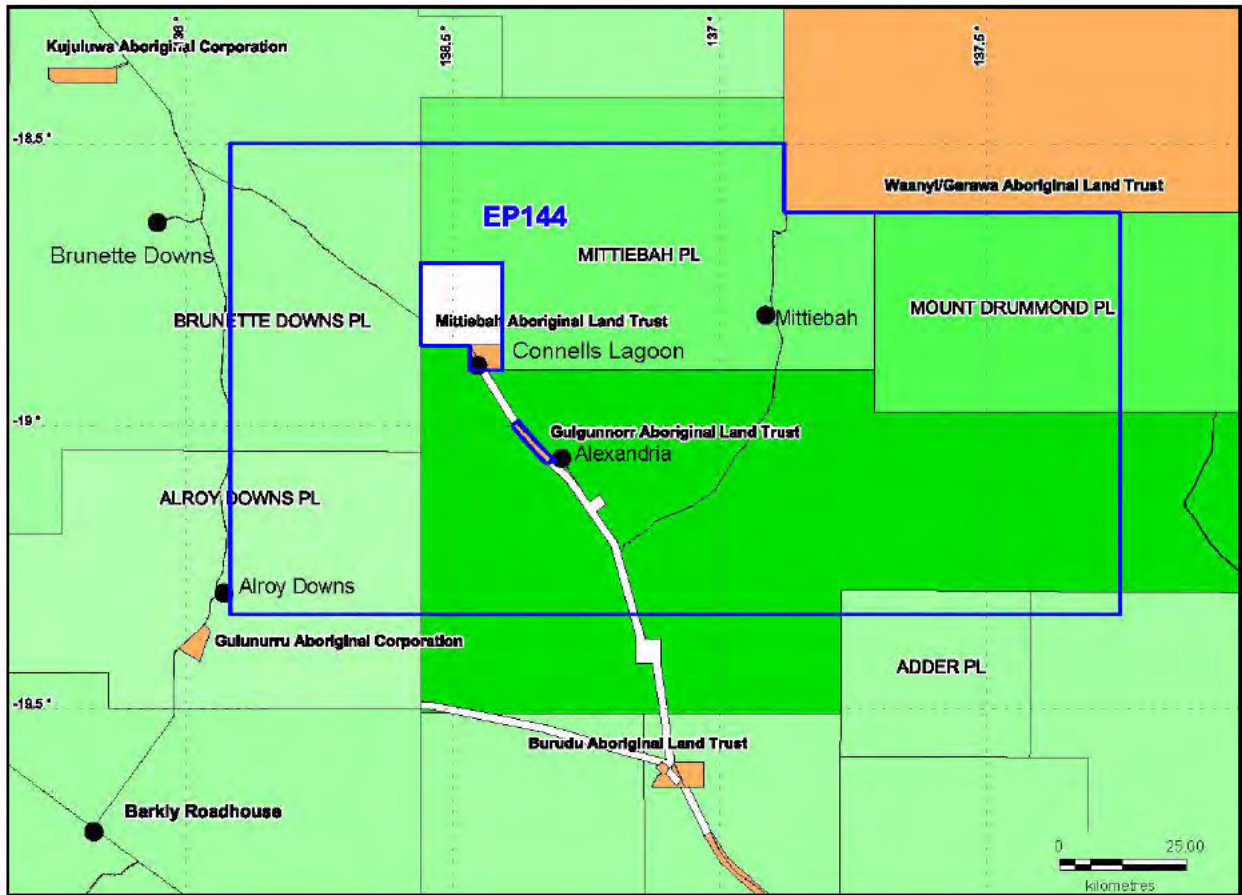
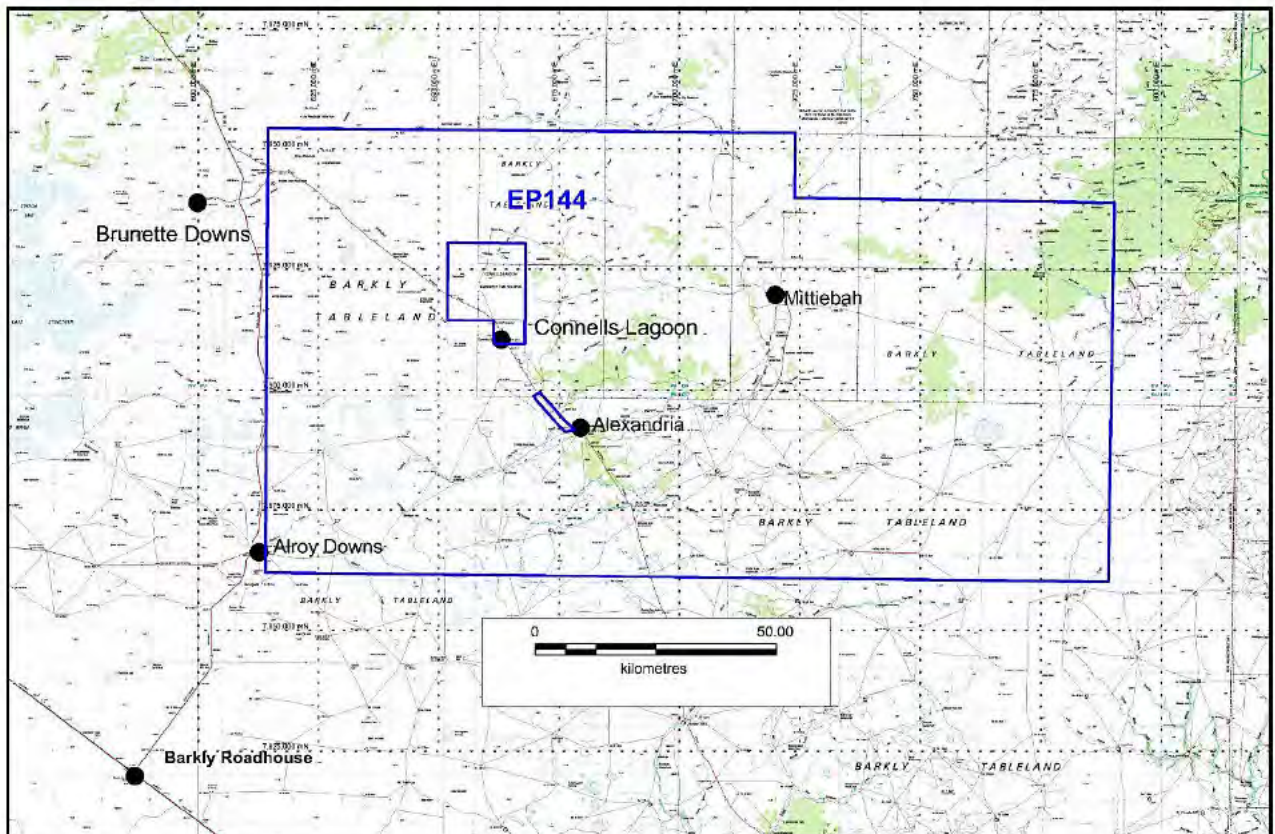


Figure 3: Topographic map of EP144



EP144 is the subject of an Exploration and Coexistence Deed between Minerals Australia Pty Ltd, Jacaranda Minerals Ltd and the Northern Land Council.

This work programme is planned for between May and November 2023 (depending on weather, NLC, AAPA, DENR and DPIR approvals and availability of contractors) and consists of the drilling of two core drill holes, approximately 1000m and 500m deep, respectively, to obtain stratigraphic and hydrocarbon-potential information from the previously un-explored South Nicholson Basin.

3. DESCRIPTION OF EXPLORATION ACTIVITIES

The exploration programme is planned for between May and November 2023 and will involve;

- Drilling of two exploratory stratigraphic core drill holes, one approximately 1000m depth and the second approximately 500m, to obtain stratigraphic information and to test potentially favourable geological structures and possible hydrocarbon potential in the un-explored South Nicholson Basin.

In 2016 Geoscience Australia (GA) conducted an extensive regional 2D seismic survey over the interpreted area of the South Nicholson Basin. The survey was designed in particular to investigate the full depth extent of the South Nicholson Basin and of older, underlying basins.

Subsequent processing by GA of the seismic data tended to reduce the detail of near-surface (1000-2000m) stratigraphy which is a target zone in EP144. Re-processing of the near-surface data will allow a more detailed interpretation of near-surface structure and stratigraphy to allow better targeting of the stratigraphic drill holes in EP144.

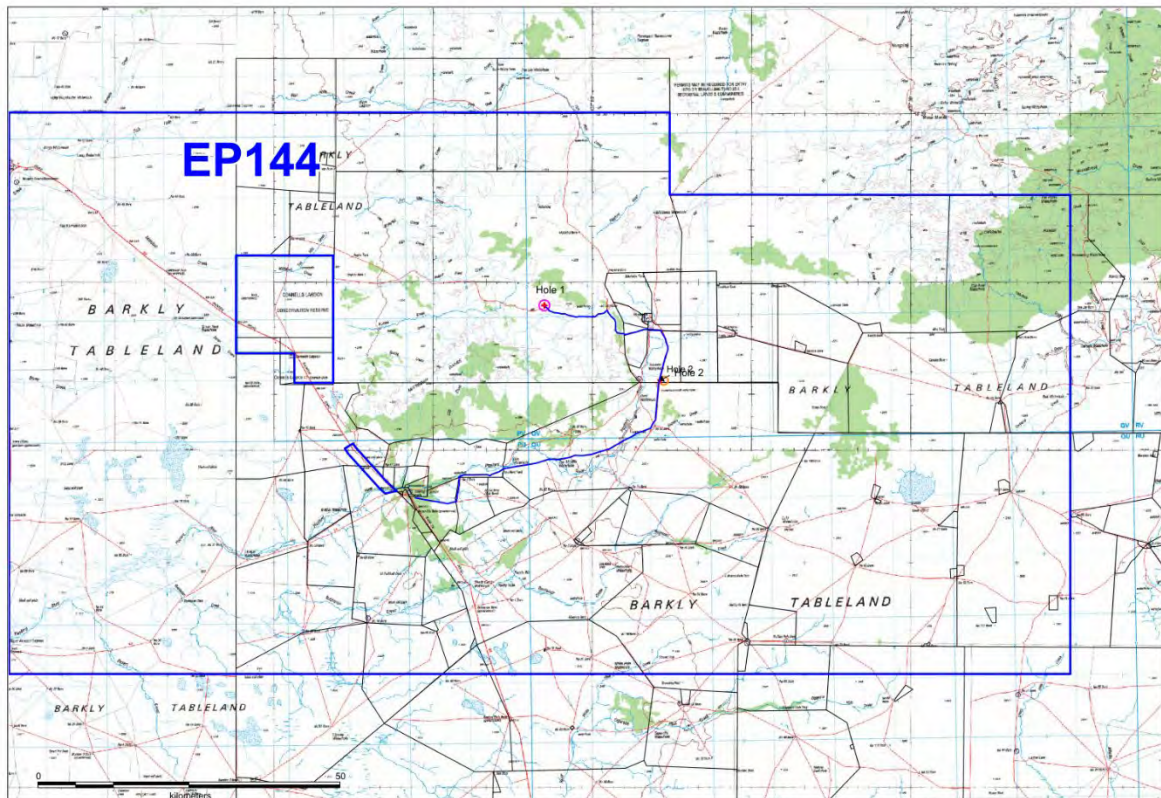
Following re-interpretation of GA seismic data, the final locations of Hole 1 and Hole 2 are shown in the table below and Figure 4.

For the purpose of this work program and environmental and significant site surveys the location of the planned holes has been assigned as the centre of a 1km radius buffer zone. The actual hole could be drilled anywhere within that zone. The drillers camp is located within the same 1 km buffer zone around Hole 2.

Hole 1	702,882 m east	7,921,378 m north
Longitude/latitude	136.924924	-18.789388
Hole 2	722,342 m east	7,909178.66 m north
Longitude/latitude	137.110851	-18.897579
Drillers' Campsite In 1km radius centred on	722,557 m east	7,909,274 north

UTM coordinates are GDA94 Zone 53

Figure 4: Location of planned drill holes & camp



3.2 Significant site surveys

In November 2016 the Aboriginal Areas Protection Authority (AAPA) issued Minerals Australia Pty Ltd Authority Certificate C2016/158 covering a planned seismic survey and stratigraphic drilling in EP144. All significant sites were recorded by the AAPA and are shown in Figure 6 and included with the GIS files provided with this document. A copy of the data provided by AAPA is shown in Figures 6 and 11.

3.3 Stratigraphic core drilling

Note that exploration stratigraphic drill holes are only approximately 100 mm in diameter. The drilling equipment and methods cannot be directly compared to conventional oil well drilling using large drilling platforms. The methods are more akin to mineral exploration drilling.

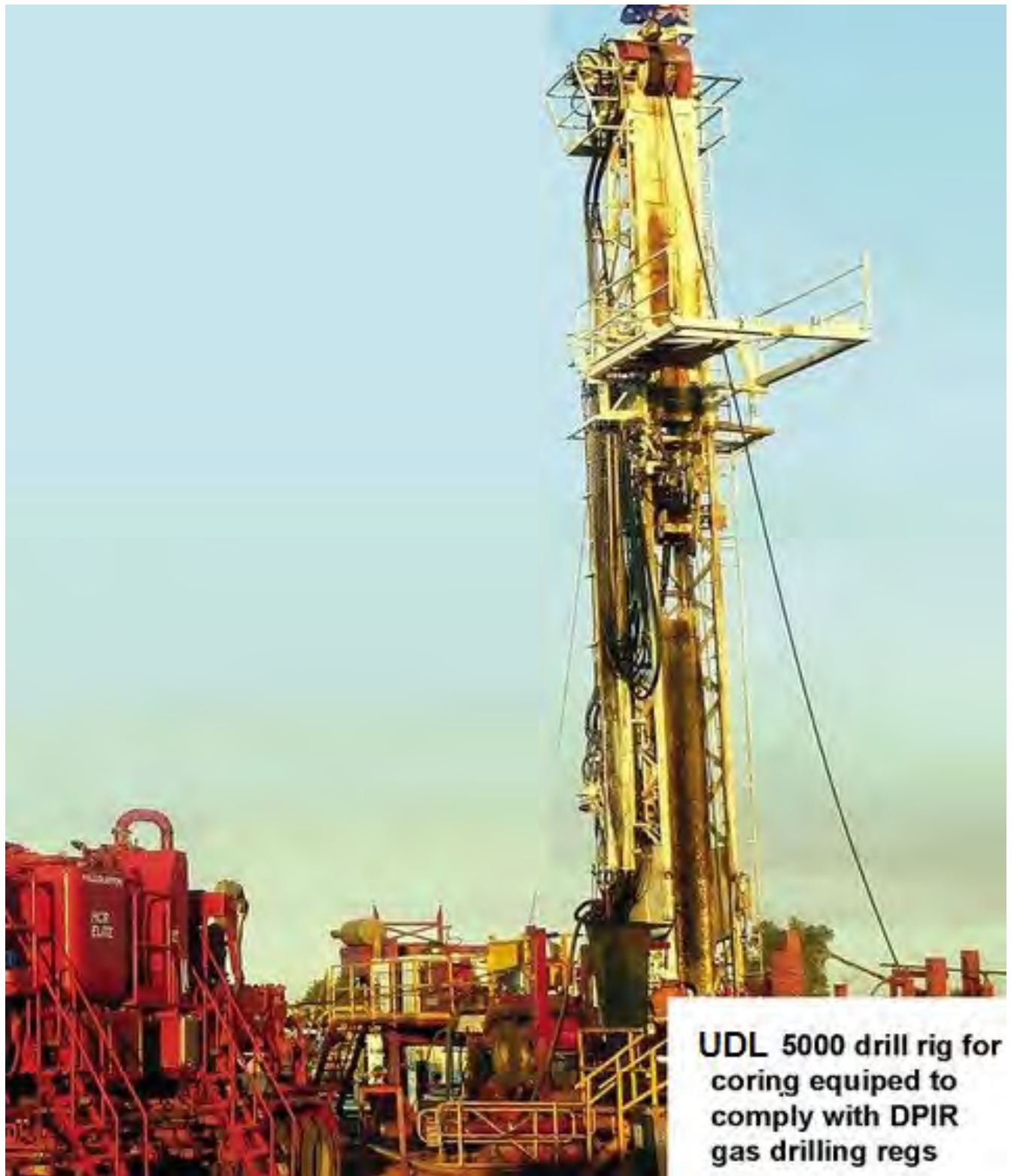
Figure 5 shows a DPRI-compliant drill rig used for fully-cored stratigraphic drill holes. Because the planned holes are for shale gas exploration purposes, the DPIR Petroleum Operations branch requires that the drill rig be fully compliant with gas-drilling regulations.

Activities associated with the drilling of stratigraphic core holes include;

- Obtain necessary approvals from the NLC, AAPA, DENR and NT DPIR (Petroleum Operations) and a land access agreement with Alexandria Station (NAPC).
- Establish a drilling-operations camp.

- Prepare drill pads for the size of rig shown in Figure 5. The pads will be a minimum of 100m x 100m as required by the DPIR.
- All ancillary drilling requirements are incorporated with the rig on the drill pad.
- Drilling operations on day and night shifts using crew of two drillers and four offsidiers.
- Down-hole geophysical logging and hole completion. Holes to be plugged and sealed.
- Site rehabilitation.

Figure 5: DPIR-compliant drilling rig for stratigraphic core drilling



Detailed plans of the location of the proposed drill holes are show in Figures 6 -10.

Drill pads for the rig shown in Figure 5 will be approximately 100m X 100m.

At least two sumps are excavated to contain drilling water/fluids, one to be used for water only. For stratigraphic drilling the drilling fluids consist of industry-standard, non-toxic and biodegradable water-bentonite mixtures to facilitate the lifting of drill cutting from the hole. On completion, if certification cannot be obtained for on-site disposal, then this waste will be transported using a licensed transporter and disposed of at a licensed facility.

The two drill holes planned will take approximately 4 weeks to complete.

Figure 6: EP144 – 2019-2020 planned stratigraphic drill holes, camp site and APPA sites

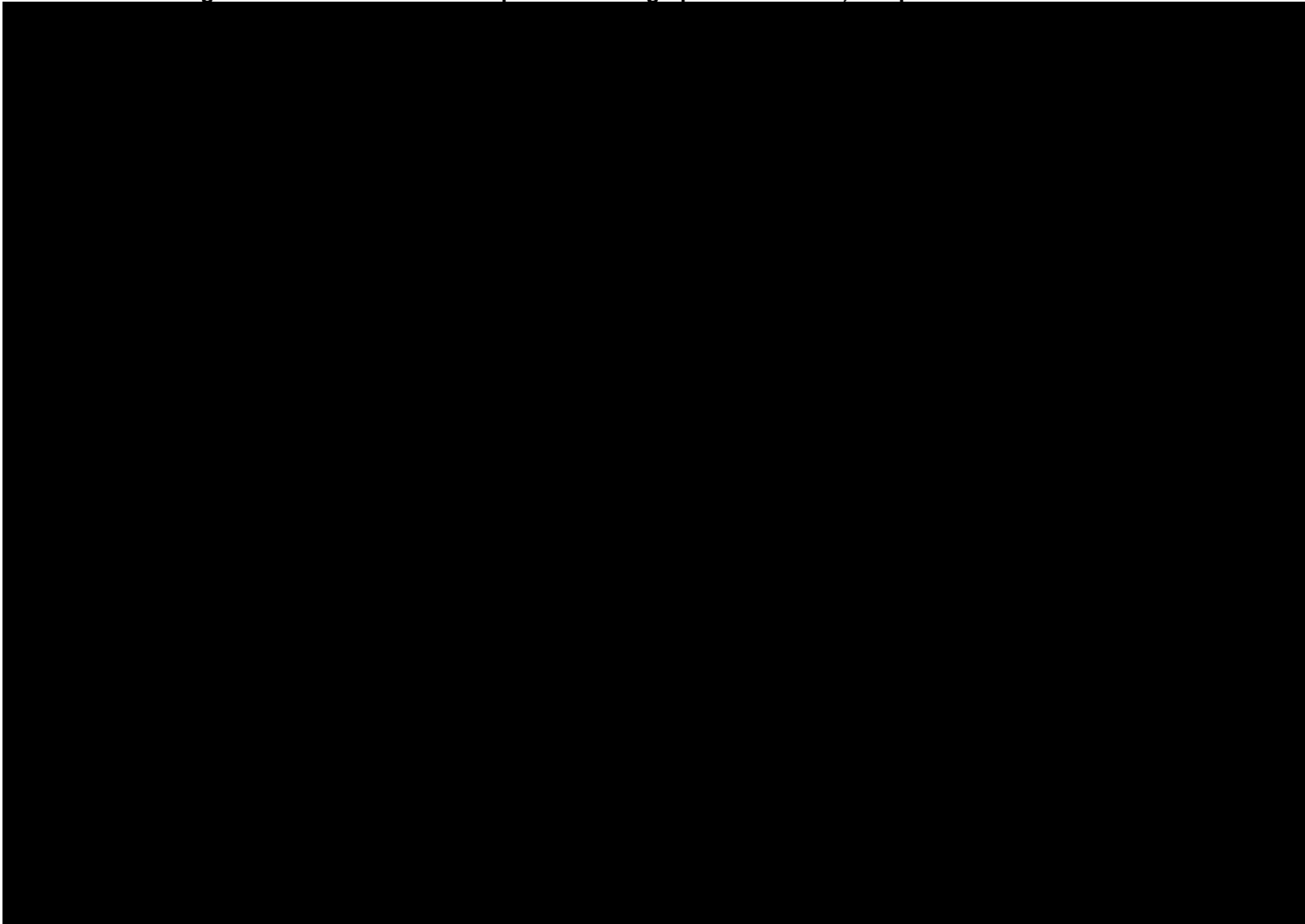


Figure 7: EP144 - Detailed location map of planned drill holes & camp site

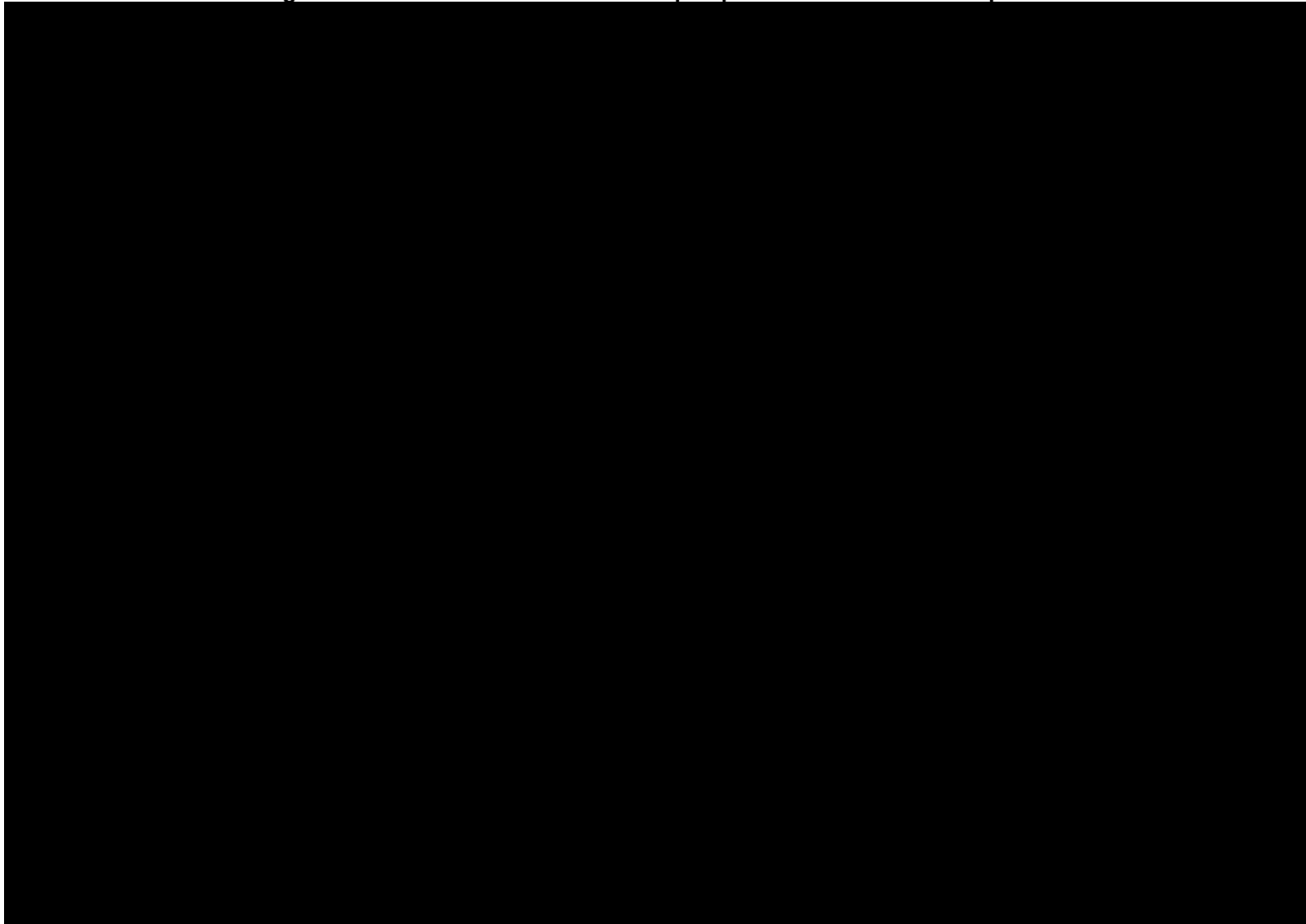


Figure 8: Satellite image of EP144 work program drill holes 1 & 2

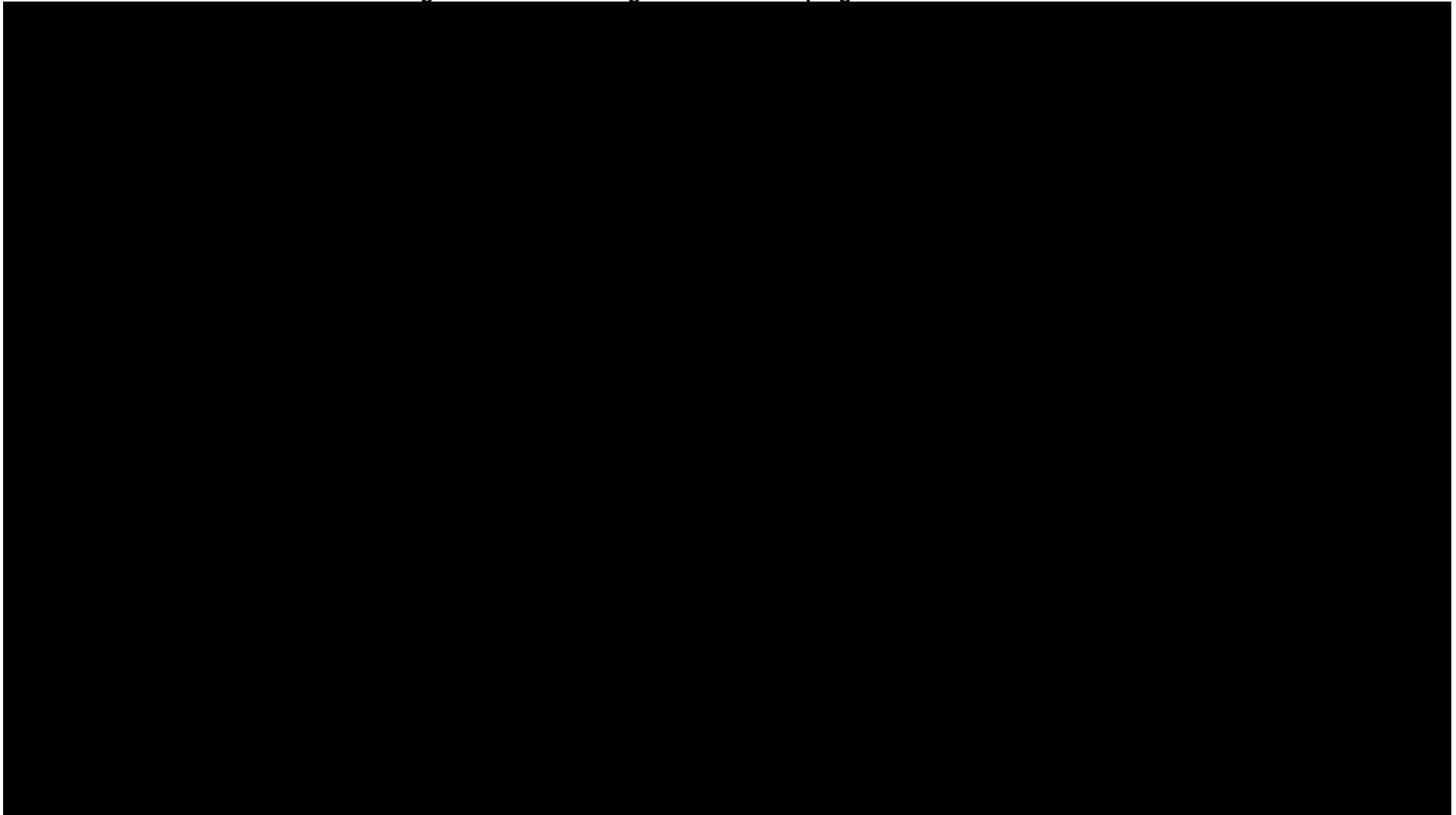


Figure 9: Enlarged satellite image of location of planned Hole 1 access

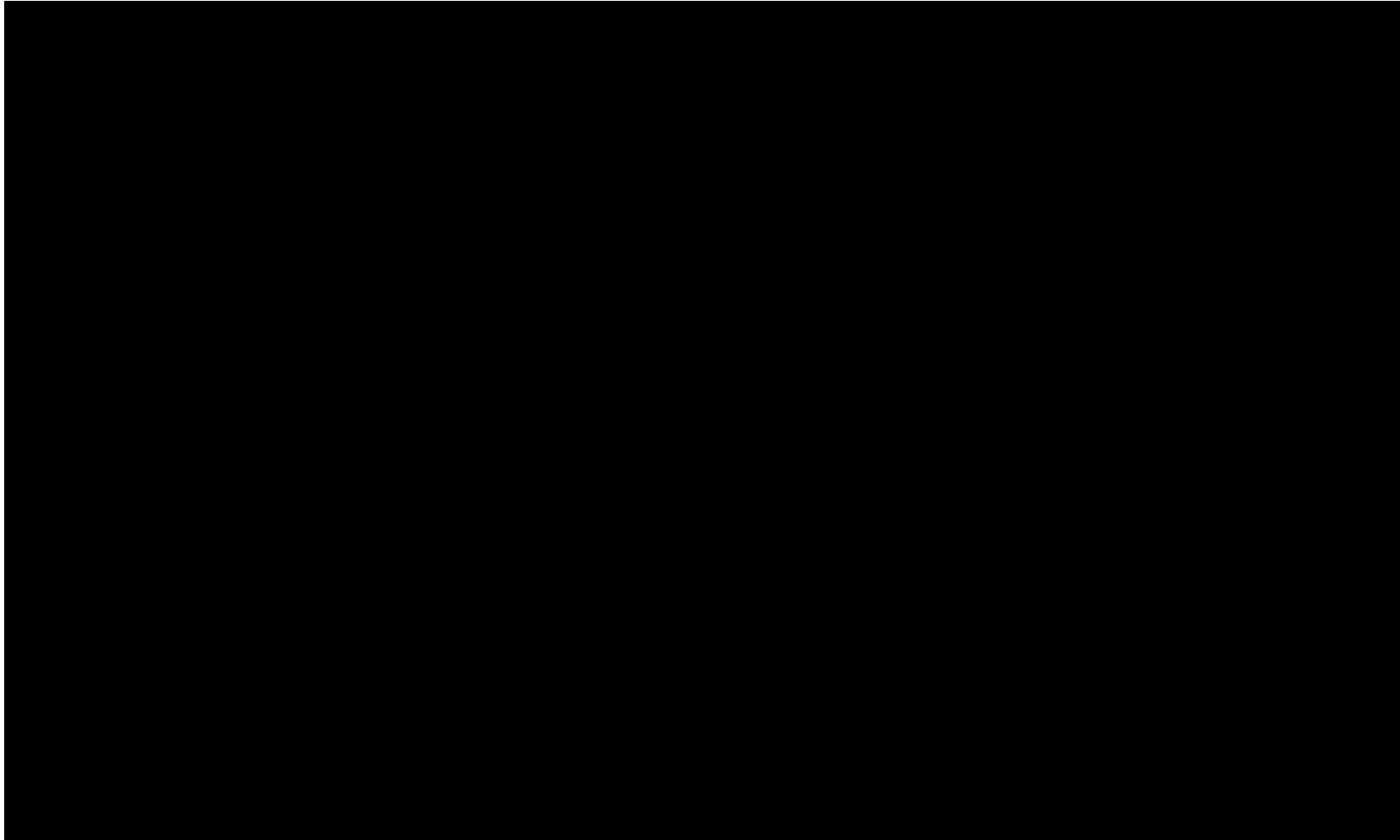


Figure 10: Enlarged satellite image of location of planned Hole 2

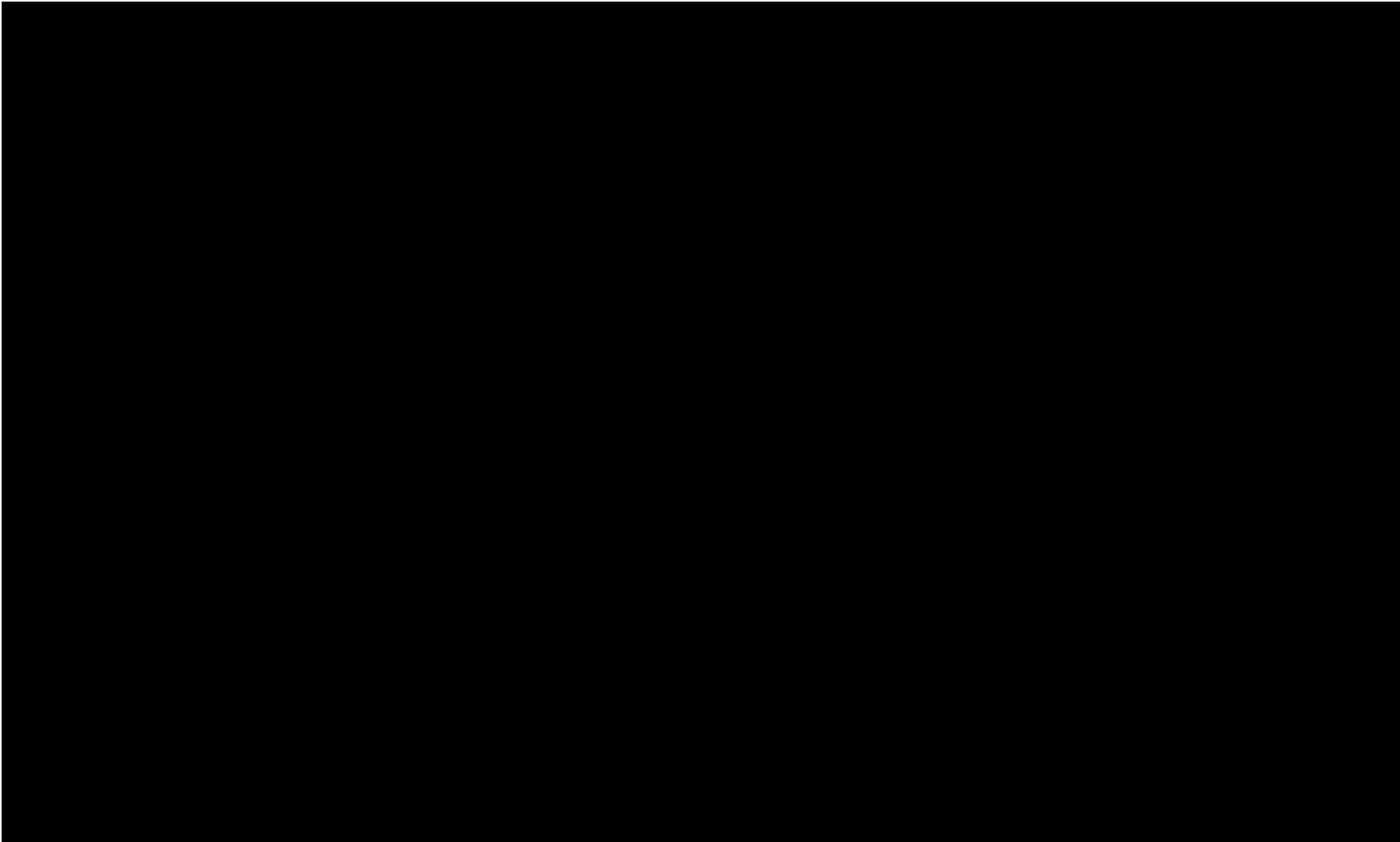
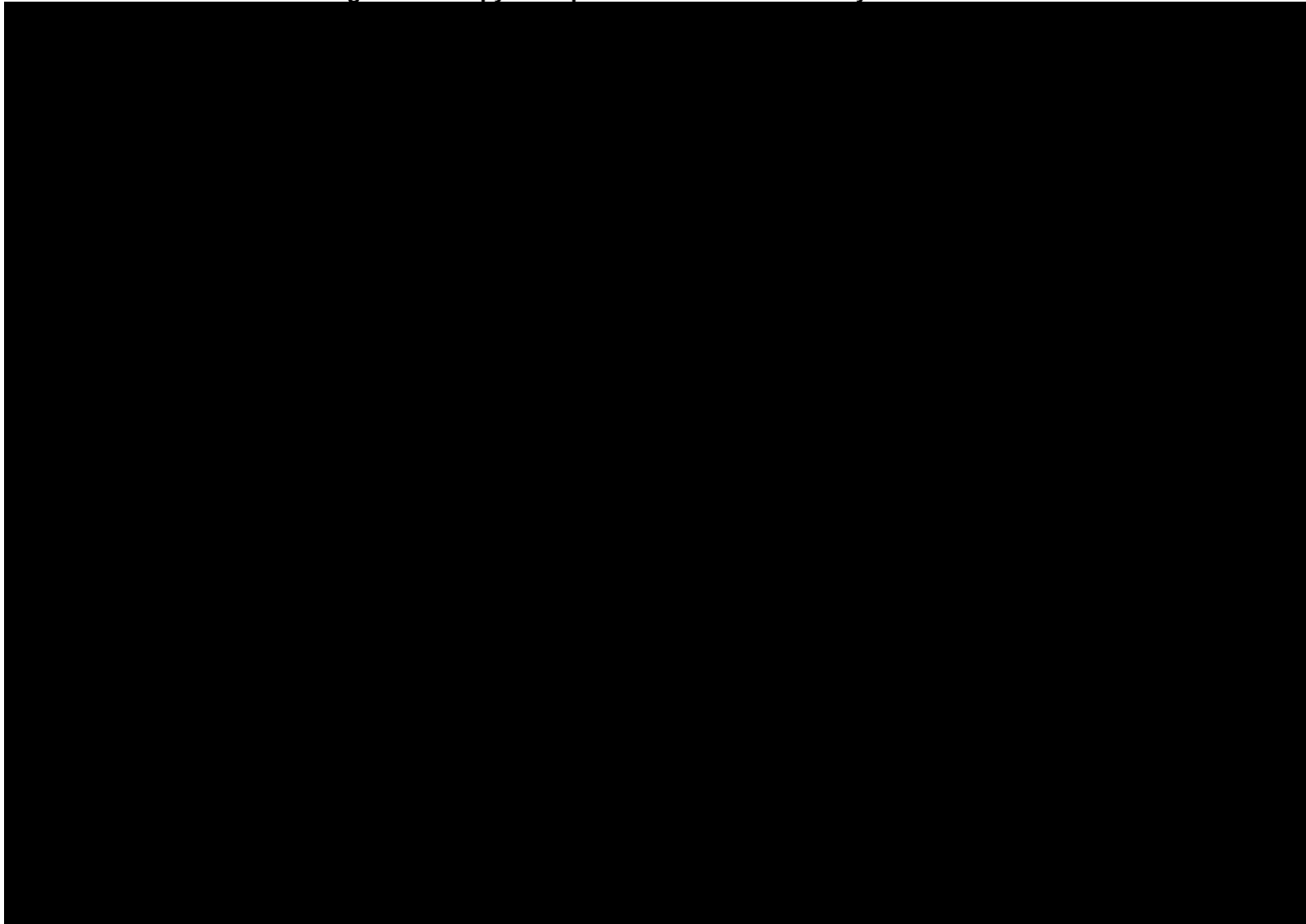


Figure 11: Copy of map from 2016 AAPA Authority Certificate



Drilling camp

For the two planned stratigraphic drill holes a single camp will be established. The camp houses all of the personnel required to operate the drill rig. Because of the special equipment required to operate the rig approximately 20-30 drill contractor employees and hydrocarbon specialists will be on site. A photo of a typical such camp is shown in Figure 12.

Figure 12: Typical field camp



The camp will be sited on Alexandria/Mittiebah station on ground conducive to camping at the site shown in Figures 4 and 6-7. The centre of the 1 km camp site buffer is at;

Drillers' Campsite In 1km radius centred on	722,803 m east	7,909,979 north
---	----------------	-----------------

The main camp can accommodate about 30 personnel and may contain more than 10 vehicles. As the majority of these vehicles transit from camp to adjacent roads and back at least once per day, and some several times, the routes from camp are clearly defined to restrict wheel track impact and impacts to adjacent areas. Vehicles are restricted to the perimeter of the camp and parking areas are also defined. The camp will occupy an area of approximately 250 x 250 m.

The camp will utilise a mobile wastewater treatment plant, to recycle the generated grey and black water (Figure 13). These sewage treatment plants are designed to treat camp generated effluent to the required environmental guidelines for advanced secondary effluent (Class "B"), to enable disposal via evaporation irrigation. The effluent will be piped to an evaporation sump about 50 m outside the camp for evaporation. The pit will be backfilled when no longer required.

Figure 3: On-site waste treatment plant



All waste produced by the workforce operating in the field will be brought back to the camp each day for correct disposal.

Recyclable materials are segregated on camp and regularly transported to an approved waste depot facility in Katherine or Darwin. Punctured or ruined tyres will be returned to Katherine or Darwin for repair, recycling or disposal.

Potential spill containment practices are to contain fuel drums within portable bunding. The storage of fuel at camp sites is contained within tankers utilising safety features such as double-skins, safety cut-off valves, top accessing or transportable bunding etc. to minimise or eliminate the potential for spills. Drip trays are provided to contain minor drips and spills which may occur during re-fuelling operations. Any uncontained spillage is chemically treated and the ground ripped.

Once the camp site has been vacated, rehabilitation is undertaken, including ensuring no rubbish or any man made items are left in situ and, when necessary and terrain permitting, the area is tyne ripped to relieve compaction and wheel tracks and ruts. Shoulders of adjacent formed tracks are reinstated and the area left to rehabilitate.

Environmental management – drilling operations

The environmental management of the drilling program must be prepared (including a Weed Management plan) and approved by the NT DENR under the newly enacted NT environmental legislation.

Environmental objectives for the stratigraphic drilling proposed to be undertaken in EP144 are to:

- minimise the visual impact of operations.
- minimise disturbance to soil resources.
- minimise disturbance to native vegetation and native fauna.
- avoid disturbance to sites of cultural and heritage significance.
- minimise disturbance to livestock, pastoral infrastructure and landholders.
- avoid the introduction or spread of exotic species and implement control measures as necessary.
- not generate any fires.
- minimise disturbance to drainage patterns and avoid contamination of surface waters and shallow groundwater resources.
- rehabilitate operational areas as necessary.
- All of any additional requirements imposed by the DENR in their assessment of the Environmental Management Plan to be submitted for this program.

These objectives will be achieved because the all access will be along existing roads and station tracks. Due to the relatively small nature and scale of the disturbance footprint associated with the proposed drilling, no threatened species or species habitat are considered likely to be significantly impacted by the proposed activities.

The drill pads will be located as far as is possible on an area devoid of shrubs or bushes and accessed as far as possible by existing tracks. The planned Hole 1 may require some clearing of scrub and some ground disturbance depending on what is encountered in the field. The planned Hole 2 is located adjacent to an existing station road and will require minimal clearing of vegetation.

Any topsoil which may need to be removed for construction of the 10m x 10m pads will be stockpiled for replacement on completion of the drill holes.

All hydrocarbons used on site will be contained in a purpose-built vehicle. The only fuel used will be diesel and appropriate spill kits will be provided by the drilling contractors to clear up any spills or diesel or hydraulic fluid.

The holes will be securely capped to DPRI requirements. The drill pads and any locally disturbed areas around the sites caused by vehicular movements will be rehabilitated by light ripping.

Cultural Heritage

Appropriate cultural monitors for the Mittiebah area will be engaged to brief the drilling crew on local Aboriginal culture prior to commencement of the survey. If both safe and practical a cultural heritage monitor will be employed by the drilling contractor to assist with the drilling operations and site rehabilitation.

4. FIRE AND WEED MANAGEMENT

4.1 Fire control

At all times during the clearing of seismic lines and the conduct of the seismic survey an appropriately equipped fire tender will accompany and be available to the operating crew to extinguish any fire accidentally started by plant and equipment. If feasible and practical a local aboriginal contractor may be employed to provide the appropriate fire tender vehicle.

All operating plant and equipment will also have individual fire extinguishers.

The seismic and drilling camp site will be cleared to include a suitable fire break to surround the site and a fire tender will be available at the camp site in case of an accidental fire outbreak. A dedicated smoking area will be established at the camp site and appropriate disposal bins provided.

4.2 Weed control

As required by new environmental regulations a weed survey will be completed as part of the Environmental Management Plan to be approved by the DENR.

All light vehicles and plant and equipment entering the area of EP154 and/or non-consent ALRA land will be appropriately washed down and inspected at a dedicated off-site facility, including a liquid collection pit prior to entry to the ALRA land. Any vehicle or part which leaves the ALRA land area and returns at a later date will be re-washed down prior to return.

5. ESTIMATED COST OF PLANNED EXPLORATION



From: [REDACTED]
Subject: RE: Shape files for EP144
Date: Thursday, 26 September 2019 4:43:47 PM

Hi Peter

I can confirm that this the work program in line with the requirements of the agreement and it is accepted. As I mentioned it is important to ensure that what you submit to AAPA references the same work program submitted to NLC.

In line with the Legal Agreement associated with EP 144 could you provide more information on how Jacaranda has previously and proposes into the future to take reasonable steps associated with section 9, Employment, Training and Business Opportunities, including:

- Identifying suitable positions and opportunities appropriate for Aboriginal people;
- Taking steps to maximise employment, training and contracting Native Title Parties and Aboriginal businesses; and
- Nominating and provide a suitable time for a suitably qualified employee, consultant or contractor to identify opportunities and assist with submission of application or tender.

Kind regards

Sarah Arblaster

A/g Senior Project Officer – Borroloola Barkly & Darwin Daly Wagait Regions

Project & Process Coordinator - Minerals & Energy

Northern Land Council



Team Email: minerals.energy@nlc.org.au

Email: [REDACTED] | Website: www.nlc.org.au

Phone: +61 8 8943 9712

From: Peter Collings [REDACTED]
Sent: Monday, 23 September 2019 1:17 PM
To: Sarah Arblaster
Cc: Greg McDonald
Subject: RE: Shape files for EP144

Sarah,

Here is the final revision of the EP144 work program. We have finalized the location of the two drill holes and hole 2 is not very far from one of the alternative holes (2a & 2b) in the previous version so probably does not change the dynamic with the TO's?

The GIS file has both shape files and Mapinfo MIF files.

Can you please let me know ASAP if this is OK? I can then submit it to the AAPA.

Regards

Peter

Peter Collings
Chief Geologist, Minerals Australia Pty Ltd
Hancock Prospecting Pty Ltd
Level 3, HPPL House
28-42 Ventnor Avenue
WEST PERTH WA 6005
Phone(direct [REDACTED])
[REDACTED]

From: Sarah Arblaster [mailto:[REDACTED]]
Sent: Monday, September 23, 2019 6:28 AM
To: Peter Collings <[REDACTED]>
Subject: Shape files for EP144

Hi Peter

Could you please send me the shape files for EP144

Cheers
Sarah

Sent from my iPhone

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From: [REDACTED]
Subject: RE: EP154 and 144
Date: Friday, 5 August 2022 2:59:00 PM

Thank you Michael. We will just have to wait and see what develops after the EMP process
Regards
Peter

From: Michael Egan [REDACTED]
Sent: Friday, 5 August 2022 2:54 PM
To: Peter Collings [REDACTED]
Cc: Greg McDonald [REDACTED]
Subject: RE: EP154 and 144

Hello Peter

To summarise, according to the *Work Programs and Sacred Site Avoidance Surveys / Work Programs and Site Clearances* (as relevant) clauses of the exploration agreements (Clause 6 for EP144 and EP153 and Clause 17 for EP154), no on-ground exploration or development activity may be undertaken:

- Without first holding work program meetings to describe the planned work to the Native Title Parties or Traditional Owners and
- Without a sacred site survey having been conducted.

The terms of the agreements make it possible for these sacred site surveys to be conducted either by the NLC or by the AAPA. Since the Pepper Inquiry an AAPA Authority Certificate is required in either case (based on either the NLC or the AAPA survey as appropriate).

The agreements for EP144 and EP153 do not specifically mention 'approval'. In the case of EP154, Clause 17.1 of the agreement states:

'The Company must only undertake such Exploration and Development activities on any part of the Permit Area that are included in a Work Program provided to the Land Council in accordance with this clause 17 and *either* approved by the Land Council in accordance with this clause 17 *or the subject of an Authority Certificate.*' (emphasis added).

The proposed EP154 work program is subject to an Authority Certificate so the terms of clause 17 which refer to 'approval' by the NLC (related to site surveys) are covered by the existing Authority Certificate (see also Clauses 17.9 and 17.12). The proposed EP144 work program is also covered by an existing Authority Certificate.

As previously confirmed, work program meetings in accordance with the agreements were held for EP154 in Minyerri in October 2019 and for EP144 in Tennant Creek in May 2021.

I hope that this is of assistance.

Regards

Michael Egan

Manager Petroleum Unit
Resources & Energy Branch
Northern Land Council



Moonta House – 43 Mitchell St (level 2), Darwin NT 0800
GPO Box 1222, Darwin NT 0801
Mobile Number: [REDACTED] | Office Number: (08) 8980 1919
Email: [REDACTED] | Website: www.nlc.org.au

From: Peter Collings [[mailto:\[REDACTED\]](mailto:[REDACTED])]
Sent: Tuesday, 26 July 2022 5:32 PM
To: Michael Egan [REDACTED]
Cc: Greg McDonald <[REDACTED]>
Subject: RE: EP154 and 144

Michael

This is in the very unexplained area of the approvals process. If you can please send me a fairly self-explanatory email describing the NLC approval process and AAPA involvement then that will at least give me something to produce when/if asked by some, so far unidentified, asks for it. I assume the NLC will get input to the EMP approval so the exploration program approval process may be appropriate at that time.

Regards
Peter

From: Michael Egan [REDACTED]
Sent: Tuesday, 19 July 2022 1:55 PM
To: Peter Collings [REDACTED]
Subject: Re: EP154 and 144

Thanks Peter

Mike

Sent from my iPhone

On 19 Jul 2022, at 3:16 pm, Peter Collings
<[REDACTED]> wrote:

Michael

I will have to follow up with the relevant “authority” to find out what is actually

require4d. I will get back to you because the approvals process is not particularly self-explanatory.

Regards
Peter

From: Michael Egan <[REDACTED]>
Sent: Monday, 18 July 2022 9:44 AM
To: Peter Collings <[REDACTED]>
Cc: Isabel Smith <[REDACTED]>
Subject: RE: EP154 and 144

Hello Peter

What format are you looking for for such correspondence? Is an email confirming that Traditional Owners were consulted and provided with details of the proposed program and given the opportunity to ask questions and provide comment sufficient?

I note that clause 17.1 of the EP154 Exploration Agreement states that:

'The Company must only undertake such Exploration and Development activities on any part of the Permit Area that are included in a Work Program provided to the Land Council in accordance with this clause 17 and either approved by the Land Council in accordance with this clause 17 or the subject of an Authority Certificate.' (emphasis added).

In the case of EP154, the work is subject to an Authority Certificate so the terms of clause 17 which refer to 'approval' by the NLC (related to site surveys) are covered by the existing Authority Certificate (see also clause 17.12).

A similar situation exists for EP144 where the sacred site survey required under clause 7 was conducted by the Aboriginal Areas Protection Authority and is subject to an Authority Certificate.

Is this sufficient for your compliance with the approval processes?

Regards

Michael Egan
Manager Petroleum Unit
Resources & Energy Branch
Northern Land Council



Moonta House – 43 Mitchell St (level 2), Darwin NT 0800

GPO Box 1222, Darwin NT 0801

Mobile Number: [REDACTED] | Office Number: (08) 8980 1919

Email: [REDACTED] | Website: www.nlc.org.au

From: Peter Collings [[mailto:\[REDACTED\]](mailto:[REDACTED])]
Sent: Monday, 11 July 2022 2:24 PM
To: Michael Egan <[REDACTED]>
Cc: Greg McDonald <[REDACTED]>
Subject: FW: EP154 and 144

Michael,
I have not had any response to this. Can the NLC please advise me ?
Regards
Peter

From: Peter Collings <>
Sent: Friday, 1 July 2022 11:21 AM
To: 'Michael Egan' [REDACTED]
Cc: Greg McDonald <[REDACTED]>
Subject: EP154 and 144

Michael
A required part of our approvals process is formal approval for our exploration programs by the NLC on behalf of the Traditional Owners. Can you please let me know when such approval may be available?
Regards
Peter

Peter Collings
Chief Geologist
Minerals Australia Pty Ltd
Hancock Prospecting Pty Ltd
Level 2, HPPL House
28-42 Ventnor Avenue
WEST PERTH WA 6005
PO Locked Bag 2
West Perth 6872

[REDACTED]
[REDACTED]

[REDACTED]

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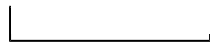
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From: [REDACTED]
Subject: RE: Contact regarding planned geophysical survey
Date: Tuesday, 1 September 2015 10:56:00 AM
Attachments: [EP144 gravity points for stations.pdf](#)
[survey crew.jpg](#)

Sam,

Thank you for your reply to my email.

You will recall that we did an initial geological reconnaissance of the area of EP144 in 2011 using a helicopter.

This planned geophysical survey is a gravity survey during which the operating crew (pilot and technician) takes a gravity reading at each station. The stations are generally at 1 km intervals on lines 4 km apart although a wider spacing is planned in the southern part of Alexandria. The crew flies from station to station using the helicopter (a small Robinson R44).I have attached a map showing the gravity survey stations and operating crew.

Gravity measurements are a standard regional exploratory tool which identifies the density contrasts in the underlying formations and thus the different rock types.

The survey crew are supported by a 4WD which carries drum fuel for the helicopter. The vehicle stays on formed roads. So the maximum crew size will be in the order of 4-5 depending on logistics and there will be a helicopter and a 4WD.

The survey is planned for the second half of September but depends on the contractors, Atlas Geophysics, completing a government gravity survey at Victoria River. Our gravity programme has already been delayed for 15 months while the NLC carried out site surveys and the AAPA issued access authority.

The crew will collect 150-200 data point per day. There are approximately 1500 survey points on Alexandria, Mittiebah and Mt Drummond (out of a total of 1734 for EP144). SO the survey should take 7-8 days if everything goes smoothly. The survey would most probably proceed along north-south grid lines but the actual logistics will depend on the contractors. Atlas Geophysics have conducted regional surveys for the government over much of the NT over the past 5-6 years and a very familiar with the requirements of stations owners for this type of survey. They will contact the stations directly a week before they commence.

I am happy to discuss all of this in more detail with you when you have had a chance to asses our programme and possible impacts on the operations of the station.

Regards

Peter Collings

Peter Collings

Chief Geologist – Minerals Australia Pty Ltd

Hancock Prospecting Pty Ltd

Level 3, HPPL House

28-42 Ventnor Avenue, West Perth WA 6005

Phone [REDACTED]

Email [REDACTED]

From: Sam Harburg [mailto:[REDACTED]]
Sent: Tuesday, 1 September 2015 8:46 AM
To: Peter Collings
Subject: FW: Contact regarding planned geophysical survey
Importance: High

Dear Peter

Thanks for your email about exploration on Alexandria.

Before we hold any discussion about access to the property, it would be helpful if you could please provide an overview of the proposed work program. This will help us understand the nature of your work program and how it may interact with our operations:

- A map of the tenement that shows the target areas for your exploration program.
- The proposed commencement date of the exploration program.
- A description of the activities that will be undertaken as part of the program:
 - Scope of activities that are planned to be undertaken
 - Size of work parties
 - Equipment that will be used on site
- Expected duration of the program

In addition, NAPCO requests that any access to the property be covered by an access agreement. We are happy to provide a template agreement in due course, once we have a basic understanding of the extent of your exploration on Alexandria. Please give me a call if you would like to discuss this further.

Kind Regards,
Sam Harburg
General Manager Breeding & Genetics
The North Australian Pastoral Company

t: [REDACTED]

f: [REDACTED]

m: [REDACTED]

[REDACTED]

www.napco.com.au

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From: Stephen Bryce
Sent: Monday, 31 August 2015 3:52 PM
To: Sam Harburg
Subject: FW: Contact regarding planned geophysical survey
Importance: High

Sam

Is this OK or do you want to talk to them.

regards

Stephen Bryce

Manager

Alexandria Station

CMB 5

via Mt Isa Q 4825

[REDACTED]

[REDACTED]

<http://www.napco.com.au>



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From: Peter Collings [mailto: [REDACTED]]
Sent: Monday, 31 August 2015 2:50 PM
To: Alexandria

Subject: Contact regarding planned geophysical survey

Minerals Australia is 50% holder of petroleum exploration permit EP144 which covers part of Alexandria. We have approval from the Northern Land Council and the Department of Mines and Energy to conduct a helicopter assisted ground gravity geophysical survey over part of EP144 which will include a large part of Alexandria.

I would like to discuss this on the phone with Stephen Bryce at a time which is convenient to him.

Can you please suggest a suitable time for me to do so?

Regards

Peter Collings

Peter Collings

Chief Geologist – Minerals Australia Pty Ltd

Hancock Prospecting Pty Ltd

Level 3, HPPL House

28-42 Ventnor Avenue, West Perth WA 6005

Phone [REDACTED]

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From: [REDACTED]
Subject: RE: NLC Invoice :- IN06399 :- Weed Survey – EP144 Cultural Monitors 2021
Date: Monday, 12 July 2021 11:02:40 AM

Hello Peter

Yes, we failed to secure appropriate cultural monitors for the EP154 weed survey in time. Thank you for the advice regarding treatment of the invoiced amounts.

We did secure appropriate cultural monitors for the EP144 survey and have been in close communication with EcOz regarding the logistics for this survey. However, I have just been advised that these cultural monitors are now unavailable for this week. I have spoken with the senior Traditional Owner and discussed options and he has advised that this survey may also continue without monitors given that it is on existing roads and that the EcOz team are already on their way to the field.

I will discuss refund of both of these invoices with our finance team.

Regards

Michael Egan
Minerals and Energy
Northern Land Council



43 Mitchell St, Darwin NT 0801
GPO Box 1222, Darwin NT 0801
Mobile Number: [REDACTED] | Office Number: (08) 8980 1919
Email: [REDACTED] | Website: www.nlc.org.au

From: Peter Collings [mailto:Peter_Collings@hancockexplorationhq.com.au]
Sent: Monday, 12 July 2021 10:01 AM
To: Michael Egan ; Greg McDonald
Cc: Daniel Wade
Subject: RE: NLC Invoice :- IN06399 :- Weed Survey – EP144 Cultural Monitors 2021

Michael and Greg,
Based on my understanding from Jeff Richardson that no cultural monitors will be involved in the EcOz survey of EP154 I request that the paid amount invoiced(attached) be refunded to Minerals Australia. I understand that the survey will be done this week.

I also would like to know the current situation regarding monitors for the EP144 survey.

Regards

Peter

From: Account Receivable <accounts.receivable@nlc.org.au>
Sent: Friday, 18 June 2021 7:23 AM
To: Peter Collings <[REDACTED]>
Cc: Greg McDonald <[REDACTED]> Michael Egan <[REDACTED]>
Subject: NLC Invoice :- IN06399 :- Weed Survey – EP144 Cultural Monitors 2021

Good Morning, Peter

Please see attached NLC Invoice :- IN06399 :- Weed Survey – EP144 Cultural Monitors 2021

Should you need further information please don't hesitate to contact us.

Thank you.

Humza Ahmad
Accounts Receivable Officer
Northern Land Council



Level 2, 45 Mitchell Street, Darwin NT 0800

GPO Box 1222, Darwin NT 0801

Reception:(08) 8920 5100 | Direct: (08) 8980 1913 | Mobile: [REDACTED]

ABN: 56 327 515 336

Website: www.nlc.org.au



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From: [REDACTED]
Subject: RE: NAPCO - Alexandria-Mittiebah access
Date: Wednesday, 22 July 2020 1:49:00 PM
Attachments: [image005.png](#)
[image006.png](#)
[image014.png](#)

Thank you Lachlan. We do not want to un-necessarily pose any risk to the station people. While our consultants are all based in Darwin we will wait until the situation is resolved one way or the other.
Regards
Peter

From: Lachlan Reed
Sent: Wednesday, 22 July 2020 1:45 PM
To: Peter Collings
Subject: RE: NAPCO - Alexandria-Mittiebah access

Hi Peter,

We still have a few restrictions in place. If travel to stations can be avoided it should be. However, if access is necessary, we require that all visitors refrain from accessing any infrastructure or buildings, and do not meet with on site staff face to face. Also, we are not currently allowing any visitors who have been to a COVID hotspot within 14 days as declared by the NT government.

These can be found here; [REDACTED]
[REDACTED]

Cheers,

Lachlan Reed
Land Development and Rangelands Officer

The North Australian Pastoral Company Pty Ltd
Address: Level 1, 12 Creek Street, Brisbane Qld 4000
Mail: GPO Box 319, Brisbane Qld 4001
Phone: [REDACTED]
napco.com.au

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From: Peter Collings <[REDACTED]>
Sent: Wednesday, 22 July 2020 2:00 PM
To: Lachlan Reed <[REDACTED]>
Subject: NAPCO - Alexandria-Mittiebah access

Lachlan,
Will you please up-date me on NAPCO's current policy on third-party access to Alexandria and

Mittiebah? We are still working our way through the NT regulatory regime for petroleum exploration and this query relates only to access for our required (by the Department of Environment) weed and archaeological surveys using a 4WD.

Regards

Peter

Peter Colligs
Chief Geologist
Minerals Australia Pty Ltd
Hancock Prospecting Pty Ltd
Level 2, HPPL House
28-42 Ventnor Avenue
WEST PERTH WA 6005
PO Locked Bag 2
West Perth 6872

[REDACTED]

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APPENDIX 2 - EP154 INFORMATION PACK

EXPLORATION WORK PROGRAMME FOR 2019-20

EP154

MANGARRAYI, ALAWA & ALAWA1 ABORIGINAL LAND TRUST AREAS MINYERRI REGION NT

Prepared by

Peter Collings – Chief Geologist

Minerals Australia Pty Ltd

for

Minerals Australia Pty Ltd and Jacaranda Minerals Ltd

January 2023

Document: NLC-EP154-MAPL0001

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1. DOCUMENT CONTROL

This Exploration Work Programme is a controlled document. Should the recipient (user) become aware of any changes or corrections that are required please photocopy the relevant page(s) to be changed, note the corrections and deliver them to:

Peter Collings

Chief Geologist

Minerals Australia Pty Ltd

PO Locked Bag 2

West Perth WA 6972

[REDACTED]

[REDACTED]

2. INTRODUCTION

EP154 was granted to Minerals Australia Pty Ltd and Jacaranda Minerals Ltd in March 2015. It is located over Aboriginal Freehold land owned by the Mangarrayi, Alawa and Alawa 1 Aboriginal Land Trusts 20-200km east-southeast of Mataranka NT (Figure 1). Figure 2 shows a regional location and topographic map.

Figure 1: Location of EP154

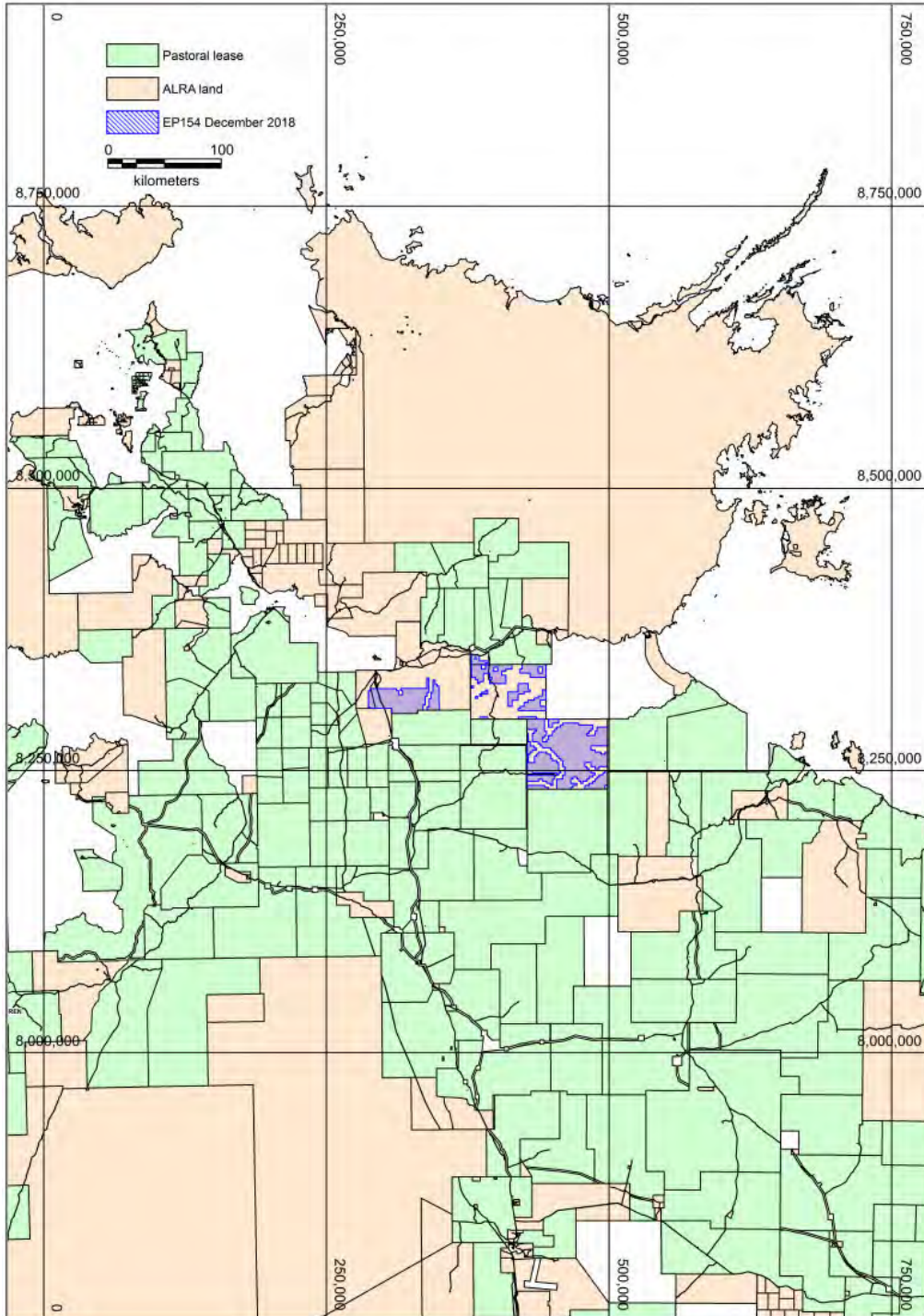
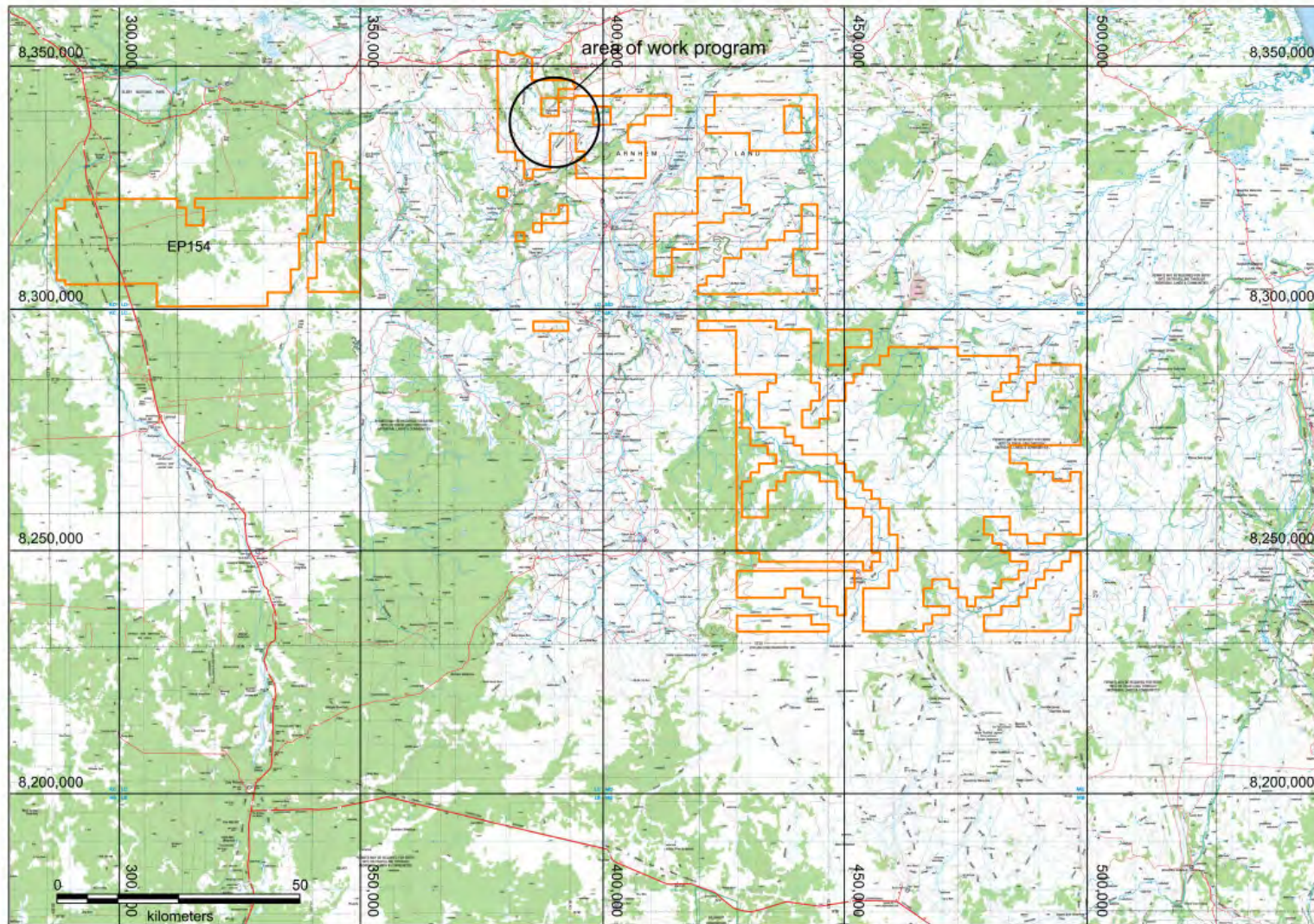


Figure 2: EP154 - detailed location and topographic map



EP154 is the subject of an Exploration and Coexistence Deed between Minerals Australia Pty Ltd, Jacaranda Minerals Ltd and the Northern Land Council.

Minerals Australia Pty Ltd and Jacaranda Minerals Ltd are private companies owned by Hancock Prospecting Pty Ltd from Perth WA. The two companies hold equal 50:50 shares in EP154. EP153 is managed by Minerals Australia Pty Ltd.

This work programme details the exploration to be carried out over ALRA land over which EP154 is wholly located. The work is planned for between October 2019 and November 2020 (depending on weather, NLC, AAPA, DENR and DME approvals and availability of contractors). The programme consists of a 43.6 line km seismic survey and the drilling of one cored drill hole to approximately 1000m depth to obtain stratigraphic information.

3. DESCRIPTION OF EXPLORATION ACTIVITIES

3.1 Geological background and exploration rationale

The exploration work area is located over an exposure of the Roper Group, some shale units of which are considered to have very high prospectivity for unconventional hydrocarbons. In particular, the Valkerri Formation is now recognised as a world-class target for tight gas and also liquid hydrocarbons.

Based on Mineral Australia’s interpretation of available geological and geophysical data, including from previous oil exploration drill holes from the 1980’s, it is believed that the Valkerri Formation will be at a depth of 500-1000m below the surface in the planned work area. The planned drill hole is designed only to identify the stratigraphy in the area and in particular to identify the depth to the Valkerri Formation.

Drill core will be taken from the Valkerri Formation and subjected to detailed chemical and physical analysis to confirm its likely prospectivity for unconventional hydrocarbons.

No hydraulic fracturing will be undertaken in this hole during the current work program. However, depending on the result of this drill evaluation, the next phases of exploration after 2020 would most probably include hydraulic fracturing and further physical and chemical evaluation. Such work is necessary to confirm, or otherwise, the potential for commercially viable production of gas and liquids.

3.2 Location of work

The exploration programme is planned for between May and November 2023 and will involve;

- Approximately 43.6 line km of 2D vibroseis seismic as shown in Figures 3,4 and 5. The start and end points of the seismic lines are shown below.

Line	Start GDA94 Zone 53	End GDA94 Zone 53	Length (km)
Line 1	380,298.115 east 8,343,685.085 north	387,207.6216 east 8,346,942.523 north	7.937km
Line 1A	378,630.8968 east 8,342,966.533 north	381,275.7885 east 8,344,202.442 north	2.919 km
Line 2	386,207.1366 east	392,914.3446 east	12.35 km

	8,330,835.868 north	8,341,114.969 north	
Line 3	387,596.2021 east 8,337,741.518 north	394,859.0396 east 8,337,890.216 north	7.256 km
Line 4	394,135.0970 east 8,337,606.942 north	399,632.1383 east 8,340,964.703 north	7.86 km
Line 5	388,949.7554 east 8,331,134.717 north	384,425.0053 east 8,333,888.577 north	5.30 km

- the drilling of one core drill hole to approximately 1000m depth to obtain stratigraphic information.

The location of the planned drill hole is shown on Figures 3,4 & 5. The coordinates of the hole are shown below. The core collected will be of HQ size (63.5mm diameter).

Hole 1	387300 m east	8332170 m north
Longitude/latitude	133.951334	-15.083513

UTM coordinates are GDA94 Zone 53

The seismic survey work will be conducted by a suitably qualified and experienced seismic survey contractor (e.g. Terrex, Geokinetics or Velsies). Equipment used will be industry-standard vibroseis all-wheel-drive vehicles.

The stratigraphic hole will be drilled by an experienced and qualified drilling contractor (e.g. DDH1 used by Pangaea in their 2015 program) using equipment complying with the requirement of the Petroleum Operations branch of the NT DPIR.

Both the seismic and drilling programs will require suitable camp facilities which will be located on a pastoral lease outside of the ALRA land. The relatively rough topography of the work area and the lack of suitable water supplies therein makes the work area unsatisfactory for an adequately functional campsite.

All company personal, contractors and any other approved persons will apply to the Northern Land Council for work permits to enter the area of EP154.

All of the work program will be done in compliance with the following guidelines promulgated by the NT government in response to the recommendations of the Scientific Enquiry into Hydraulic Fracturing;

- DENR (May 2019) "Code of Practice: Onshore Petroleum Activities in the Northern Territory" (Part A- Surface activities).
- DENR (February 2019) "Land Clearing Guidelines"
- DENR (June 2019) "Weed Management Planning Guide: Onshore Petroleum Projects"
- NT Petroleum(Environment) Regulations (2016) – Preparation of Environmental Management Plans.

Figure 3: EP154 – planned seismic traverses and drill hole & existing access tracks

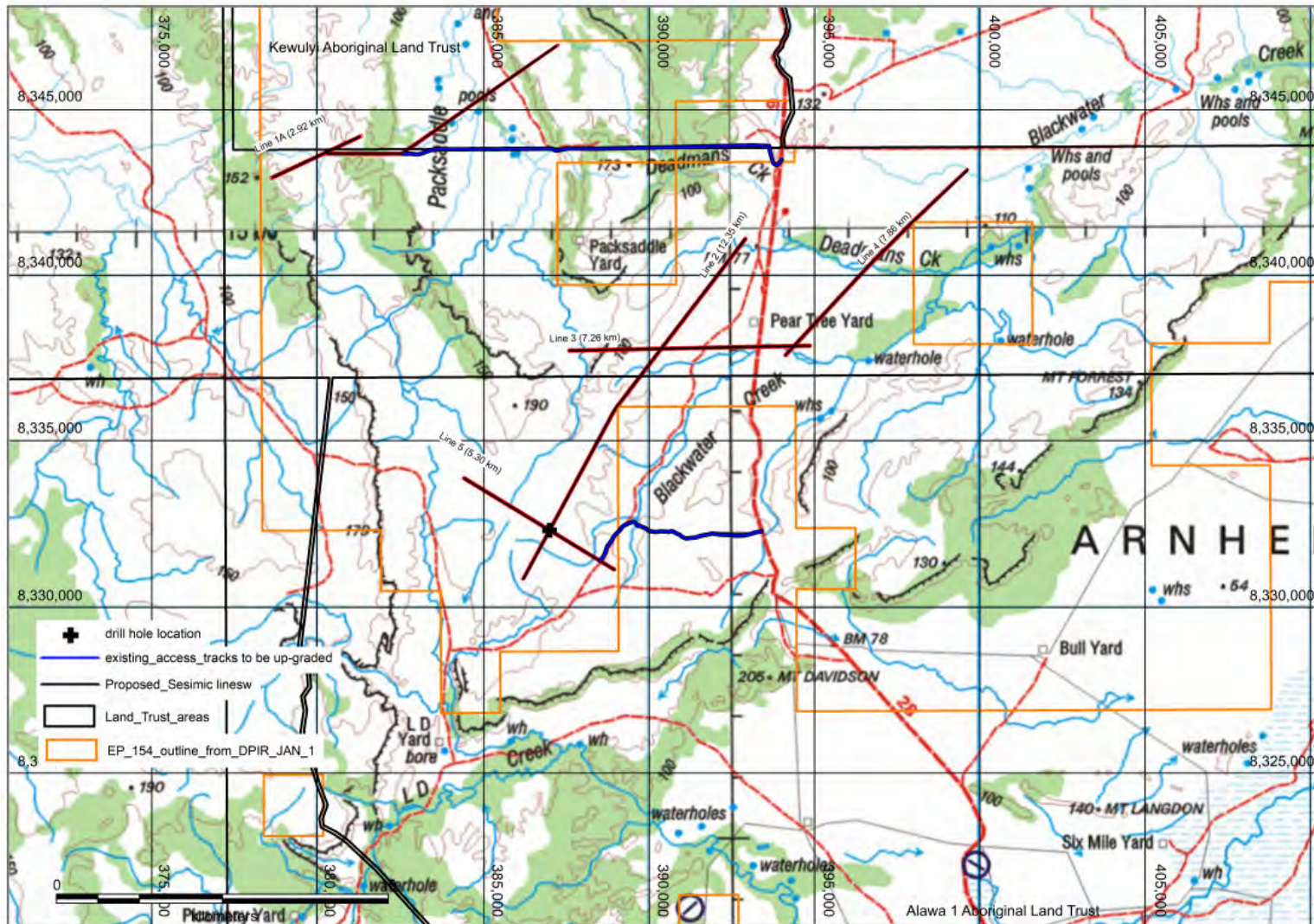
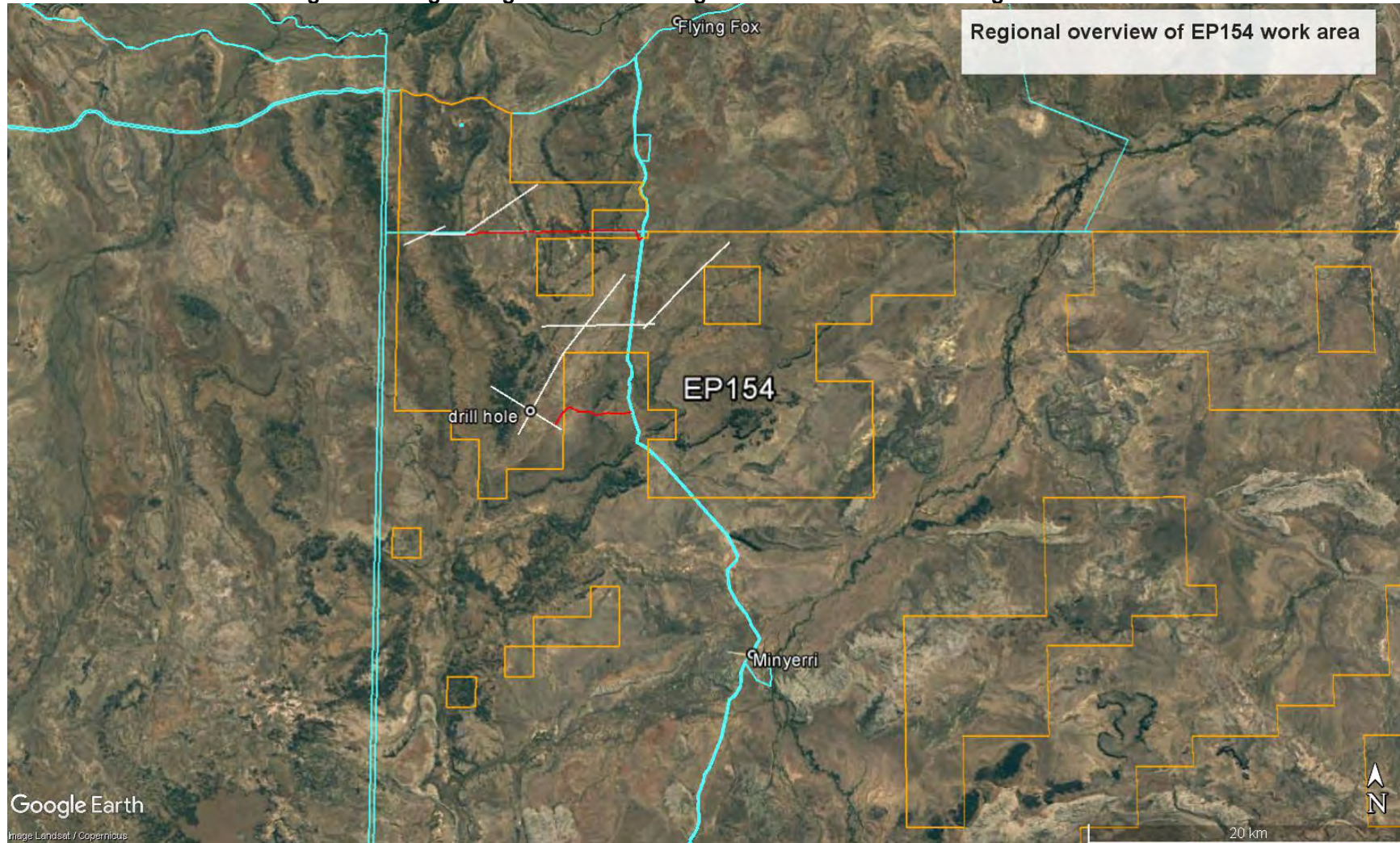


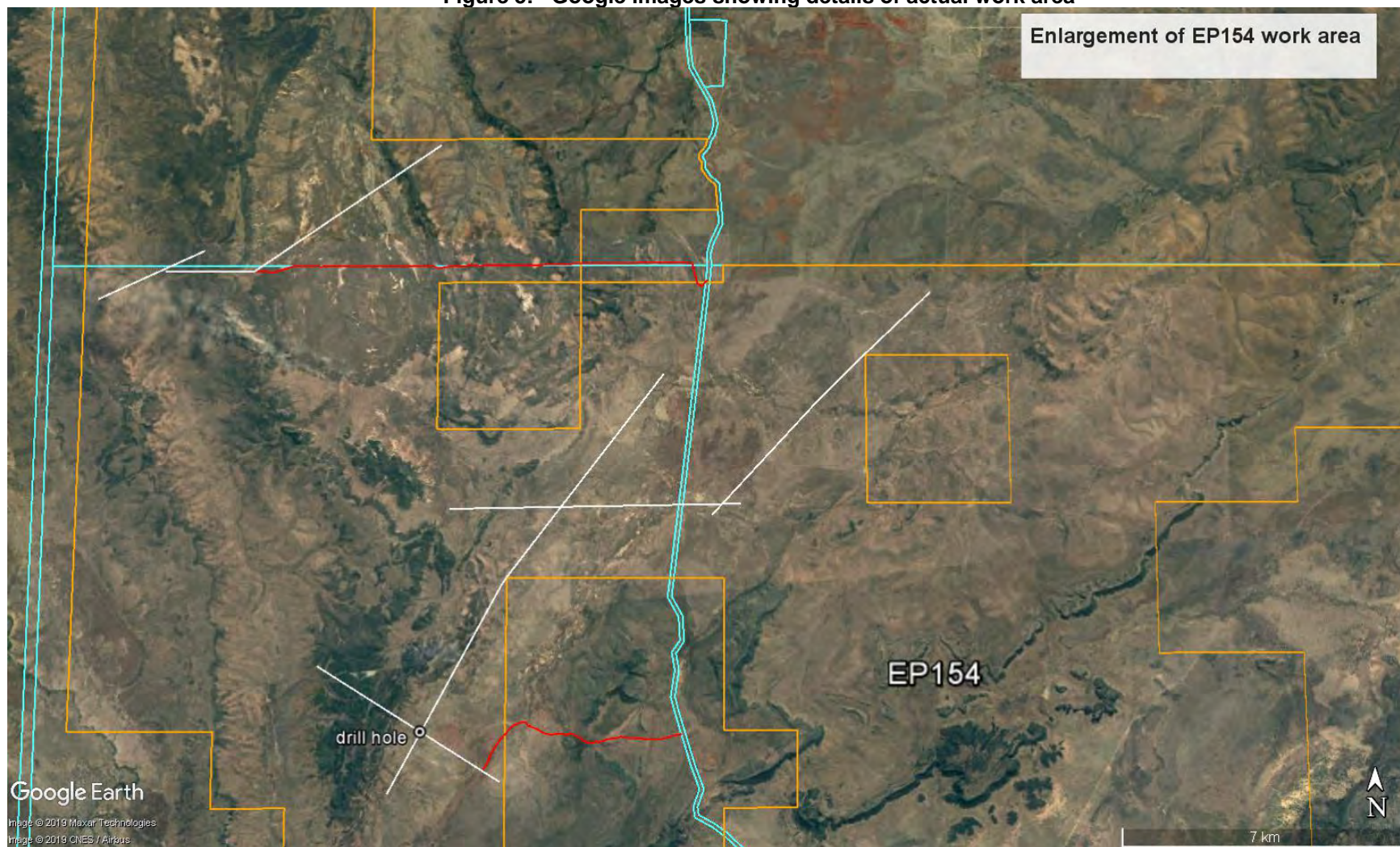
Figure 4: Google image of the overall region of the work area showing land trust boundaries



Blue lines = Land Trust areas. White lines= seismic lines planned. Red lines=existing access tracks. Orange lines=EP154 boundaries

NLC-EP154-MAPL001-Rev_7

Figure 5: Google images showing details of actual work area



Blue lines =Land Trust boundaries. white lines = seismic lines planned. Red line = existing access tracks. Orange lines =EP154 boundaries.

NLC-EP154-MAPL001-Rev_7

4. Details of planned work programs

Prior to commencing any exploration work, Minerals Australia must submit and Environmental Management Plan (EMP) to the NT government. The EMP must include a weed survey, an ecological survey (rare or endangered fauna and flora species) and an archaeological survey (separate from NLC significant site surveys).

The findings of these surveys will be implemented and managed by Minerals Australia to minimise non-mandatory risk to a level as low as reasonably practical (ALARP) and acceptable.

4.1 Seismic survey

The EMP for EP154 will be completed by November 2023 and hopefully approved by the EPA in December.

The NLC must complete sacred site and cultural heritage (anthropological) surveys on behalf of the Traditional Owners and an Authority Certificate issued by the AAPA.

Exploration can only commence when all the necessary approvals have been obtained from the NLC, AAPA, DENR, the EPA and the DPIR).

Activities associated with the seismic operations to be undertaken are as follows;

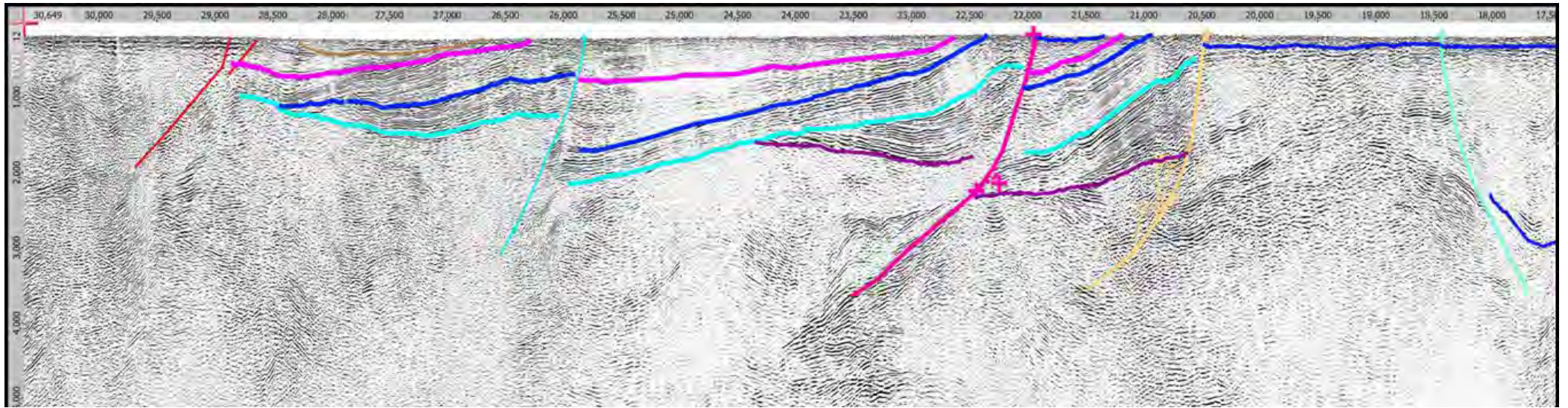
- Access track surveying and up-grading;
Access for seismic lines and the drill hole is via the Roper Highway then along existing station tracks off the Hodgson River road. The access tracks shown in Figures 3,4 & 5 are existing tracks. The northern track is along a fence line and the southern track accesses a station dam. A previously selected access track shown on the 250,000 topographic map in Figure 3, appears to erroneously located and no evidence of it can be seen on satellite imagery.
- All up-grading of access tracks to comply strictly with DENR (February 2019) "Land Clearing Guidelines".
- All of the seismic lines planned are new lines which may require clearing. Aboriginal consultants will monitor all clearing operations where such contractors are both available and cost competitive local aboriginal contractors will be involved in clearing and rehabilitation activities.
- Seismic recording operations.
- Establishment and operation of camp site and provision of associated supplies on Flying Fox pastoral lease.
- recording operations.
- up hole drilling and logging (during or after recording phase, as and when required)
- Restoration and rehabilitation of seismic lines and drill pad.
- Monitoring of access tracks, seismic lines and drill pad restoration (after completion of recording and up hole drilling / logging) 6 months after completion.
- The seismic survey crew will number approximately 30 and will work 12 hour days. The survey will take approximately 5-7 days.
- The seismic survey is 20-30 km northwest of Minyerri and will have minimal, if any impact on that community.

Seismic Methodology

(Extracted with permission from Santos Ltd "ExplorationPermit-161, 2D Seismic Exploration Survey, 2013 Environmental Plan Summary")

Seismic acquisition allows the exploration company to 'image' below the surface and identify areas where oil and gas deposits may have accumulated. The seismic method uses vibrator trucks as energy sources (Figure 6). The energy source creates sound (acoustic) waves, which travel through the earth and are then reflected from subsurface geological structures. The returning reflections are recorded in a digital format and relayed to a seismic data processing centre to produce a 'cross-section' of the layers of the earth's crust. This data is then interpreted to identify potential future drilling locations.

An example of seismic survey stratigraphic section and interpretation is shown below.



© Commonwealth of Australia (Geoscience Australia) 2019

From Geoscience Australia "Exploring for the Future: South Nicholson Basin Region project outcomes and sequence stratigraphy"
(Lidena Carr, Chris Southby, Paul Henson, Chris Carson, Jade Anderson, Susannah MacFarlane, Amber Jarrett, Tanya Fomin and Ross Costelloe)

Figure 6: Seismic survey vibrator truck



Seismic crew camp

For this relatively small 2D seismic survey and (drilling program) it is assumed that a single camp will be used. The camp houses the recording crew, crew management team and the recording and mechanical back-up teams. Flying Fox station has existing camp facilities (Figure 7) established prior to the moratorium imposed in 2016. The facilities and catering are provided on a commercial basis by the station and will be utilised by both the seismic contractor crew and the drilling contractor crew

Figure 7: Flying Fox station camp facilities



Environmental management – seismic survey

A brief description of the regional characteristics of the Hodgson River region, obtained from the Territory Natural Resources Management Infonet site, is provided as an appendix to this report (Hodgson River NT NRM Report).

All site activities will be conducted in compliance with the Northern Territory Government approved Environmental Management Plan to be submitted by Minerals Australia.

The environmental objectives for the 2D seismic survey proposed to be undertaken in EP154 will be managed by Minerals Australia. Any mandatory requirements will be strictly complied with. Non-mandatory risks will be managed to a level as low as reasonably practical (ALARP) and acceptable.

Objectives include management of at least;

- the visual impact of operations.
- disturbance to soil resources.
- disturbance to native vegetation and native fauna.
- avoid disturbance to sites of cultural and heritage significance.
- minimise disturbance to livestock, pastoral infrastructure and landholders.
- avoid the introduction or spread of exotic species and implement control measures as necessary.
- not generate any fires.
- disturbance to drainage patterns and avoid contamination of surface waters and shallow groundwater resources.
- rehabilitate operational areas as necessary and monitor within 6 months.

The area in which the seismic survey will be done, while remote and rough is virtually all open woodland. Clearing of lines will avoid clearing of any trees but will unavoidably involve some disturbance of low bushes and grasses. Such vegetation will regenerate quickly after appropriate rehabilitation of the cleared lines.

Cultural heritage

At least two appropriate cultural monitors will be engaged to brief the seismic crew on local Aboriginal culture prior to commencement of the survey. They will also be engaged to accompany company representatives, contractors and other approved persons at all times during all exploration activities within EP154 and to ensure that any previously unidentified significant sites are not disturbed.

Use of Aboriginal contractors

Seismic line clearing operation will employ appropriately experienced local earthmoving contractors who will employ local Aboriginal plant operators where possible.

While the contractors cannot be identified at this early stage of planning, one such contractor is MS Contracting run by Mark Sullivan, the previous owner of Flying Fox station on the Roper Highway to the north of Minyerri. They claim to have good working relationships with local Aboriginal groups and do/will employ suitable local Aboriginal plant operators for line clearing operations.

4.2 Stratigraphic core drilling

As described in section 4 above, prior to commencing any exploration work, Minerals Australia must submit and Environmental Management Plan (EMP) to the NT government. The EMP must include a weed survey, an ecological survey (rare or endangered fauna and flora species) and an archaeological survey (separate from NLC significant site surveys).

The environmental objectives for the stratigraphic drilling proposed to be undertaken in EP154 will be managed by Minerals Australia. Any mandatory requirements will be strictly complied with. Non-mandatory risks will be managed to a level as low as reasonably practical (ALARP) and acceptable.

All activities associated with the drilling program will comply with;

- DENR (May 2019) “Code of Practice: Onshore Petroleum Activities in the Northern Territory” (Part A- Surface activities).
- DENR (February 2019) “Land Clearing Guidelines”
- NT Petroleum Act and Regulations (2016)
- DIPR Guideline- Applications for Drilling or Workover Rig activities
- The requirements of the EMP to be submitted by Minerals Australia for approval.

The location of the planned drill hole is shown in Figures 3,4 and 5. The hole is to obtain only stratigraphic information and no hydraulic fracturing will be done in this program. No chemical specific to hydraulic fracturing will thus be used.

Drilling operations will use only water and industry-standard drilling muds. The well will be fully cased with casing cemented to ensure no interaction between the well and surrounding ground. Water or mud drilling will be carried out in the top 100-200m and core drilling will be carried out through the prospective shale formations to obtain samples for physical and chemical analyses.

Figure 8 shows a DPRI-compliant drill rig suitable to be used for cored stratigraphic drill holes. Because the planned holes are for shale gas exploration purposes, the DPRI Petroleum Operations branch requires that the drill rig be fully compliant with oil and gas drilling regulations.

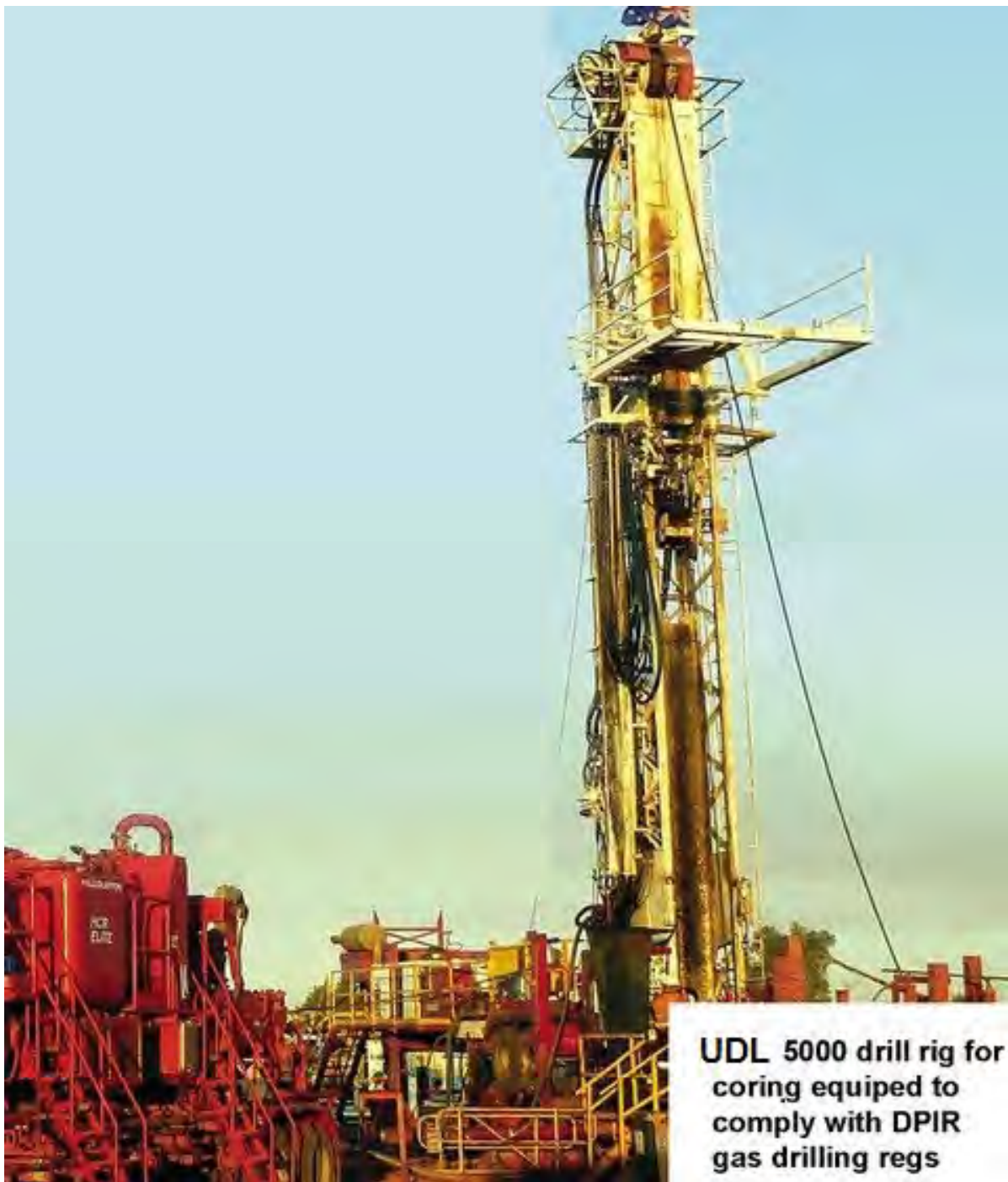
The drill hole is located approximately 20km northwest of Minyerri and drilling operations will have minimal, if any impact on that community.

Activities associated with the drilling of stratigraphic core holes include;

- Obtain necessary approvals from the NLC, AAPA, DENR and NT DPRI (Petroleum Operations).
- Operations to be in compliance with any mandatory requirements. Non-mandatory risks will be managed to a level as low as reasonably practical (ALARP) and acceptable.
- Utilise drilling-operations camp located off EP154 on Flying Fox station.
- Clear access for drilling equipment. For the planned hole shown in Figures 3,4 & 5 this will probably involve some clearing of vegetation for suitable, safe accessibility.
- Prepare drill pads for the size of rig shown in Figure 8. The pads will be cleared over a minimum of 100m x 100m as required by the DPRI for safe operations.

- All ancillary drilling requirements are incorporated with the rig on the drill pad.
- Drilling operations on day and night shifts with a crew of approximately 20.
- Drilling will take 4-6 weeks to complete.
- Down-hole geophysical logging and hole completion. Holes to be plugged and sealed.
- Site rehabilitation and on-going monitoring.

Figure 8: DPIP-compliant drilling rig for stratigraphic core drilling



For DPIP-compliant drill rigs as shown in Figure 8 a pad approximately 100m x100m in area is required. Two sumps are excavated to contain drilling water/fluids, one for fluids

only. The drilling fluids consist of industry-standard, non-toxic and biodegradable water-bentonite mixtures to facilitate the lifting of drill cutting from the hole. On completion, if certification cannot be obtained for on-site disposal, then this waste will be transported using a licensed transporter and disposed of at a licensed facility.

There is no viable source of adequate water in the planned work area. Water for drilling will be obtained from Flying Fox station. On completion of drilling the sumps will be backfilled and any remaining drilling fluids disposed of in a station rubbish disposal site where they will dry and degrade. The drill hole will take approximately 4 weeks to complete.

Drillers camp setup

The camp will utilise the same camp facilities as is the seismic crew camp on Flying Fox station. The camp houses all of the personnel required to operate the drill rig. Because of the special equipment required to operate the rig approximately 20-30 drill contractor employees and hydrocarbon specialists will be on site.

Environmental management – drilling operations

An Environmental Management Plan for the drilling program must be prepared including a Weed Management plan, ecological survey (rare and endangered faunal and floral species) and archaeological survey, and approved by the NT DENR and Minister for Environment under the NT environmental legislation. It is expected that the EMP will be approved in November 2019.

Environmental objectives for the stratigraphic drilling proposed to be undertaken in EP154 are to:

- minimise the visual impact of operations.
- minimise disturbance to soil resources.
- minimise disturbance to native vegetation and native fauna.
- avoid disturbance to sites of cultural and heritage significance.
- minimise disturbance to livestock, pastoral infrastructure and landholders.
- avoid the introduction or spread of exotic species and implement control measures as necessary.
- not generate any fires.
- minimise disturbance to drainage patterns and avoid contamination of surface waters and shallow groundwater resources.
- rehabilitate operational areas as necessary.
- All of any additional requirements imposed by the DENR in their assessment of the Environmental Management Plan to be submitted for this program.

Minerals Australia will manage the implementation of all requirements detailed in the approved Environmental Management Plan.

Access tracks are existing tracks which will be up-graded for suitable vehicular access. The drill pad will be located as far as is possible on an area devoid of shrubs or bushes and accessed as far as possible by existing tracks. The planned hole will require some clearing of scrub and some ground disturbance depending on what is encountered in the field.

Any topsoil which may need to be removed for construction of the 150m x 150m pads will be stockpiled for replacement on completion of the drill holes.

All hydrocarbons used on site will be contained in a purpose-built vehicle. The only fuel used will be diesel and appropriate spill kits will be provided by the drilling contractors to clear up any spills or diesel or hydraulic fluid.

The holes will be securely capped to DPR1 requirements. The drill pads and any locally disturbed areas around the sites caused by vehicular movements will be rehabilitated by light ripping and the rehabilitation monitored.

Cultural Heritage

Two appropriate cultural monitors will be engaged to brief the drilling crew on local aboriginal culture prior to commencement of the survey. They will also be engaged to accompany company representatives, contractors and other approved persons at all times during all exploration activities within EP154 and to ensure that any previously unidentified significant sites are not disturbed.

If both safe and practical a suitable local aboriginal will be employed by the drilling contractor to assist with the drilling operations and site rehabilitation.

5. FIRE AND WEED MANAGEMENT

These procedures will be in strict compliance with the DENR (May 2019) "Code of Practice: Onshore Petroleum Activities in the Northern Territory" (Part A- Surface activities).

Appropriate vehicle wash-down facilities will be established on Flying Fox station.

5.1 Fire control

At all times during the clearing of seismic lines and the conduct of the seismic survey an appropriately equipped fire tender will accompany and be available to the operating crew to extinguish any fire accidentally started by plant and equipment. If feasible and practical a local aboriginal contractor may be employed to provide the appropriate fire tender vehicle.

All operating plant and equipment will also have individual fire extinguishers.

5.2 Weed control

As required by new environmental regulations a weed survey will be completed as part of the Environmental Management Plan to be approved by the DENR.

All light vehicles and plant and equipment entering the area of EP154 and/or non-consent ALRA land will be appropriately washed down and inspected at a dedicated off-site facility, including a liquid collection pit prior to entry to the ALRA land. Any vehicle or plant which leaves the ALRA land area and returns at a later date will be re-washed down prior to return.

6. ABORIGINAL EMPLOYMENT, TRAINING AND BUSINESS

The planned work program involves highly specialised personnel performing very specific operations related to seismic acquisition and stratigraphic drilling over a relatively short time. Thus at this stage of exploration there is only limited scope to involve potential local aboriginal employment in other than operational monitoring roles described previously above.

Seismic and drilling contractors will be required to give due consideration to employing aboriginal workers in any temporary labouring roles during the program.

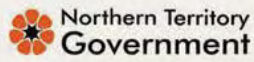
If exploration proceeds to the next stage after 2020, involving more extensive seismic and drilling operations Minerals Australia will initiate appropriate training programs so that local aboriginals will obtain sufficient qualification to be employed on a longer-term basis. The training programs will be developed in cooperation with the NLC and the NT government.

Contractors to the project post-2020 will be required to employ suitably qualified locals if they are available.

7. ESTIMATED COST OF WORK PROGRAMME



APPENDIX: NT NRM Report Hodgson River District



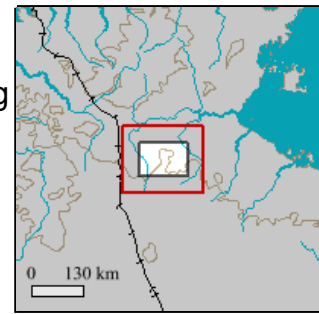
NT NRM Report



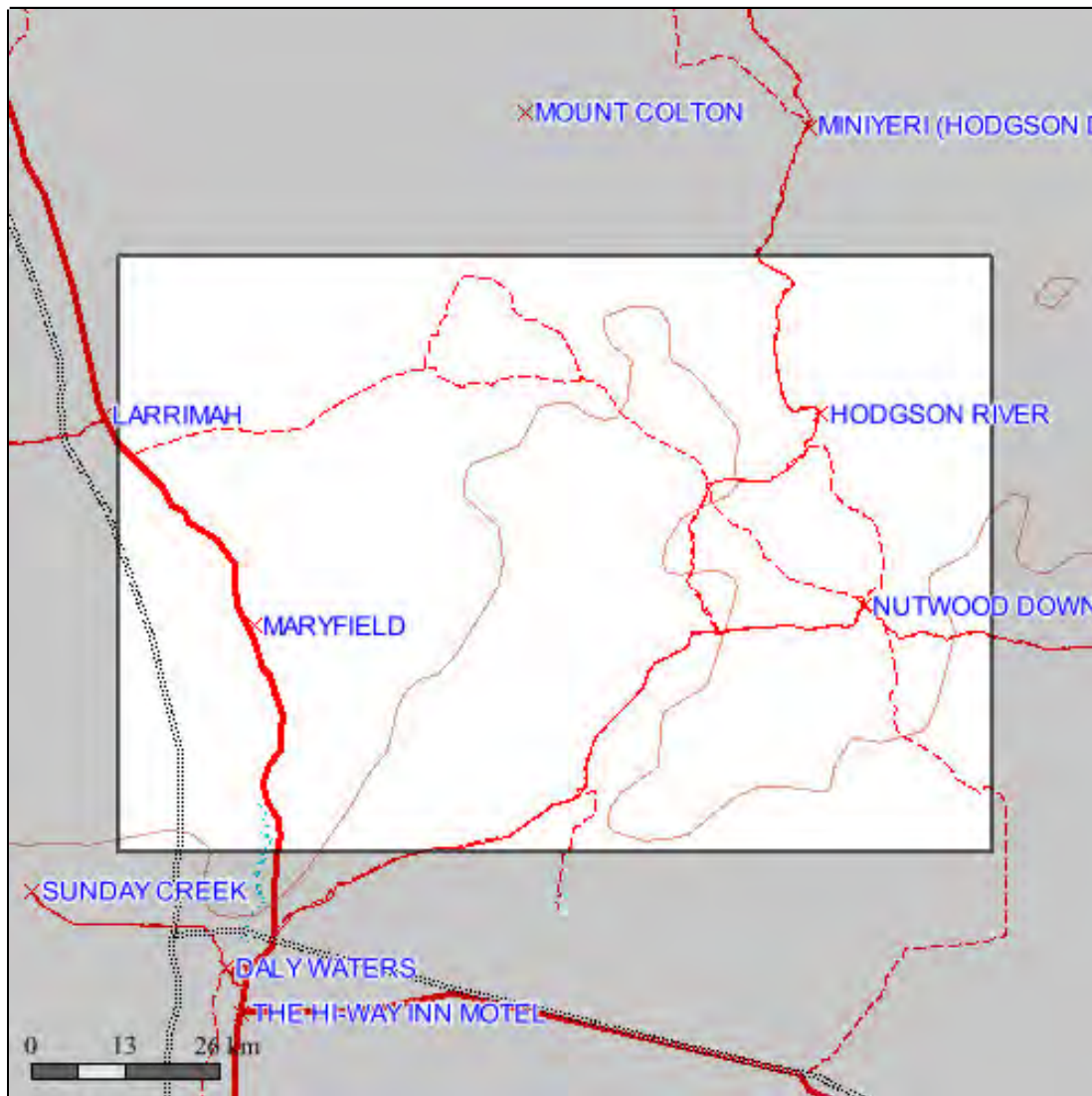
Custom area

Custom area encompasses an area of 9301.8 sq km extending from 15 deg 22.0 min to 16 deg 6.0 min S and 133 deg 14.0 min to 134 deg 18.0 min E.

Custom area is located in the Gulf Fall and Uplands, Sturt Plateau, bioregion(s)



Location of Custom area



Custom area Climate

The closest long-term weather station is LARRIMAH (15 deg 34.0 min S, 133.2138E) 62 km W of the center of selected area

Statistics

Mean max temp (deg C)
 Mean min temp (deg C)
 Average rainfall (mm)
 Average days of rain

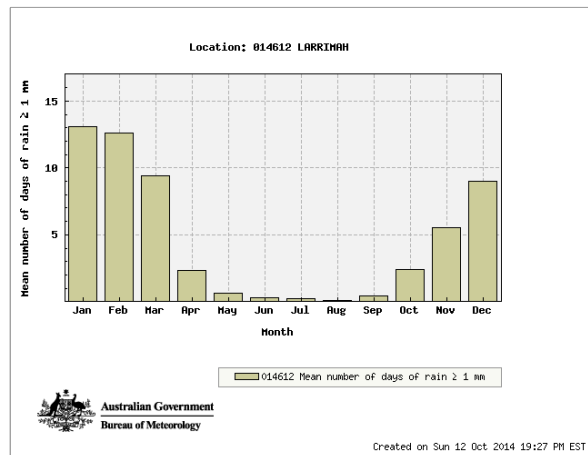
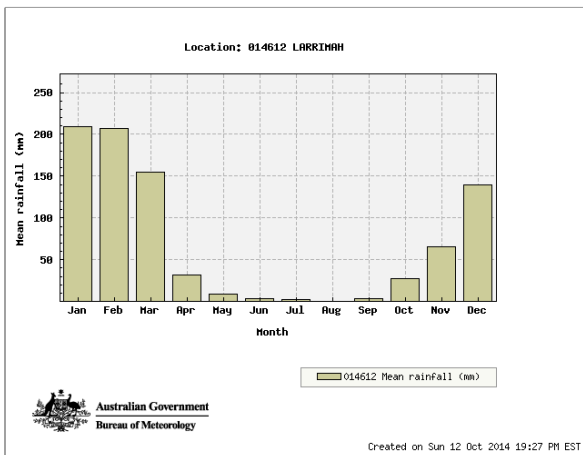
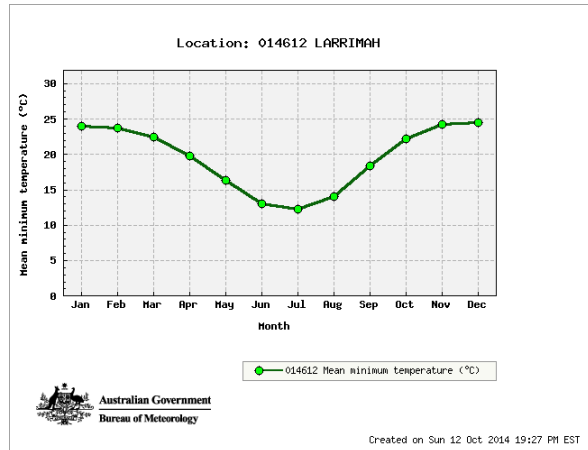
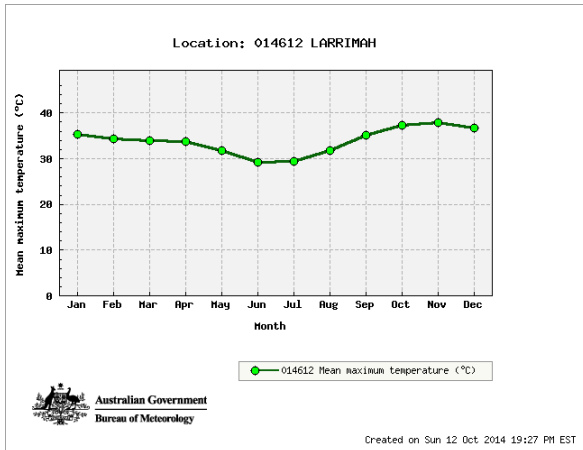
Annual Values

33.9
 19.6
 862.9
 55.9

Years of record

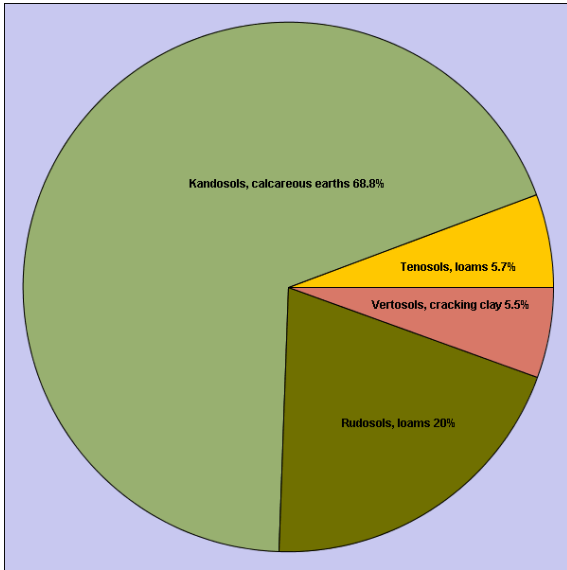
47
 47
 60
 60

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



Custom area Soils

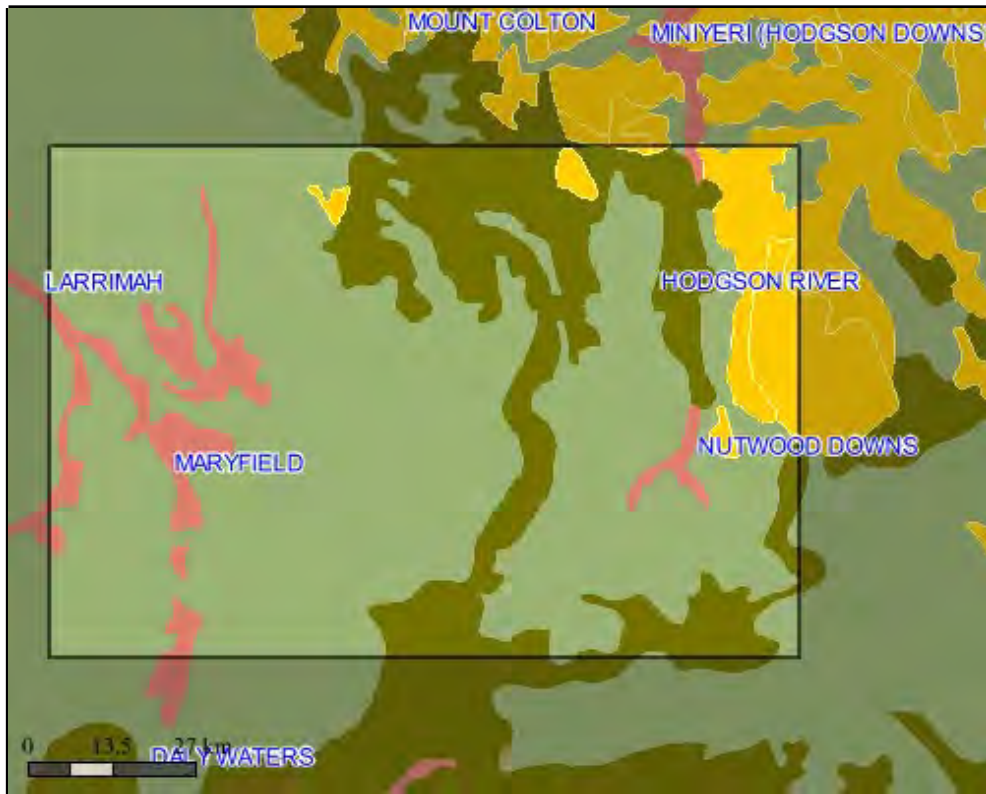
Soil Types



Area of soil types (Northcote Factual Key)

Category	Area sq km	Area%
Kandosols, calcareous earths	6400.83	68.81
Rudosols, loams	1858.20	19.98
Tenosols, loams	527.09	5.67
Vertosols, cracking clay	515.69	5.54

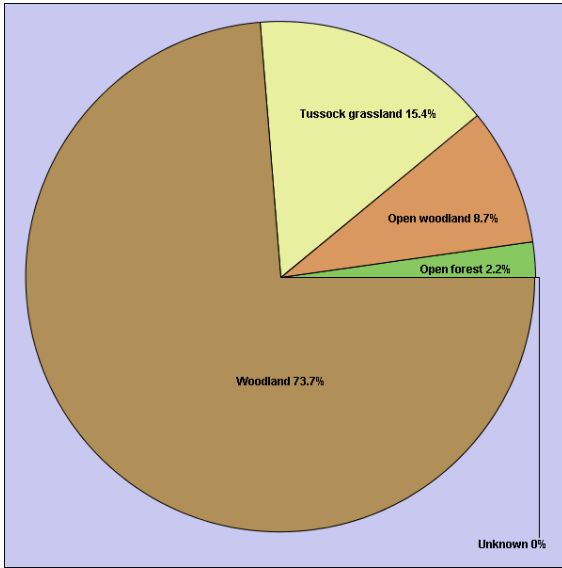
Soil Types



Soils 1:2M Layer is a copy of the NT portion (1:2,000,000 scale dataset) of the CSIRO Atlas of Australian Soils - K.H. Northcote et al. Data scale: 1:2,000,000 ANZLIC Identifier: 2DBC771205D06B6E040CD9B0F274EFE
 More details: Go to www.lrm.nt.gov.au/nrrmapsnt/ and enter the ANZLIC identifier in the Spatial Data Search

Custom area Vegetation

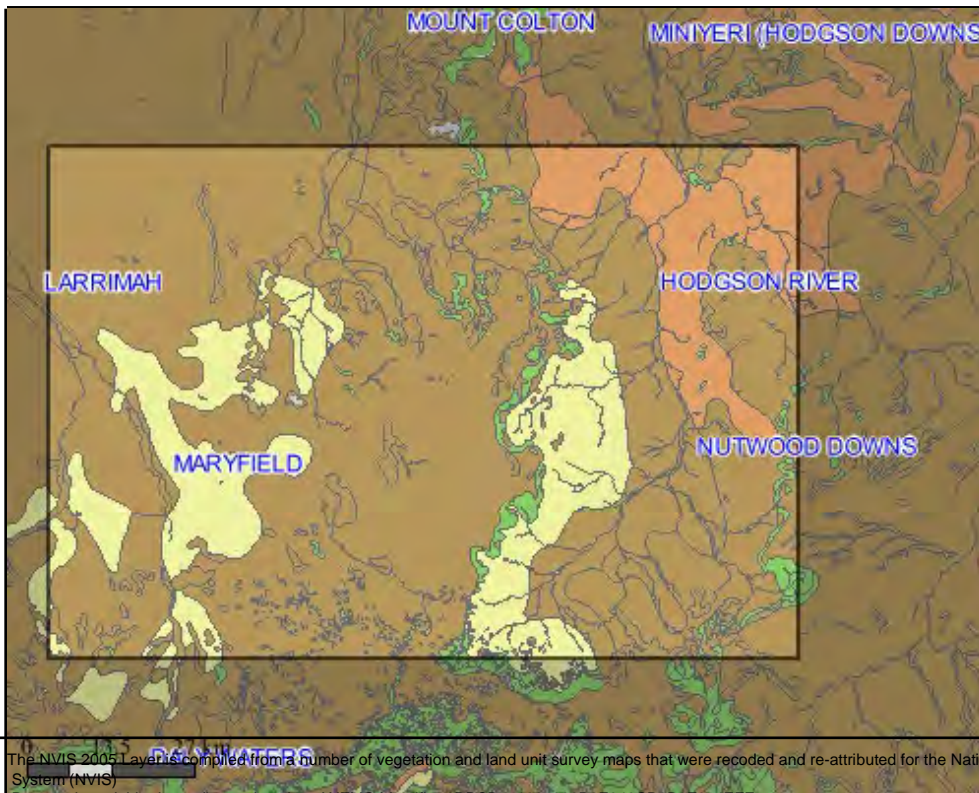
Vegetation Communities



Area of vegetation communities

Category	Area sq km	Area%
Woodland	6856.04	73.71
Tussock grassland	1430.66	15.38
Open woodland	806.42	8.67
Open forest	206.68	2.22
Unknown	1.99	.02

Vegetation Communities

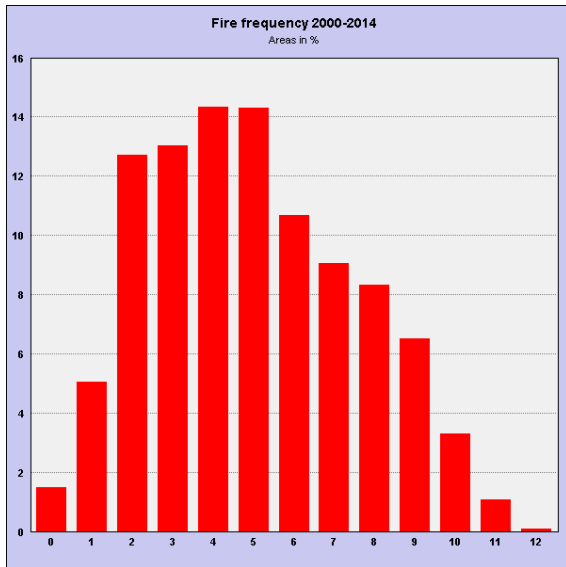


The NVIS 20051 layer is compiled from a number of vegetation and land unit survey maps that were recorded and re-attributed for the National Vegetation Information System (NVIS).

Data scale variable depending on location. ANZLIC Identifier 2DBCB771207006B8E640CD9B0F274EFE
 More details: Go to www.irm.nt.gov.au/nrmapsnt/ and enter the ANZLIC identifier in the Spatial Data Search

Custom area Fire History

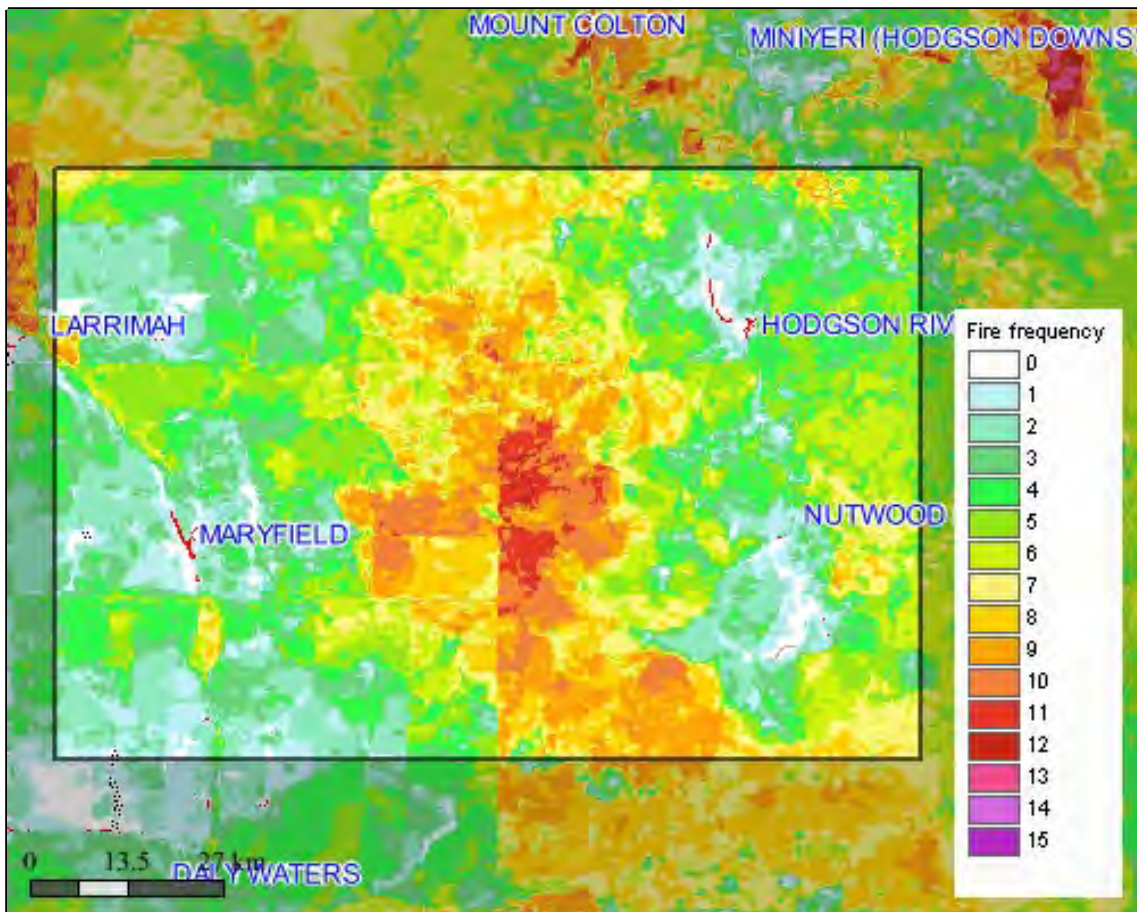
Years burnt 2000-2014



and area burnt in each category

Category	Area sq km	Area%
0	138.86	1.49
1	470.50	5.06
2	1182.09	12.71
3	1212.67	13.04
4	1333.74	14.34
5	1330.31	14.30
6	995.11	10.70
7	842.71	9.06
8	773.84	8.32
9	605.15	6.51
10	306.27	3.29
11	101.49	1.09
12	9.07	.10

Years burnt 2000-2014



The fire frequency(250m) Layer is derived from satellite imagery sourced from the Moderate Resolution Imaging Spectroradiometer (MODIS) on the NASA Terra satellite
Spatial Resolution: 250m x 250m pixels (at Nadir).

Custom area Threatened Species



Threatened species recorded in Custom area (Records Updated: Sept 2013)

Group	Common Name	Scientific Name	NT	National	ID	#Observations (Latest)	#Specimens (Latest)	#Surveys (Latest)
			Status	Status				
Reptiles	Yellow-spotted Monitor	<i>Varanus panoptes</i>	VU	.	347307	0 (Unknown)	1 (1977)	0 (Unknown)
Birds	Grey Falcon	<i>Falco hypoleucos</i>	VU	.	.	1 (2000)	0 (Unknown)	0 (Unknown)
Birds	Australian Painted Snipe	<i>Rostratula australis</i>	VU	EN	246428	1 (2001)	0 (Unknown)	0 (Unknown)
Birds	Crested Shrike-tit	<i>Falcunculus frontatus</i>	.	VU	176377	3 (1999)	0 (Unknown)	0 (Unknown)
Birds	Gouldian Finch	<i>Erythrura gouldiae</i>	VU	EN	176370	5 (2000)	0 (Unknown)	2 (2002)

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

Survey = this category refers to data collected using systematic survey methodology
 Specimen = this category refers to museum or other records where a specimen has been collected and lodged
 Observation = this category refers to all other incidental recordings where systematic methodology may not have been used consistently.

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

Custom area Threatened Species Grid



Threatened species recorded in the grid cell(s) in which Custom area occurs (Records Updated: Sept 2013)

Group	Family Name	Scientific Name	Common Name	NT Status	National Status	#Observations	Latest Observation Date	#Specimens	Latest Specimen Date	#Surveys	Latest Survey Record
Reptiles	Varanidae	<i>Varanus mertensi</i>	Mertens' Water Monitor	VU		3	1993	0	Unknown	1	1993
Reptiles	Varanidae	<i>Varanus panoptes</i>	Yellow-spotted Monitor	VU		0	Unknown	1	1977	0	Unknown
Birds	Columbidae	<i>Geophaps smithii</i>	Partridge Pigeon	VU	VU	0	Unknown	1	1898	0	Unknown
Birds	Falconidae	<i>Falco hypoleucos</i>	Grey Falcon	VU		4	2008	0	Unknown	0	Unknown
Birds	Rostratulidae	<i>Rostratula australis</i>	Australian Painted Snipe	VU	EN	2	2001	0	Unknown	0	Unknown
Birds	Meliphagidae	<i>Grantiella picta</i>	Painted Honeyeater	VU		1	2001	0	Unknown	0	Unknown
Birds	Pachycephalidae	<i>Falcunculus frontatus</i>	Crested Shrike-tit		VU	19	2009	0	Unknown	0	Unknown
Birds	Estrildidae	<i>Erythrura gouldiae</i>	Gouldian Finch	VU	EN	23	2006	0	Unknown	3	2002
Mammals	Dasyuridae	<i>Dasyurus hallucatus</i>	Northern Quoll	CR	EN	1	Unknown	1	Unknown	0	Unknown
Mammals	Dasyuridae	<i>Pseudantechinus mimulus</i>	Carpentarian Antechinus		VU	0	Unknown	1	1987	0	Unknown
Mammals	Thylacomyidae	<i>Macrotis lagotis</i>	Greater Bilby	VU	VU	1	1930	0	Unknown	0	Unknown
Mammals	Muridae	<i>Rattus tunneyi</i>	Pale Field-rat	VU		0	Unknown	2	1999	0	Unknown

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

Survey = this category refers to data collected using systematic survey methodology
 Specimen = this category refers to museum or other records where a specimen has been collected and lodged
 Observation = this category refers to all other incidental recordings where systematic methodology may not have been used consistently.

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

Custom area Weeds and Potential Weeds



Introduced plants recorded in the grid cell(s) in which Custom area occurs and that have been identified as problem weeds in one or more locations in northern Australia. Occurrence based on Northern Territory Government databases.

Family Name	Scientific Name	Common Name	NT Status	National Status	Other Status	#Surveys	Latest Record
Amaranthaceae	<i>Alternanthera pungens</i>	Khaki Weed	B C		DEU NSW SA	0	Unknown
Poaceae	<i>Bothriochloa pertusa</i>	Indian Bluegrass			DEU	0	Unknown
Apocynaceae	<i>Calotropis procera</i>	Rubber Bush	B C (S of 16 5 deg S)		WA1 WA2 G&M	0	Unknown
Poaceae	<i>Cenchrus ciliaris</i>	Buffel Grass			MP Gr G&M DEU	0	Unknown
Cucurbitaceae	<i>Cucumis melo</i>	Ulcardo Melon			DEU	16	2001
Solanaceae	<i>Datura ferox</i>	Fierce Thornapple	A C		WA1 WA3 WA4 G&M	0	Unknown
Poaceae	<i>Echinochloa colona</i>	Awnless Barnyard Grass			DEU	7	1999
Amaranthaceae	<i>Gomphrena celosioides</i>	Gomphrena Weed			DEU	0	Unknown
Lamiaceae	<i>Hyptis suaveolens</i>	Hyptis	B C		G&M	2	2001
Euphorbiaceae	<i>Jatropha gossypifolia</i>	Bellyache Bush	B C	WONS	K2 WA1 WA4 Q2 C&E G&M CYP DEU	0	Unknown
Fabaceae	<i>Macroptilium atropurpureum</i>	Siratro			C&E	0	Unknown
Malvaceae	<i>Malvastrum americanum</i>	Spiked Malvastrum			DEU	2	1999
Malvaceae	<i>Malvastrum coromandelianum</i>	Prickly Malvastrum			DEU	1	1995
Asteraceae	<i>Parthenium hysterophorus</i>	Parthenium Weed	A C	WONS	MP K0 WA1 WA2 Q2 CYP DEU NSW SA	0	Unknown
Verbenaceae	<i>Phyla nodiflora var. nodiflora</i>	Lippia			G&M NSW	2	1999
Combretaceae	<i>Quisqualis indica</i>	Rangoon Creeper			C&E	0	Unknown
Plantaginaceae	<i>Scoparia dulcis</i>	Bitter Broom			DEU	0	Unknown
Malvaceae	<i>Sida cordifolia</i>	Flannel Weed	B C		WA1 G&M DEU	0	Unknown
Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne	B C		MP G&M DEU	0	Unknown
Malvaceae	<i>Sida spinosa</i>	Spiny Sida			DEU	16	2001
Poaceae	<i>Sorghum almum</i>	Columbus Grass			NSW	0	Unknown
Fabaceae	<i>Stylosanthes hamata</i>	Caribbean Stylo			DEU	1	2009
Zygophyllaceae	<i>Tribulus terrestris</i>	Caltrop	B C		CYP SA	0	Unknown
Poaceae	<i>Urochloa mosambicensis</i>	Sabi Grass			DEU	0	Unknown
Fabaceae	<i>Vachellia farnesiana</i>	Sweet Acacia			DEU	2	1999
Asteraceae	<i>Xanthium strumarium</i>	Noogoora Burr	B C		MP WA1 WA2 WA4 DEU NSW SA	0	Unknown

Status Codes:

1. NATIONAL STATUS CODES

Alert, Alert List for Environmental Weeds (Please call Exotic Plant Pest Hotline 1800 084 881 if you think you have seen this weed)

Sleeper, National Sleeper Weed

Target, Targeted for eradication. (www.landmanager.com.au/view/index.aspx?id=449837)

WONS, Weeds of National Significance

2. NT STATUS CODES

A, NT Class A Weed (to be eradicated)

B, NT Class B Weed (growth & spread to be controlled)

C, NT Class C Weed (not to be introduced) (www.landmanager.com.au/view/index.aspx?id=449869)

3. OTHER STATUS CODES

C&E, Csurhes, S. & Edwards, R. (1998) Potential Environmental Weeds in Australia. Candidate Species for Preventative Control. Environment Australia, Canberra (www.landmanager.com.au/view/index.aspx?id=394504)

CYP, Draft Cape York Peninsula Pest Management Plan 2006-2011 (www.landmanager.com.au/view/index.aspx?id=371200)

DEU, Plants listed as environmental weeds by the Desert Uplands Strategic Land Resource

Assessment (www.landmanager.com.au/view/index.aspx?id=332123)

G&M, Grice AC, Martin TG. 2005. The Management of Weeds and Their Impact on Biodiversity in the Rangelands. Cooperative Research Centre (CRC) for Australian Weed Management and CSIRO Sustainable Ecosystems. Commonwealth Australia (www.landmanager.com.au/view/index.aspx?id=163572)

Gr, Groves et al. 2003. Weed categories for natural and agricultural ecosystem management. Bureau of

Rural Sciences (www.landmanager.com.au/view/index.aspx?id=388018)

K0, High Priority Weeds not yet established in the Katherine region

K1, High Priority Weeds posing environmental threats in the Katherine region

K2, High Priority Weeds posing existing threats in the Katherine region, as described in the Katherine Regional Weed Management Strategy 2005-2010 (www.landmanager.com.au/view/index.aspx?id=130286)

MP, Northern Territory Parks & Conservation Masterplan (www.landmanager.com.au/view/index.aspx?id=144141)

NAQS, North Australian Quarantine Strategy Target List (www.landmanager.com.au/view/index.aspx?id=449416)

NSW, Declared Noxious Weed in NSW (www.landmanager.com.au/view/index.aspx?id=449983)

Q1, QLD Class 1 Weed (not to be introduced, kept or supplied)

Q2, Class 2 Weed (eradicate where possible, not to be introduced, kept or supplied)

Q3, Qld Class 3 Weed (to be controlled near environmentally sensitive areas- not to be supplied/sold without a permit) (www.landmanager.com.au/view/index.aspx?id=190714)

SA, Declared Plant in South Australia (www.landmanager.com.au/view/index.aspx?id=449996)

WeedsAus, Listed as a significant weed by Weeds Australia (www.landmanager.com.au/view/index.aspx?id=14576)

WA1, WA Weed Class P1 (movement prohibited)

WA2, WA Weed Class P2 (aim to eradicate)

WA3, WA Weed Class P3 (control infestations)

WA4, WA Weed Class P4 (prevent spread)

WA5, WA Weed Class P3 (control infestations on public land) (www.landmanager.com.au/view/index.aspx?id=449884).

Survey = this category refers to data collected using systematic survey methodology

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Observation = this category refers to all other incidental recordings where systematic methodology may not have been used consistently.

More species info: Go to www.landmanager.org.au/view/index.aspx?id=####

where #### is the ID number from the tables above for the species of interest.

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

Custom area Pest and Potential Pest Animals



Animals with pest potential recorded in the grid cell(s) in which Custom area occurs. Occurrence based on Northern Territory Government databases.

Common Name	Scientific Name	NT Status	National Status	ID	#Observations (Latest)	#Specimens (Latest)	#Surveys (Latest)
Cane Toad	<i>Rhinella marina</i>	P	.	183252	4 (2009)	1 (1999)	4 (2005)
Asian House Gecko	<i>Hemidactylus frenatus</i>	P	.	188964	2 (1989)	2 (1989)	0 (Unknown)
Red-tailed Black-cockatoo	<i>Calyptrorhynchus banksii macrorhynchus</i>	N	.	223765	122 (2008)	3 (1992)	4 (1999)
Sulphur-Crested Cockatoo	<i>Cacatua galerita</i>	N	.	223772	28 (2001)	0 (Unknown)	1 (2005)
Agile Wallaby	<i>Macropus agilis</i>	N	.	223786	7 (2000)	1 (1996)	2 (2000)
Black Rat	<i>Rattus rattus</i>	P	.	183236	0 (Unknown)	2 (1999)	1 (1996)
Dingo / Wild dog	<i>Canis lupus</i>	N	.	183280	10 (1999)	11 (1973)	5 (1993)
Cat	<i>Felis catus</i>	P	.	183259	4 (2000)	0 (Unknown)	2 (1993)
Donkey	<i>Equus asinus</i>	P	.	183287	1 (1999)	0 (Unknown)	1 (1999)
Horse	<i>Equus caballus</i>	P	.	183315	1 (1987)	0 (Unknown)	0 (Unknown)
Pig	<i>Sus scrofa</i>	P	.	183329	1 (1983)	0 (Unknown)	0 (Unknown)
Swamp Buffalo	<i>Bubalus bubalis</i>	P	.	183245	3 (2001)	0 (Unknown)	0 (Unknown)
Cattle	<i>Bos taurus</i>	P	.	183266	6 (1999)	0 (Unknown)	3 (1993)

NT STATUS CODES:

Int, Introduced species (all non-prohibited vertebrates, and all other exotic species (www.landmanager.com.au/view/index.aspx?id=280771))

N, Native species with pest potential.

P, Prohibited species (all exotic vertebrates except those listed as non-prohibited (www.landmanager.com.au/view/index.aspx?id=450509))

Survey = this category refers to data collected using systematic survey methodology

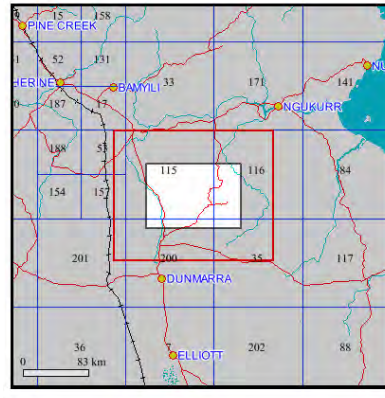
Specimen = this category refers to museum or other records where a specimen has been collected and lodged

Observation = this category refers to all other incidental recordings where systematic methodology may not have been used consistently.

More species info: Go to www.landmanager.org.au/view/index.aspx?id=####

where #### is the ID number from the tables above for the species of interest.

Potential pest animals listed in the table above were recorded from all the grid cells shown below (red/blue line) that overlap Custom area



Generated from NT Infonet (<http://www.infonet.org.au>) Wed Jun 24 14:40:00 CST 2015

Soils and vegetation graphs and tables refer to area of soils and vegetation only. Fire graphs and tables refer to entire selected area including sea if present. Calculations are derived from map images or vector data, and should be taken as a guide only. Accuracy cannot be guaranteed. For small areas, figures should be rounded to the nearest whole number.

From: [REDACTED]
Subject: RE: EP154 and 144
Date: Friday, 5 August 2022 2:59:00 PM

Thank you Michael. We will just have to wait and see what develops after the EMP process
Regards
Peter

From: Michael Egan [REDACTED]
Sent: Friday, 5 August 2022 2:54 PM
To: Peter Collings <[REDACTED]>
Cc: Greg McDonald <[REDACTED]>
Subject: RE: EP154 and 144

Hello Peter

To summarise, according to the *Work Programs and Sacred Site Avoidance Surveys / Work Programs and Site Clearances* (as relevant) clauses of the exploration agreements (Clause 6 for EP144 and EP153 and Clause 17 for EP154), no on-ground exploration or development activity may be undertaken:

- Without first holding work program meetings to describe the planned work to the Native Title Parties or Traditional Owners and
- Without a sacred site survey having been conducted.

The terms of the agreements make it possible for these sacred site surveys to be conducted either by the NLC or by the AAPA. Since the Pepper Inquiry an AAPA Authority Certificate is required in either case (based on either the NLC or the AAPA survey as appropriate).

The agreements for EP144 and EP153 do not specifically mention 'approval'. In the case of EP154, Clause 17.1 of the agreement states:

'The Company must only undertake such Exploration and Development activities on any part of the Permit Area that are included in a Work Program provided to the Land Council in accordance with this clause 17 and *either* approved by the Land Council in accordance with this clause 17 *or the subject of an Authority Certificate.*' (emphasis added).

The proposed EP154 work program is subject to an Authority Certificate so the terms of clause 17 which refer to 'approval' by the NLC (related to site surveys) are covered by the existing Authority Certificate (see also Clauses 17.9 and 17.12). The proposed EP144 work program is also covered by an existing Authority Certificate.

As previously confirmed, work program meetings in accordance with the agreements were held for EP154 in Minyerri in October 2019 and for EP144 in Tennant Creek in May 2021.

I hope that this is of assistance.

Regards

Michael Egan

Manager Petroleum Unit
Resources & Energy Branch
Northern Land Council



Moonta House – 43 Mitchell St (level 2), Darwin NT 0800
GPO Box 1222, Darwin NT 0801
Mobile Number: [REDACTED] | Office Number: (08) 8980 1919
Email: [REDACTED] | Website: www.nlc.org.au

From: Peter Collings [[mailto:\[REDACTED\]](mailto:[REDACTED])]
Sent: Tuesday, 26 July 2022 5:32 PM
To: Michael Egan <[REDACTED]>
Cc: Greg McDonald <[REDACTED]>
Subject: RE: EP154 and 144

Michael

This is in the very unexplained area of the approvals process. If you can please send me a fairly self-explanatory email describing the NLC approval process and AAPA involvement then that will at least give me something to produce when/if asked by some, so far unidentified, asks for it. I assume the NLC will get input to the EMP approval so the exploration program approval process may be appropriate at that time.

Regards
Peter

From: Michael Egan <[REDACTED]>
Sent: Tuesday, 19 July 2022 1:55 PM
To: Peter Collings <[REDACTED]>
Subject: Re: EP154 and 144

Thanks Peter

Mike

Sent from my iPhone

On 19 Jul 2022, at 3:16 pm, Peter Collings
[REDACTED] wrote:

Michael
I will have to follow up with the relevant “authority” to find out what is actually

require4d. I will get back to you because the approvals process is not particularly self-explanatory.

Regards
Peter

From: Michael Egan <[REDACTED]>
Sent: Monday, 18 July 2022 9:44 AM
To: Peter Collings <[REDACTED]>
Cc: Isabel Smith <[REDACTED]>
Subject: RE: EP154 and 144

Hello Peter

What format are you looking for for such correspondence? Is an email confirming that Traditional Owners were consulted and provided with details of the proposed program and given the opportunity to ask questions and provide comment sufficient?

I note that clause 17.1 of the EP154 Exploration Agreement states that:

'The Company must only undertake such Exploration and Development activities on any part of the Permit Area that are included in a Work Program provided to the Land Council in accordance with this clause 17 and either approved by the Land Council in accordance with this clause 17 or the subject of an Authority Certificate.' (emphasis added).

In the case of EP154, the work is subject to an Authority Certificate so the terms of clause 17 which refer to 'approval' by the NLC (related to site surveys) are covered by the existing Authority Certificate (see also clause 17.12).

A similar situation exists for EP144 where the sacred site survey required under clause 7 was conducted by the Aboriginal Areas Protection Authority and is subject to an Authority Certificate.

Is this sufficient for your compliance with the approval processes?

Regards

Michael Egan
Manager Petroleum Unit
Resources & Energy Branch
Northern Land Council



Moonta House – 43 Mitchell St (level 2), Darwin NT 0800

GPO Box 1222, Darwin NT 0801

Mobile Number: [REDACTED] | Office Number: (08) 8980 1919

Email: [REDACTED] | Website: www.nlc.org.au

From: Peter Collings [[mailto:\[REDACTED\]](mailto:[REDACTED])]

Sent: Monday, 11 July 2022 2:24 PM

To: Michael Egan [REDACTED]

Cc: Greg McDonald <[REDACTED]>

Subject: FW: EP154 and 144

Michael,

I have not had any response to this. Can the NLC please advise me ?

Regards

Peter

From: Peter Collings <>

Sent: Friday, 1 July 2022 11:21 AM

To: 'Michael Egan' [REDACTED]

Cc: Greg McDonald [REDACTED]

Subject: EP154 and 144

Michael

A required part of our approvals process is formal approval for our exploration programs by the NLC on behalf of the Traditional Owners. Can you please let me know when such approval may be available?

Regards

Peter

Peter Collings

Chief Geologist

Minerals Australia Pty Ltd

Hancock Prospecting Pty Ltd

Level 2, HPPL House

28-42 Ventnor Avenue

WEST PERTH WA 6005

PO Locked Bag 2

West Perth 6872

[REDACTED]
[REDACTED]

[REDACTED]

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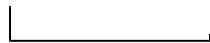
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From: [REDACTED]
Subject: RE: NLC Invoice :- IN06399 :- Weed Survey – EP144 Cultural Monitors 2021
Date: Monday, 12 July 2021 11:02:40 AM

Hello Peter

Yes, we failed to secure appropriate cultural monitors for the EP154 weed survey in time. Thank you for the advice regarding treatment of the invoiced amounts.

We did secure appropriate cultural monitors for the EP144 survey and have been in close communication with EcOz regarding the logistics for this survey. However, I have just been advised that these cultural monitors are now unavailable for this week. I have spoken with the senior Traditional Owner and discussed options and he has advised that this survey may also continue without monitors given that it is on existing roads and that the EcOz team are already on their way to the field.

I will discuss refund of both of these invoices with our finance team.

Regards

Michael Egan
Minerals and Energy
Northern Land Council



43 Mitchell St, Darwin NT 0801
GPO Box 1222, Darwin NT 0801
Mobile Number: [REDACTED] | Office Number: (08) 8980 1919
Email: [REDACTED] | Website: www.nlc.org.au

From: Peter Collings [mailto:[REDACTED]]
Sent: Monday, 12 July 2021 10:01 AM
To: Michael Egan ; Greg McDonald
Cc: Daniel Wade
Subject: RE: NLC Invoice :- IN06399 :- Weed Survey – EP144 Cultural Monitors 2021

Michael and Greg,
Based on my understanding from Jeff Richardson that no cultural monitors will be involved in the EcOz survey of EP154 I request that the paid amount invoiced(attached) be refunded to Minerals Australia. I understand that the survey will be done this week.

I also would like to know the current situation regarding monitors for the EP144 survey.

Regards
Peter

From: Account Receivable <accounts.receivable@nlc.org.au>
Sent: Friday, 18 June 2021 7:23 AM
To: Peter Collings <[REDACTED]>
Cc: Greg McDonald <[REDACTED]> Michael Egan <[REDACTED]>
Subject: NLC Invoice :- IN06399 :- Weed Survey – EP144 Cultural Monitors 2021

Good Morning, Peter

Please see attached NLC Invoice :- IN06399 :- Weed Survey – EP144 Cultural Monitors 2021

Should you need further information please don't hesitate to contact us.

Thank you.

Humza Ahmad
Accounts Receivable Officer
Northern Land Council



Level 2, 45 Mitchell Street, Darwin NT 0800

GPO Box 1222, Darwin NT 0801

Reception:(08) 8920 5100 | Direct: (08) [REDACTED]

ABN: 56 327 515 336

Website: www.nlc.org.au



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<https://www.hancockprospecting.com.au/images/hpplemailfooter.jpg>



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APPENDIX Q EVAPORATION, RAINFALL, FREEBOARD MANAGEMENT & FLOODING EP144

Minerals Australia Pty Ltd
&
Jacaranda Minerals Pty Ltd

EMP MIA01-01
NT Exploration Permit (EP) 144

Appendix Q

**Evaporation, Rainfall, Freeboard
Management & Flooding**

Rev	Description	Date	Author	Reviewed	Approved
0	Prepared	01/11/2022	Jon Bennett	Katie Robertson Vicky Cartwright	Jon Bennett
1					

Prepared For

Minerals Australia Pty Ltd
&
Jacaranda Minerals Pty Ltd

Prepared By

inGauge Energy Australia
Level 3, 16 McDougall St. Milton QLD 4064
E: admin@ingauge.com.au
ABN: 51 164 429 190

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This appendix gives an overview of the regulated activities to be carried out by Minerals Australia Pty Ltd & Jacaranda Minerals Pty Ltd (the Interest Holder) under EMP MIA01-01, and its revisions (EMP).

1.1 Evaporation, Rainfall, and Freeboard Management

1.1.1 Evaporation Data Source

inGauge has used SILO Data Drill lake evaporation data [SILO, 2022] for the calculation of evaporation in the rainfall study area.

1.1.2 Monthly Evaporation

Monthly evaporation depth totals have been listed in **Table 1** for the 10th, 50th and 90th percentiles (P10, P50 and P90). Percentiles are based on 120 years of SILO Data Drill lake evaporation data.

The average annual evaporation for Alexandria is approximately 1,803mm, which exceeds the annual rainfall even in the wettest of years.

Given that the highest rainfall months for the Project Area are December, January, and February, inGauge has used the sum of the P10 lake evaporation for December, January and February, being 565mm. As such, inGauge has used 90-day evaporation of 550mm when calculating freeboard requirements to cater for 1 in 1,000-year rainfall events.

Table 1: Alexandria's Average Monthly Evaporation

Evaporation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
P10 (mm)	202.3	165.1	152.3	109.5	73.7	57.7	68.6	96.1	126.5	162.3	183.8	197.7	1595.6
P50 (mm)	226.6	190.9	176.2	124.4	88.0	65.8	76.7	106.9	143.3	187.0	199.1	218.9	1803.5
P90 (mm)	243.1	206.5	186.3	133.0	94.6	71.3	84.1	115.2	153.5	196.5	211.9	237.3	1933.2

1.2 Rainfall

1.2.1 Rainfall Data Source

The Location of the rainfall study area is west of Alexandria in the Northern Territory.

inGauge has used Bureau of Meteorology (BOM) data from weather station 15088 (Alexandria) in its Climate analysis [BOM, 2022] . The Alexandria BOM station is located ~40km southwest of EP144's Well and has 69 years of daily rainfall data (1886 to present).

inGauge has evaluated average monthly rainfall, average daily rainfall, historical Significant Rainfall Events (SREs), and 1 in 1,000-year events for use when assessing rainfall risks for this EMP.

1.2.2 Average Monthly Rainfall

The rainfall study area experiences a tropical savannah climate within the humid zone with distinct wet and dry seasons. This seasonal variation has significant implications for water resources; the summer monsoon season brings rain and cyclones and experiences considerable rainfall events. These rainfall events can cause flooding, determined by the rainfall's volume, duration, and spatial distribution. It is these flooding events that provide the recharge to the aquifers. In contrast, the dry season between April and December experiences little rain, resulting in many rivers ceasing to flow.

The average monthly rainfall for the Alexandria region is shown in Table 2.

Table 2: Alexandria Average Monthly Rainfall

Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Mean Rain (mm)	98.1	90.3	57.0	14.5	7.3	9.6	4.7	2.6	6.1	13.5	32.8	65.8	249.9
Median Rain (mm)	66.4	73.6	33.5	1.5	0.0	0.0	0.0	0.0	0.0	4.6	23.4	50.0	219.3
Highest Daily (mm)	166.4	167.5	180.3	89.0	50.8	95.8	104.2	42.7	51.1	58.6	60.5	172.4	180.3

1.2.3 Average Daily Rainfall

Alexandria’s average daily rainfall records show that the expected amount of rainfall and uncertainty range is highest in December through March, inclusive. The average rainfall and uncertainty range for May through November is relatively low, with averages below 1mm per day. In December, the rainfall is still relatively low at 2.6mm a day, and it is falling on dry ground, so little runoff is expected.

The daily recorded rainfall for Alexandria showing the minimum, lower quartile, median, upper quartile, maximum and outliers (1.5 times the maximum) are shown in Figure 1.

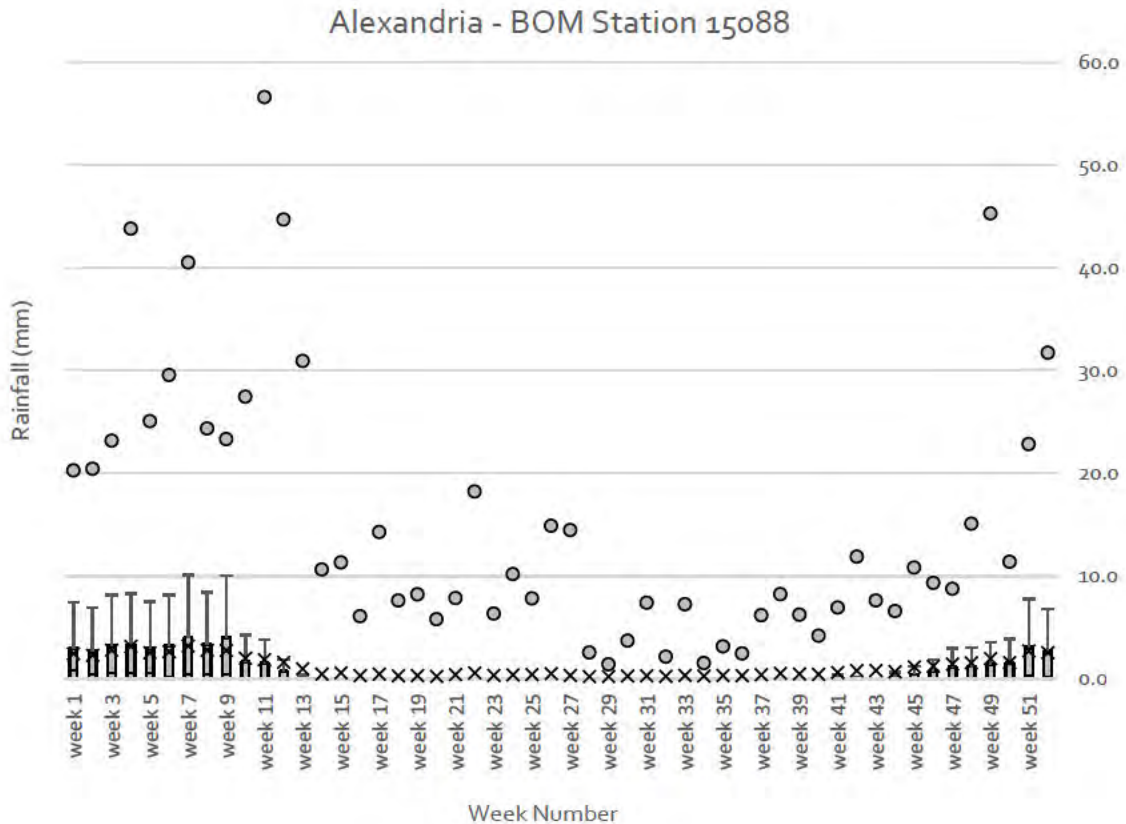


Figure 1: Daily Rainfall Statistics

1.2.4 Significant Rainfall Events

inGauge has defined a Significant Rainfall Event (SRE) in this EMP as an event where more than 300mm of rainfall occurs over four days. This type of rain is consistent with monsoonal troughs, tropical lows, or cyclones. The three historical SREs for Alexandria are shown in Figure 2, along with SREs for the Darwin Airport for comparison.

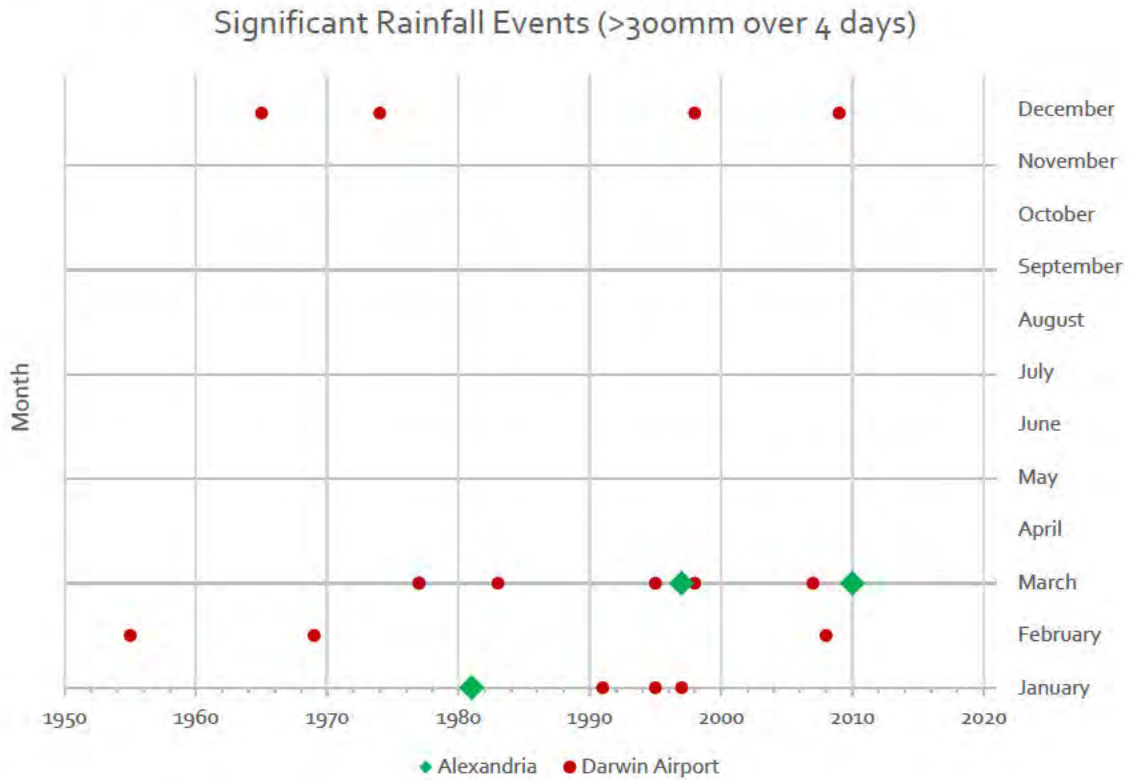


Figure 2: Significant Rainfall Events

1.2.5 Wet Season

1.2.5.1 1 in 1,000 Average Rainfall Interval (wet season)

Consistent with industry-accepted methodology associated with practices such as dam risk assessments (which calculate the wet season based on your geographical location), three months was determined to be an appropriate period to model a 1 in 1,000-year rainfall event.

Alexandria's highest three-month rainfall periods were used, and a Log Pearson III distribution was fitted to the data. This analysis allowed us to extrapolate the 1,000-year, three-month duration wet season.

The median highest predicted 1 in 1,000-year total rainfall in three months, within the wet season, for Alexandria is 1,098mm. However, confidence bounds show that it could be up to 1,207mm. These calculations do not allow for any evaporation.

Figure 3 shows the Log Pearson III distribution plots for 1:1,000-year events with 10% uncertainty bounds.

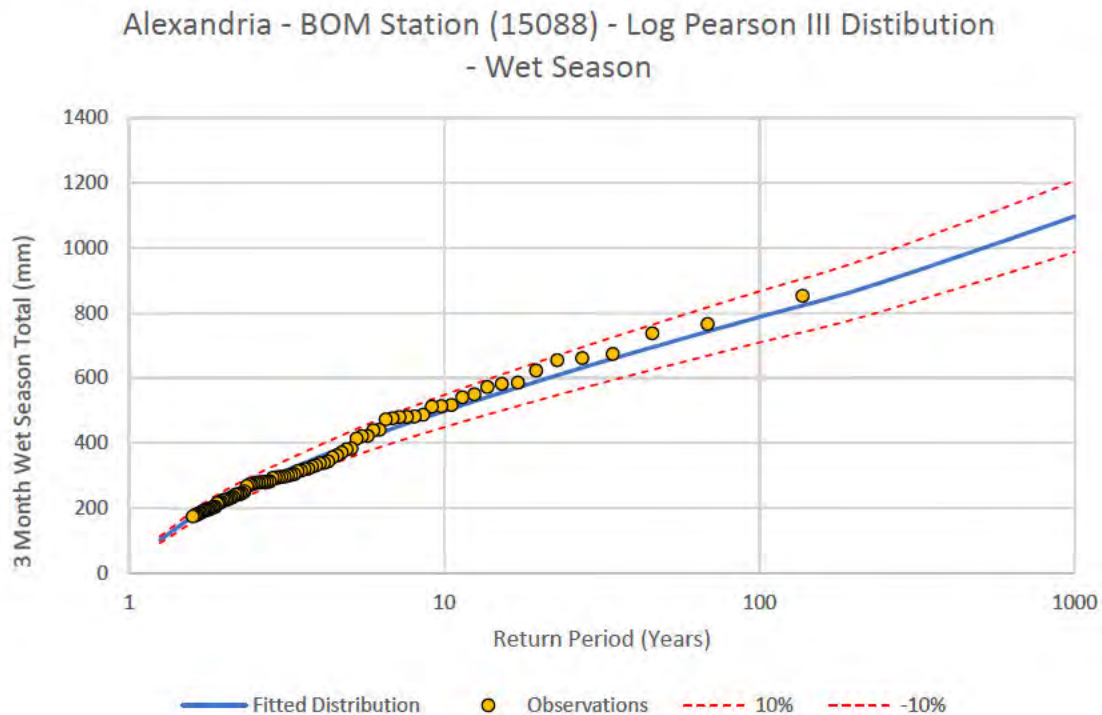


Figure 3: 1:1,000-year Events – Wet season

1.2.5.2 Freeboard (wet season)

Based on the most conservative values of 1207mm of rainfall and P10 evaporation of 550mm factored into the 90-day extreme rain event, a freeboard of 700mm will be applied to all open pits and unattended open-top tanks to minimise the risk of overtopping during wet season.

1.2.6 Dry Season

1.2.6.1 1 in 1,000 Average Rainfall Interval (dry season)

Consistent with industry-accepted methodology associated with practices such as dam risk assessments (which calculate the wet season based on your geographical location), three months was determined to be an appropriate period to model a 1 in 1,000-year rainfall event.

Alexandria's highest three-month rainfall periods were used, and a Log Pearson III distribution was fitted to the data. This analysis allowed us to extrapolate the 1,000-year, three-month duration dry season.

The median highest predicted 1 in 1,000-year total rainfall in three months, within the dry season, for Figure 4 is 185mm. However, confidence bounds show that it could be up to 204mm. These calculations do not allow for any evaporation.

Figure 4 shows the Log Pearson III distribution plots for 1:1,000-year events, with 10% uncertainty bounds.

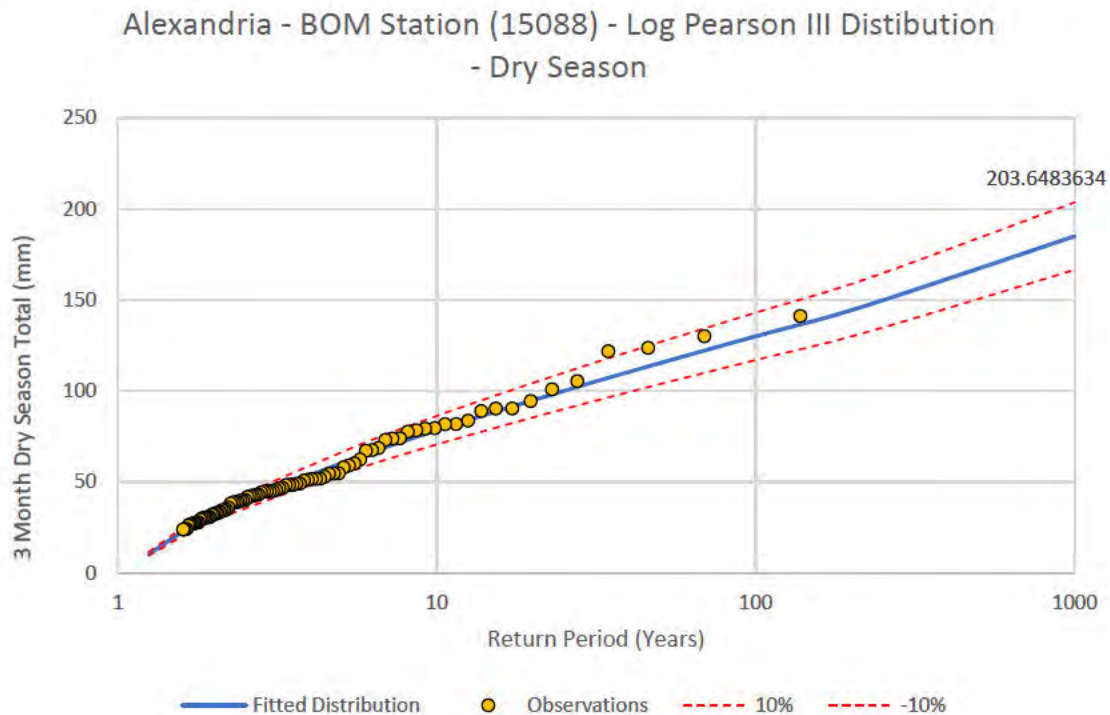


Figure 4: 1:1,000-year events – Dry season

1.2.6.2 Freeboard (dry season)

Based on the most conservative values of 204mm of rainfall and P₁₀ evaporation of 200mm factored into the 90-day extreme rain event, a theoretical freeboard of 50mm could be applied to all open pits and unattended open-top tanks to minimise the risk of overtopping.

inGauge believes that 0.5m freeboard is ALARP and acceptable as it will accommodate 2.5 times the 1 in 1,000-year dry season rainfall event without overtopping, without allowing for any evaporation. The 0.5m dry season freeboard is also compatible with the freeboard utilised in other parts of the Northern Territory for dry season freeboard.

1.2.7 Freeboard Management

All pits and open-topped tanks will be operated with sufficient freeboard available to accommodate the total rainfall anticipated based on a 1 in 1,000-year Average Recurrence Interval (ARI) relevant to the appropriate season. Freeboard for tanks and pits will be set and managed according to the season, as shown in Table 3 below.

Table 3: Wastewater Storage Freeboard

Storage	Wet Season	Dry Season
Pit	0.65m	0.5m
Open-topped treatment tank	0.65m	0.5m
Closed-topped storage tank	0.5m	0.5m

1.3 Flooding

1.3.1 Location Characteristics

The flood study area is in the headwaters of the Playford River, which drains to the west. The primary watercourses are the Playford River and the Burton Creek, which leads into the Mittiebah Creek, then the Burnette Creek, before joining the Playford River to the West of the flood study area.

These smaller streams are ephemeral and only experience flow during the wet season, mainly from cyclones and monsoonal rainfall.

The hydrologically enforced SRTM (Shuttle Radar Topography Mission) digital elevation model, and the report 'Northern Territory Hydrology - The Alice Springs to Darwin Railway, indicate that the land containing the proposed well pad locations can mostly be characterised as arid and flat with poorly defined catchment boundaries [W. D. WEEKS, 2006].

1.3.2 Flood Modelling

An Annual Exceedance Probability (AEP) is the probability of a flood event occurring in any year. It is denoted as either a percentage, such as a 1% or a 1 in 100-year event.

Typically, a Regional Flood Frequency Estimation (RFFE) would be used with the SRTM model to calculate peak stream discharge rates for a known flow path. However, it was determined that for flood modelling in the flood study area, this method is not adequately accurate due to the following points:

- The ephemeral nature of the nearby streams.
- There are no gauged watercourses within usable proximity of the flood study area.

Therefore, a Log Pearson III distribution was used to calculate a 1 in 100-year rainfall event. A rainfall simulation was then developed over the catchment area using TUFLOW and the SRTM data to calculate peak flood depths and flow rates using the rainfall values from this event. The results are displayed in **Figure 5** below.

As seen in **Figure 5**, none of the proposed well pad locations will be affected by a flood, even during a 1 in 100-year rainfall event.

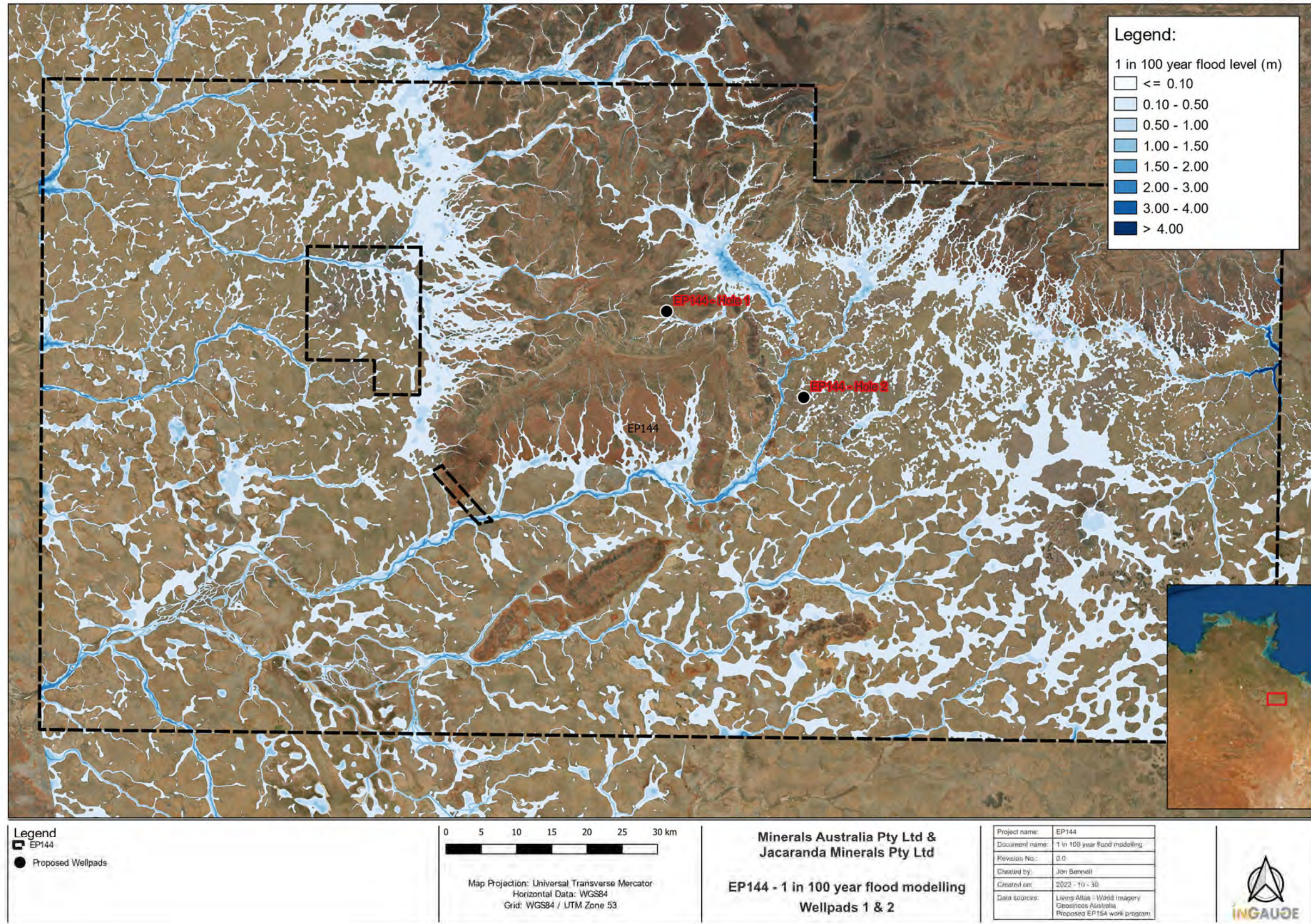


Figure 5: 1 in 100-year Flooding Event Over the Flood Study Area

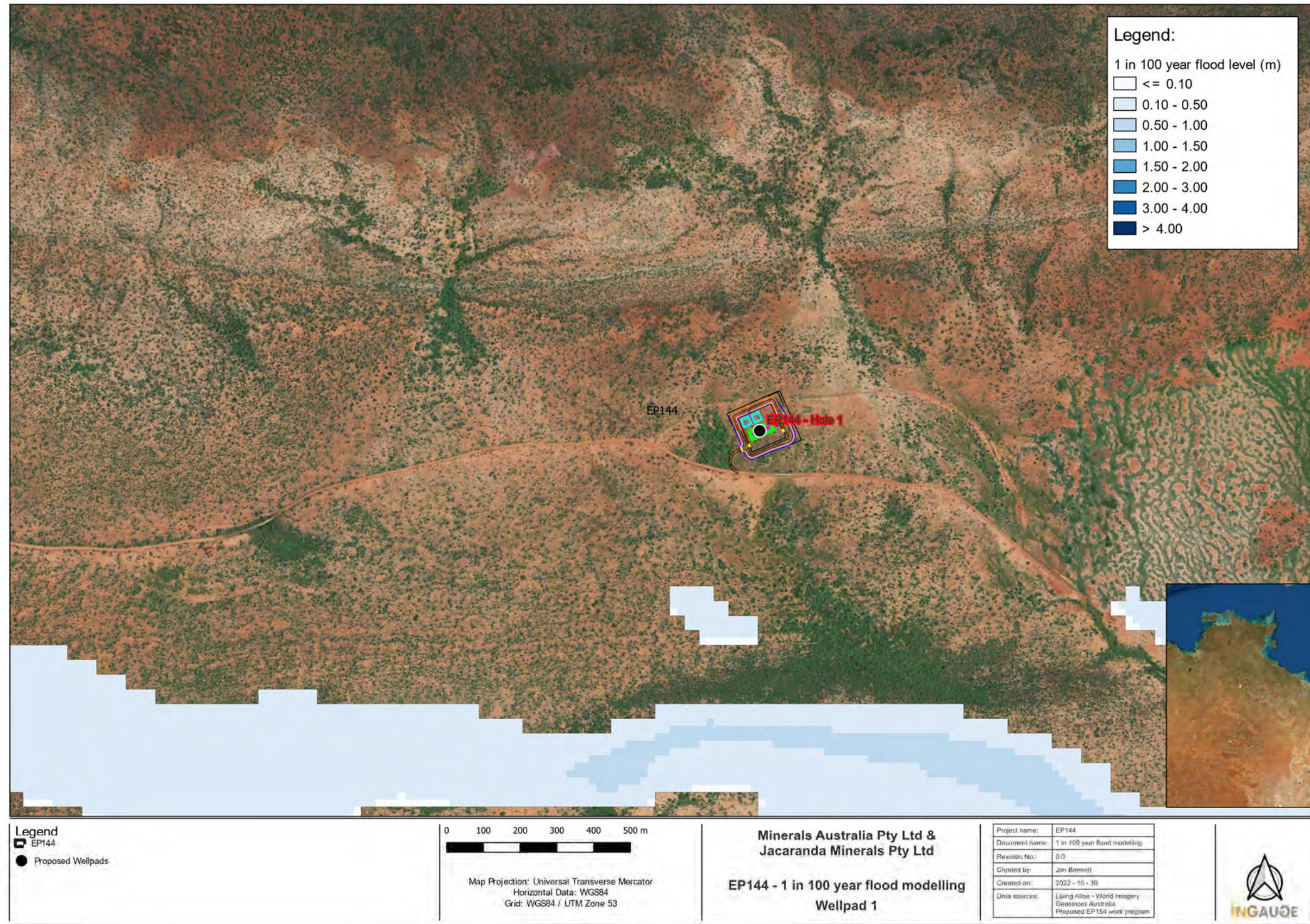


Figure 6: 1 in 100-year Flooding Event - Wellpad 1

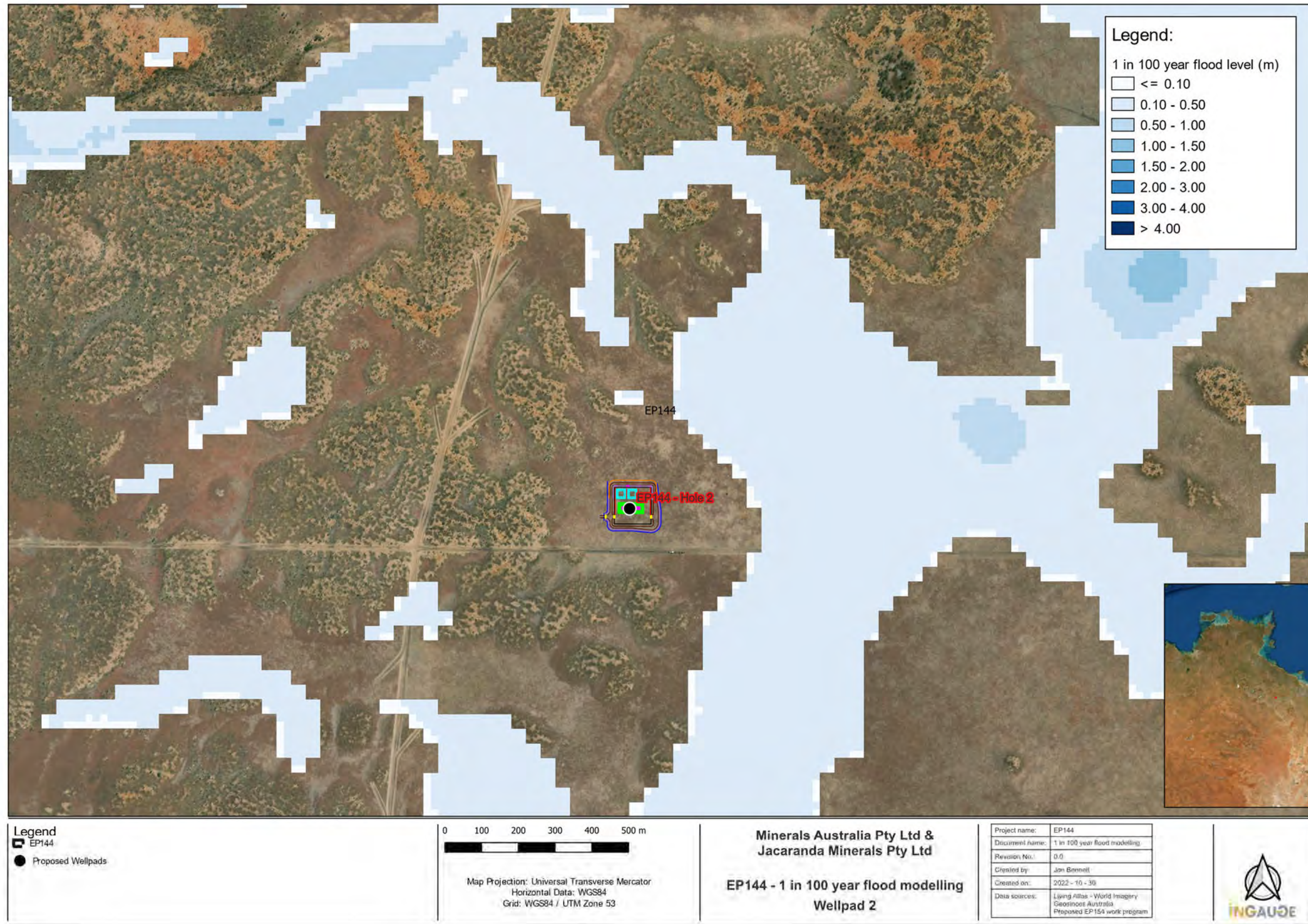


Figure 7: 1 in 100-year Flooding Event - Wellpad 2

1.1 References

BOM. (2022). *Climate Statistics for Australian locations - Summary Statistics - Alexandrina*. Australian Government, Bureau of Meteorology.

http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=136&p_display_type=dailyDataFile&p_startYear=&p_c=&p_stn_num=15088

SILO. (2022). *SILO - Australian climate data from 1889 to yesterday*

<https://longpaddock.qld.gov.au/silo/gridded-data/>

W. D. Weeks. (2006, 2006). *Northern Territory hydrology: the Alice Springs to Darwin railway*

Austrroads Bridge Conference, 6th, Perth, Western Australia.

<http://155.212.5.248/Presto/content/Detail.aspx?ctID=MjE1ZTI4YzctZjc1YS00MzQ4LTkyY2UtMDJmNTgxYjg2ZDA5&rID=NTQ3Mw==&qrs=RmFsc2U=&q=d2Qgd0VFS1M=&ph=VHJ1ZQ==&bckToL=VHJ1ZQ==&rrtc=VHJ1ZQ==>

APPENDIX R EVAPORATION, RAINFALL, FREEBOARD MANAGEMENT & FLOODING EP154

Minerals Australia Pty Ltd
&
Jacaranda Minerals Pty Ltd

EMP MIA01-01
NT Exploration Permit (EP) 154

Appendix R

**Evaporation, Rainfall, Freeboard
Management & Flooding**

Rev	Description	Date	Author	Reviewed	Approved
0	Prepared	01/11/2022	Jon Bennett	Katie Robertson Vicky Cartwright	Jon Bennett
1					

Prepared For

Minerals Australia Pty Ltd
&
Jacaranda Minerals Pty Ltd

Prepared By

inGauge Energy Australia
Level 3, 16 McDougall St. Milton QLD 4064
E: admin@ingauge.com.au
ABN: 51 164 429 190

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This appendix gives an overview of the regulated activities to be carried out by Minerals Australia Pty Ltd & Jacaranda Minerals Pty Ltd (the Interest Holder) under EMP MIA01-01, and its revisions (EMP).

1.1 Evaporation, Rainfall, and Freeboard Management

1.1.1 Evaporation Data Source

inGauge has used SILO Data Drill lake evaporation data [SILO, 2022] for the calculation of evaporation in the Project Area.

1.1.2 Monthly Evaporation

Monthly evaporation depth totals have been listed in **Table 1** for the 10th, 50th and 90th percentiles (P10, P50 and P90). Percentiles are based on 120 years of SILO Data Drill lake evaporation data. [SILO, 2022]

The average annual evaporation for Nutwood Downs is approximately 2,050mm, which exceeds the annual rainfall even in the wettest of years.

Given that the highest rainfall months for the Project Area are December, January, and February, inGauge has used the sum of the P10 lake evaporation for December, January and February, being 473mm. As such, inGauge has used 90-day evaporation of 530mm when calculating freeboard requirements to cater for 1 in 1,000-year rainfall events.

Table 1: Nutwood Downs's Average Monthly Evaporation

Evaporation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
P10 (mm)	163.1	131.5	148.6	144.3	128.9	106.8	119.7	147.9	173.5	201.5	196.0	178.3	1840.1
P50 (mm)	190.1	162.2	183.0	161.5	140.0	118.9	129.1	155.1	184.7	214.5	212.0	198.6	2049.7
P90 (mm)	209.1	192.9	201.9	175.7	148.8	124.3	133.8	163.6	192.8	226.2	220.9	226.6	2216.6

1.2 Rainfall

1.2.1 Rainfall Data Source

The Location of the rainfall study area is north of Nutwood Downs in the Northern Territory.

inGauge has used Bureau of Meteorology (BOM) data from weather station 14621 (Nutwood Downs) in its Climate analysis [BOM, 2022]. The Nutwood Downs BOM station is located ~80km south of EP154's Well 1 and has 87 years of daily rainfall data (1935 to present).

inGauge has evaluated average monthly rainfall, average daily rainfall, historical Significant Rainfall Events (SREs), and 1 in 1,000-year events for use when assessing rainfall risks for this EMP.

1.2.2 Average Monthly Rainfall

The Project Area experiences a tropical savannah climate within the humid zone with distinct wet and dry seasons. This seasonal variation has significant implications for water resources; the summer monsoon season brings rain and cyclones and experiences considerable rainfall events. These rainfall events can cause flooding, determined by the rainfall's volume, duration, and spatial distribution. It is these flooding events that provide the recharge to the aquifers. In contrast, the dry season between April and December experiences little rain, resulting in many rivers ceasing to flow.

The average monthly rainfall for the Nutwood Downs region is shown in Table 2.

Table 2: Nutwood Downs Average Monthly Rainfall

Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Mean Rain (mm)	191.1	187.6	125.6	23.7	8.0	3.3	2.3	1.1	3.5	19.4	52.9	119.4	737.9
Median Rain (mm)	178.6	171.0	93.4	5.1	0.0	0.0	0.0	0.0	0.0	6.0	41.2	92.5	587.8
Highest Daily (mm)	226.1	221.4	185.4	151.6	85.2	99.1	44.0	44.0	47.8	74.6	97.0	132.8	226.1

1.2.3 Average Daily Rainfall

Nutwood Downs’s average daily rainfall records show that the expected amount of rainfall and uncertainty range is highest in December through March, inclusive. The average rainfall and uncertainty range for May through November is relatively low, with averages below 1mm per day. In December, the rainfall is still relatively low at 2.6mm a day, and it is falling on dry ground, so little runoff is expected.

The daily recorded rainfall for Nutwood Downs showing the minimum, lower quartile, median, upper quartile, maximum and outliers (1.5 times the maximum) are shown in Figure 1.

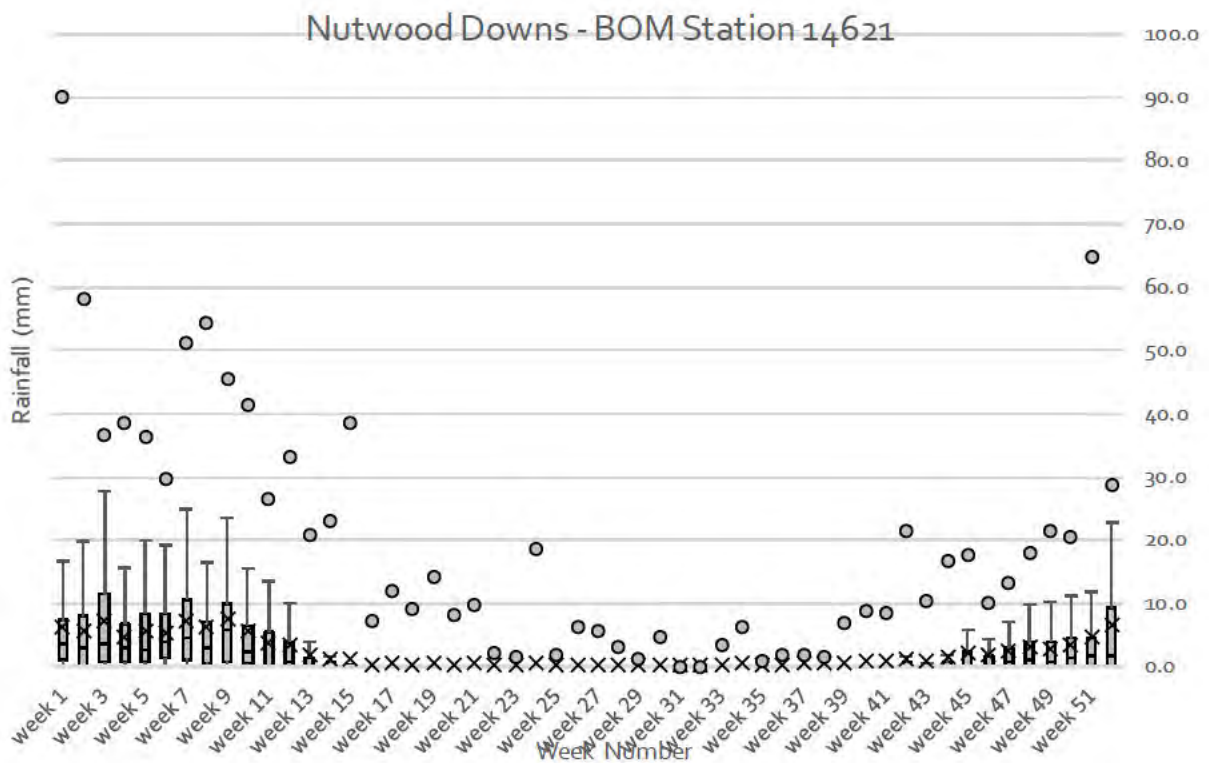


Figure 1: Daily Rainfall Statistics

1.2.4 Significant Rainfall Events

inGauge has defined a Significant Rainfall Event (SRE) in this EMP as an event where more than 300mm of rainfall occurs over four days. This type of rain is consistent with monsoonal troughs, tropical lows, or cyclones. The four historical SREs for Nutwood Downs are shown in **Figure 2**, along with SREs for the Darwin Airport for comparison.

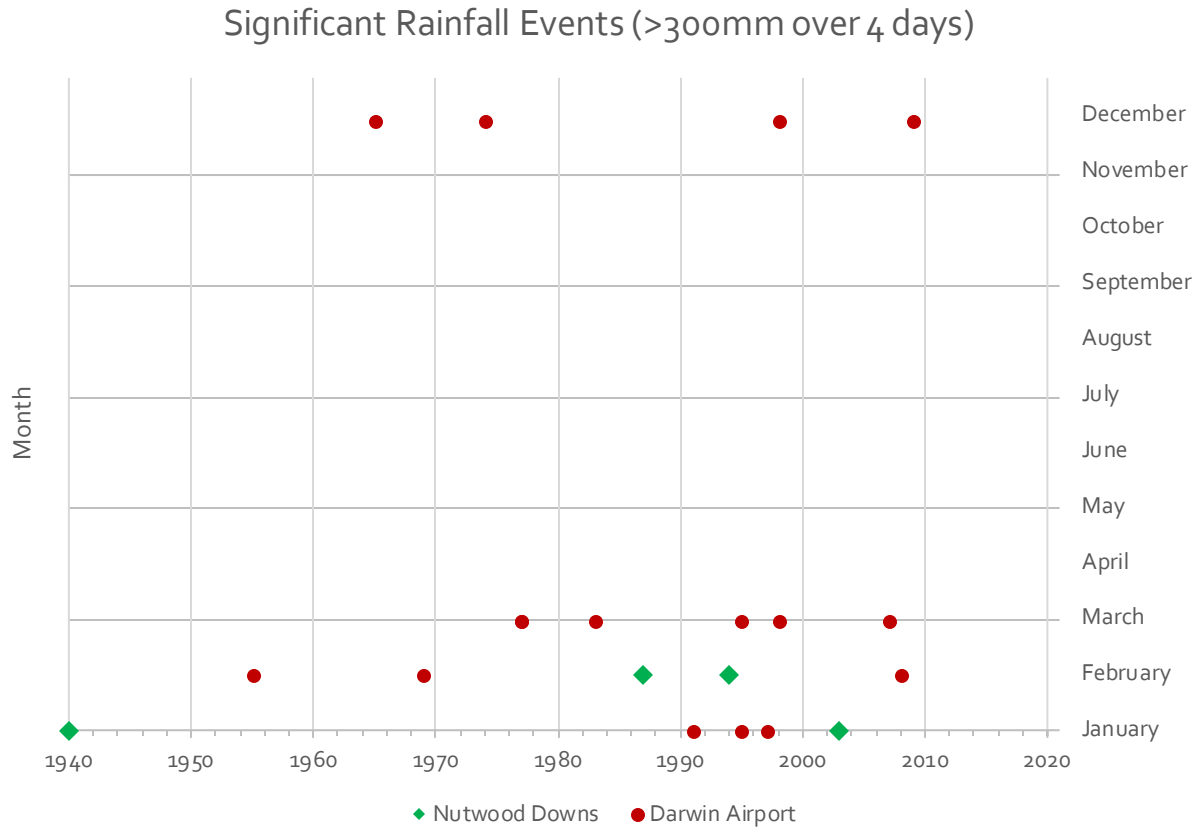


Figure 2: Significant Rainfall Events

1.2.5 Wet Season

1.2.5.1 1 in 1,000 Average Rainfall Interval (wet season)

Consistent with industry-accepted methodology associated with practices such as dam risk assessments (which calculate the wet season based on your geographical location), three months was determined to be an appropriate period to model a 1 in 1,000-year rainfall event.

Nutwood Downs's highest three-month rainfall periods were used, and a Log Pearson III distribution was fitted to the data. This analysis allowed us to extrapolate the 1,000-year, three-month duration wet season.

The median highest predicted 1 in 1,000-year total rainfall in three months, within the wet season, for Nutwood Downs is 1,483mm. However, confidence bounds show that it could be up to 1,631mm. These calculations do not allow for any evaporation.

Figure 3 shows the Log Pearson III distribution plots for 1:1,000-year events with 10% uncertainty bounds.

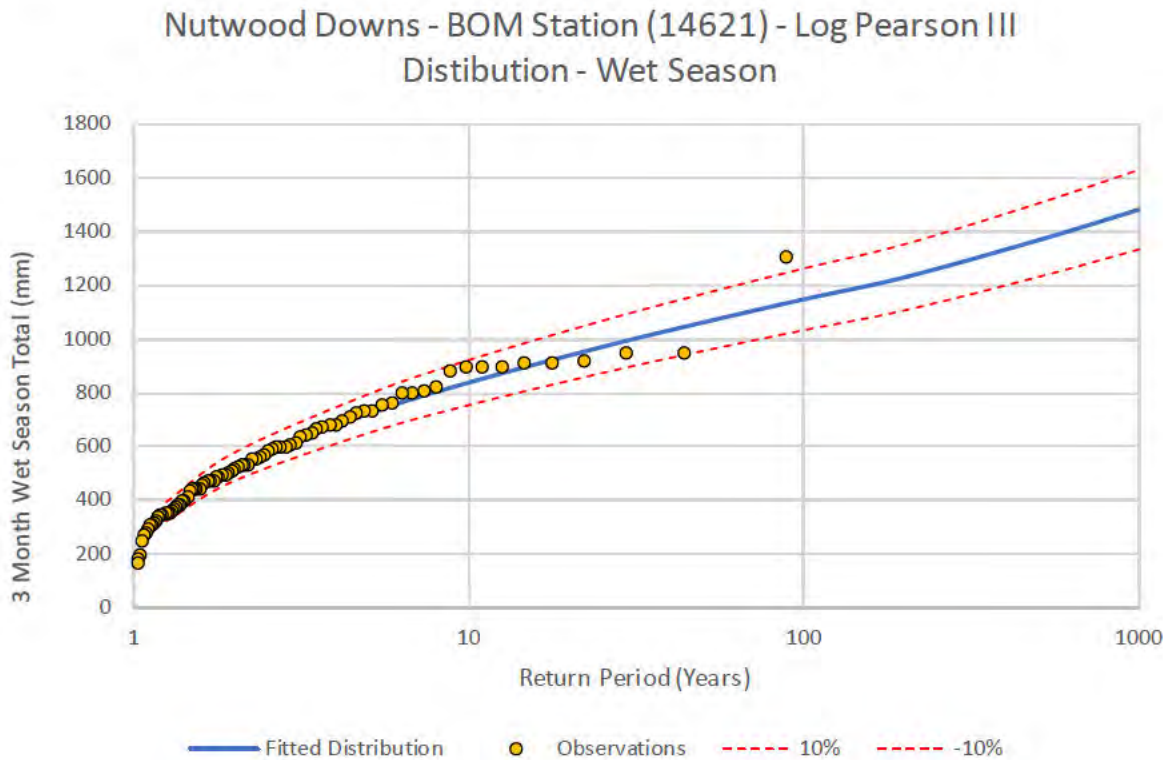


Figure 3: 1:1,000-year Events – Wet season

1.2.5.2 Freeboard (wet season)

Based on the most conservative values of 1631mm of rainfall and P10 evaporation of 473mm factored into the 90-day extreme rain event, a freeboard of 1200mm will be applied to all open pits and unattended open-top tanks to minimise the risk of overtopping during wet season.

1.2.6 Dry Season

1.2.6.1 1 in 1,000 Average Rainfall Interval (dry season)

Consistent with industry-accepted methodology associated with practices such as dam risk assessments (which calculate the wet season based on your geographical location), three months was determined to be an appropriate period to model a 1 in 1,000-year rainfall event.

Nutwood Downs's highest three-month rainfall periods were used, and a Log Pearson III distribution was fitted to the data. This analysis allowed us to extrapolate the 1,000-year, three-month duration dry season.

The median highest predicted 1 in 1,000-year total rainfall in three months, within the dry season, for Figure 4 is 340mm. However, confidence bounds show that it could be up to 374mm. These calculations do not allow for any evaporation.

Figure 4 shows the Log Pearson III distribution plots for 1:1,000-year events, with 10% uncertainty bounds.

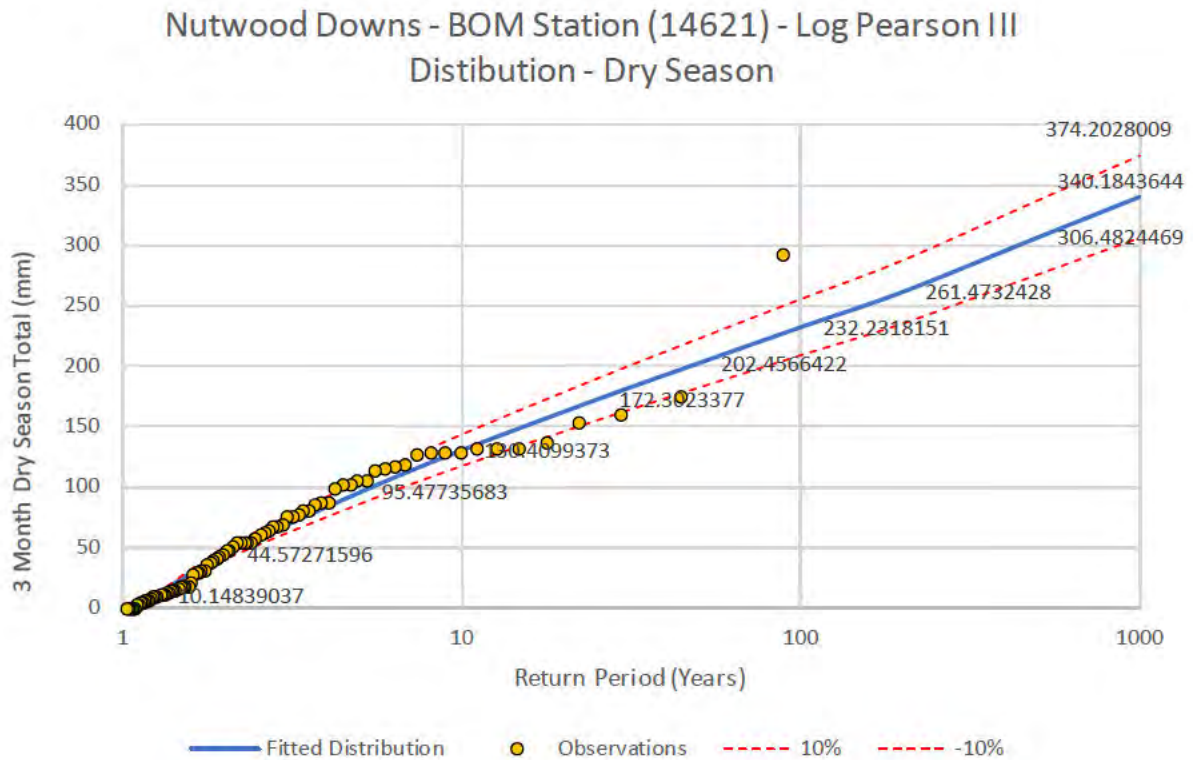


Figure 4: 1:1,000-year events – Dry season

1.2.6.2 Freeboard (dry season)

Based on the most conservative values of 374mm of rainfall and P10 evaporation of 355mm factored into the 90-day extreme rain event, a theoretical freeboard of 20mm could be applied to all open pits and unattended open-top tanks to minimise the risk of overtopping.

inGauge believes that 0.5m freeboard is ALARP and acceptable as it will accommodate 2.5 times the 1 in 1,000-year dry season rainfall event without overtopping, without allowing for any evaporation. The 0.5m dry season freeboard is also compatible with the freeboard utilised in other parts of the Northern Territory for dry season freeboard.

1.2.7 Freeboard Management

All pits and open-topped tanks will be operated with sufficient freeboard available to accommodate the total rainfall anticipated based on a 1 in 1,000-year Average Recurrence Interval (ARI) relevant to the appropriate season. Freeboard for tanks and pits will be set and managed according to the season, as shown in Table 3 below.

Table 3: Wastewater Storage Freeboard

Storage	Wet Season	Dry Season
Pit	1.2m	0.5m
Open-topped treatment tank	1.2m	0.5m
Closed-topped storage tank	0.5m	0.5m

1.3 Flooding

1.3.1 Location Characteristics

The flood study area is in the headwaters of the Hodgson and Roper Rivers, which drain to the north east. The primary watercourses are the Roper River and the Blackwater Creek, which leads into the Hodgson River to the north of the flood study area.

These smaller streams are ephemeral and only experience flow during the wet season, mainly from cyclones and monsoonal rainfall.

The hydrologically enforced SRTM (Shuttle Radar Topography Mission) digital elevation model, and the report 'Northern Territory Hydrology - The Alice Springs to Darwin Railway, indicate that the land containing the proposed well pad locations can mostly be characterised as arid and flat with poorly defined catchment boundaries [W. D. WEEKS, 2006].

1.3.2 Flood Modelling

An Annual Exceedance Probability (AEP) is the probability of a flood event occurring in any year. It is denoted as either a percentage, such as a 1% or a 1 in 100-year event.

Typically, a Regional Flood Frequency Estimation (RFFE) would be used with the SRTM model to calculate peak stream discharge rates for a known flow path. However, it was determined that for flood modelling in the Project Area, this method is not adequately accurate due to the following points:

- The ephemeral nature of the nearby streams.
- There are no gauged watercourses within usable proximity of the Project Area.

Therefore, a Log Pearson III distribution was used to calculate a 1 in 100-year rainfall event. A rainfall simulation was then developed over the catchment area using TUFLOW and the SRTM data to calculate peak flood depths and flow rates using the rainfall values from this event. The results are displayed in **Figure 5** below.

As seen in **Figure 5**, none of the proposed well pad locations will be affected by a flood, even during a 1 in 100-year rainfall event.

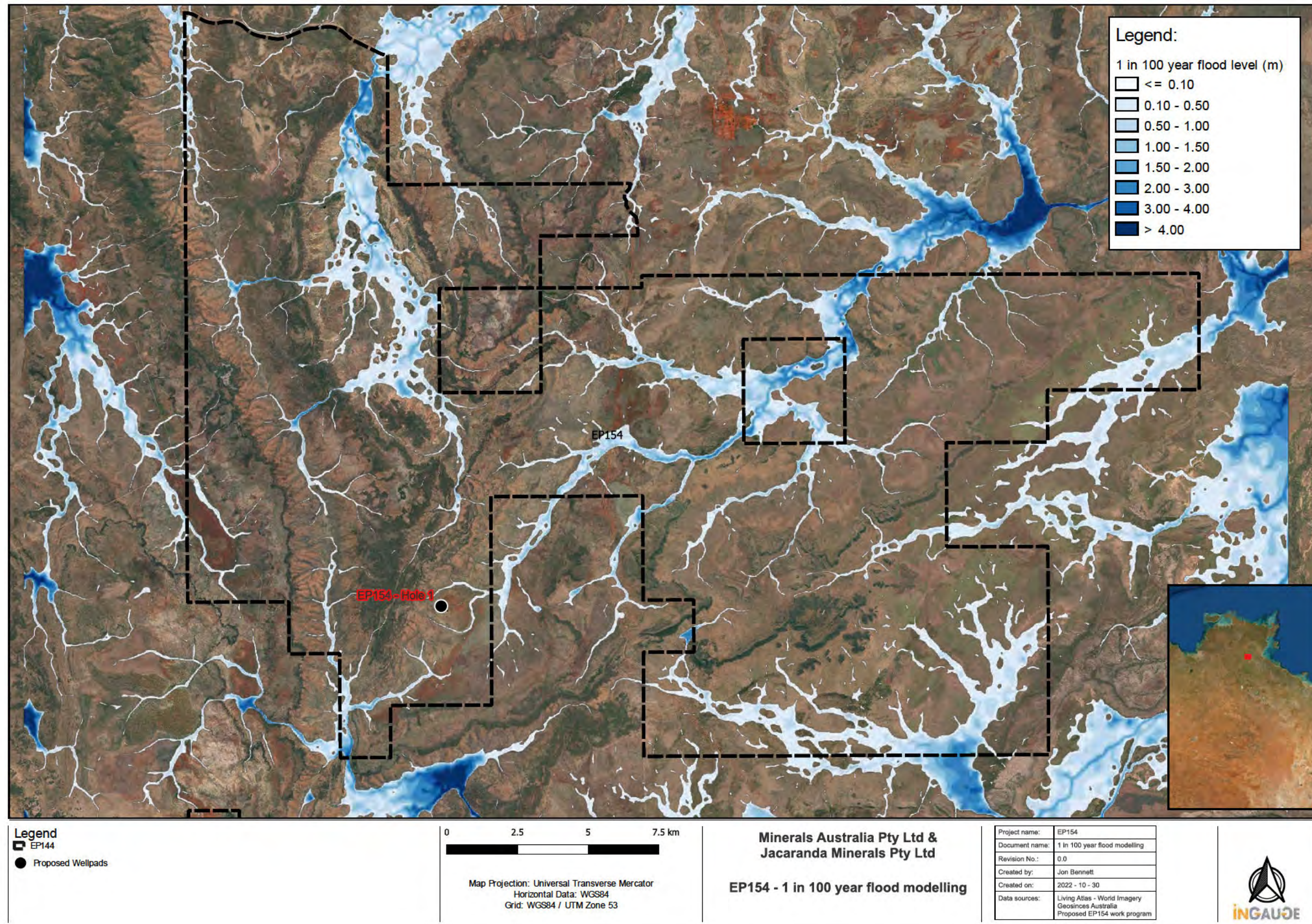


Figure 5: 1 in 100-year Flooding Event Over the flood study area

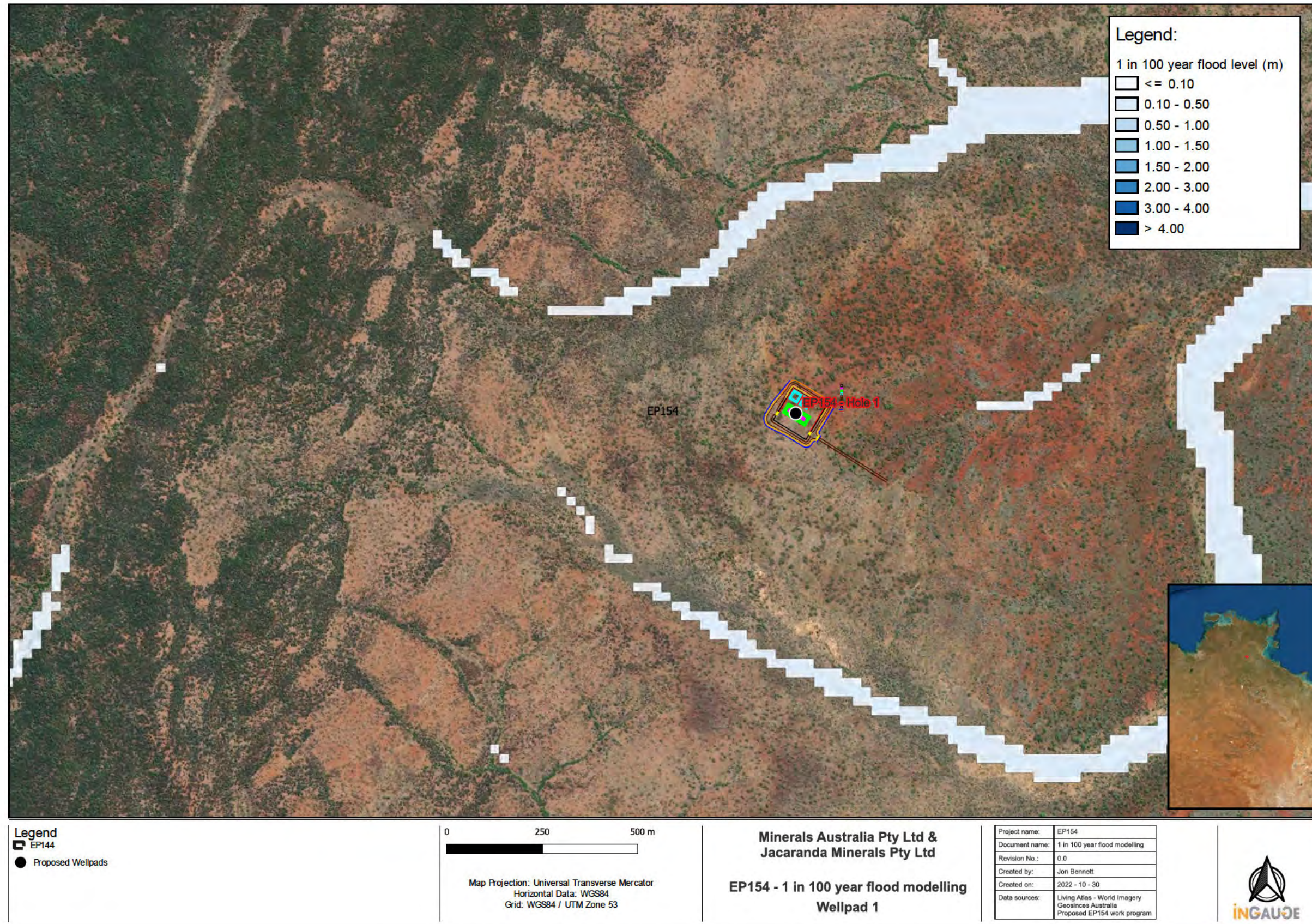


Figure 6: : 1 in 100-year Flooding Event Over Wellpad 1

1.1 References

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