



Barr Creek Project (EPM25239) –  
Proposed Exploration Drilling

Assessment Application Report

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## 1. INTRODUCTION

Phosphate International (the applicant) proposes to undertake exploration drilling for phosphate on EPM25239 as part of the Barr Creek Project approximately 160 km northwest of Mount Isa (refer **Locality map**). The applicant holds an existing Environmental Authority (EPSX011660013) and is seeking to amend this authority to allow limited exploration drilling to take place within:

- the former Gregory Wild River Area (now the Gulf Rivers Strategic Environmental Area (SEA) (refer map **Strategic Environmental Areas**)); and
- 500 metres of a Category B Environmentally Sensitive Area (in this case, an endangered Regional Ecosystem (RE)).

The applicant is targeting known and potential phosphate deposits within the D8 and Thornton South East target areas. Exploration is also proposed for a third target area (Desert South); however, this drilling can be undertaken without requiring further amendments to existing approvals.

The effect of the proposed amendments would be to increase the extent of surface impacts associated with the exploration drilling program. Therefore the program no longer qualifies for the exemption applied to 'pre-existing resource activities' under the *Regional Planning Interests Act 2014* (RPI Act). Therefore, this Assessment Application Report supports an application for Regional Interests Development Approval (RIDA) to undertake exploration activities within the Gulf Rivers SEA in accordance with Section 28(1) of the RPI Act.

This document provides information on the environmental attributes of the D8 and Thornton South East target areas and assesses the risk and likely magnitude of impacts on those attributes.

### 1.1. Project overview

The Barr Creek Project is located in the North West Mineral Province, which accounts for the majority of Queensland's base metal production. Mining is also the dominant industry in the North West region in terms of employment, economic activity and gross regional product (DIP 2010). However, existing mines in the area are at a mature stage of development and a number are scheduled for closure between 2015 and 2020 (DIP 2010; DNRM 2012). According to DNRM (2012), "the long-term future of Queensland's...minerals industry is dependent upon new mineral discoveries and improved infrastructure to extend the lives of mines in the area".

Phosphate International's D8 prospect is a high priority, advanced phosphate exploration target, with previous drilling in this area supporting an exploration target in the range of 35 to 90 Mt. Drilling of the Thornton South East and Desert South targets is proposed to test new conceptual models which indicate previously undiscovered phosphate potential in the region.

The area immediately surrounding EPM25239 contains a number of major phosphate deposits (Thorntonia, Paradise North, Paradise South, D-Tree and East Galah Creek), with a further four deposits within 25 to 50 kilometres of this EPM. The discovery of more phosphate within EPM25239 would greatly enhance the possible development of a major phosphate mining district in north west Queensland.

### 1.2. The applicant

ACN 132 668 314 Pty Ltd, trading as Phosphate International, is the holder of EPM25239 and the associated EA (EPSX011660013) and is therefore an eligible person under section 28 of the RPI Act.

### 1.3. Property and tenure details

**Table 1.1** and **Table 1.2** summarise property and tenure details for the subject land.

**Table 1.1 Underlying property and tenure details for EPM25239 (D8 target area)**

<b>Category</b>	<b>Particulars</b>
Real property description	Lot 4 on Plan UM803944
Property name	Barr Creek
Tenure	Lands Lease
Lessee	Alfred Arthur Lanskey
Purpose for which lease was granted	No purpose defined

**Table 1.2 Underlying property and tenure details for EPM25239 (Thornton South East)**

<b>Category</b>	<b>Particulars</b>
Real property description	Lot 1 on Plan UN7
Property name	Thorntonia
Tenure	Lands Lease
Lessee	Bezuma Pastoral Co Pty Ltd
Purpose for which lease was granted	Pastoral

## 2. PROPOSED EXPLORATION ACTIVITIES

The proposed activities to be undertaken on EPM25239 comprise the establishment of exploration drill sites, an associated laydown storage area and campsite for the drill crew and access tracks. A summary of project activities and their location is provided in **Table 2.1**.

**Table 2.1 Summary of project activities**

Activity	Number	Location	Total disturbance (ha)
RC drill sites	40	Lot 4 UM803944	3
RC drill sites	4	Lot 1 UN7	0.3
Diamond drill sites	2	Lot 1 UN7	0.3
Access tracks	As required	Lot 4 UM803944 & Lot 1 UN7 (Final location to be determined in consultation with landholder/s)	As required
Campsite	2	Lot 4 UM803944 & Lot 1 UN7	0.08
Laydown storage	2	Lot 4 UM803944 & Lot 1 UN7	0.08
Total disturbance (excluding access tracks)			3.76

### 2.1. Drilling program

Exploration drilling will be undertaken using conventional methods (reverse circulation (RC) and diamond core drilling) and will be carried out using an approved and accredited contractor.

RC drill holes are of 150 mm diameter and drilling depth will range from 30-65 metres below the present surface. RC drill sites encompass an area of approximately 750 m<sup>2</sup> (30 x 25 m). RC drill sites typically require limited disturbance, with mature trees avoided and pads oriented to minimise the amount of clearing required (see **Plate 1**). In this area, drill pad preparation typically involves the use of a front end loader to "sweep" spinifex from the surface and there is little or no ground breaking required. Any swept vegetation or soil is stockpiled at the end of drillpads and is later rehabilitated by sweeping soil and plant matter back across the drillpad.

A small number of holes will be drilled using diamond core drilling techniques. Diamond drill sites are typically larger than the RC sites (approximately 30 x 50 metres or 1500 m<sup>2</sup>) to allow room for an additional truck carrying drill rods (see **Plate 2**). Minor earthworks may be required to prepare drill pads in these locations. These sites typically require two drill sumps (approximately 10 metres long by five metres wide) constructed side by side to hold drilling waters. Drilling water is trucked in from off-site and gets circulated from the drill hole into and out of the two sumps during operations. As evaporation is rapid in this terrain and climate, drilling water is typically left in the sumps and evaporates away after drilling, typically within two to three weeks. Sumps are fenced to prevent stock access.

Equipment to be used comprises a truck-mounted drill rig (Mercedes 4WD or 6WD), a light truck for transportation of drilling crew, a Landcruiser utility for the geologist and fieldhand, a support vehicle (Mercedes 4WD) carrying diesel, water, maintenance supplies and an auxiliary vehicle (Mercedes 4WD) carrying an auxiliary compressor and booster compressor. It is anticipated that a front end loader will be used to clear drill pads and sweep tracks. A loader is also capable of most earthworks in this terrain other than ripping of solid bedrock.

A copy of the drill site layout checklist to be used for the exploration program is included at **Attachment 1**.

## 2.2. Access roads and tracks

Parts of EPM25239 have been subject to exploration in the past and, wherever possible, existing tracks will be used or upgraded to facilitate site access. Minor tidying of old tracks may be required, with new tracks selected to avoid creek crossings, large trees and areas of rough ground wherever practical to do so. Tracks are typically formed using a front end loader to sweep material from the surface. Where necessary, vegetation and topsoil will be stockpiled at approximately 50 metre intervals; however, only limited vegetation or earth is likely to require disturbance in this terrain.

The width of new access tracks is usually the width of the front end loader blade used to clear tracks (approximately five metres) but will be restricted to a maximum of seven metres wide. New tracks will be constructed along natural grades wherever possible. It is highly unlikely that formed river or creek crossings will be required for the Barr Creek exploration program. Where required, dry crossing sites would be chosen with crossings located to minimise earthworks and constraints with use.

Tracks constructed solely for exploration will be rehabilitated prior to the onset of the wet season (i.e. the end of October).

## 2.3. Campsites and other facilities

Some stations have staff accommodation available for rent; this would be used to house personnel involved in the exploration program where available. Where staff accommodation is not available, a field camp would be established (see Plate 3).

The campsite and associated disposal area will be located outside the 500 metre buffer zone around the endangered RE mapped along the Thornton River and tributaries. All camp waste will be bagged and removed to an approved Council rubbish dump. Human waste is typically disposed of by way of a drilled toilet hole and backfilled. Grey water from showers and dishwashing is disposed of to ground soakage pits which facilitate rapid infiltration and filtration. As noted above, evaporation is rapid in this climate.

Limited volumes of oil and drilling fluids (up to 500 litres) will be located in one appropriately designed, dedicated lay down storage area (approximately 20 x 20 m). Laydown storage areas will also be located outside the 500 metre buffer zone around the endangered RE.

## 2.4. Water supply

Some water is held on the support truck and may be used to mix up stiffening agents to hold loose sands together on the hole walls. Water requirements during drilling are typically in the order of 10-150 litres per hole and no return of this to ground surface usually occurs other than (sometimes) as wet cuttings. Water would come from an approved supply. A bore on the station is a common source subject to agreement with the landholder; otherwise, this water is trucked into site from an approved external source.

Drinking water and washing water will be trucked into site from elsewhere (e.g. a nearby station, Mount Isa or Camooweal).

## 2.5. Timing

Exploration activities will be undertaken during the northern dry season (April to November) to avoid periods of high rainfall in the region. Rehabilitation of disturbed areas will occur as soon as practical from the completion of drilling. This may be up to six months after completion of drilling at each site pending collection, analysis and interpretation of assay and geological data. Rehabilitation will occur when areas are closed off due to no further geological interest.



**Plate 1 – Typical RC drill site layout (existing cleared area)**



**Plate 2 – Typical diamond drill site layout (site in existing disturbed area)**



**Plate 3 – Typical exploration field camp layout**

## 2.6. Rehabilitation actions and outcomes

The primary rehabilitation objective is to promote natural regeneration of any vegetation communities disturbed as a result of exploration. This will be achieved through:

- Rehabilitating all areas as soon as practical and prior to the onset of the wet season (November to April).
- Decommissioning non-artesian drill holes as soon as practical, but no later than six months from the time of drilling. Surplus sample will be stored on site in large bags until samples have been analysed and then all bags are rehabilitated by pouring back down the hole. No acid-producing materials are anticipated in this location but, where encountered, these are replaced first to prevent oxidation. Holes are capped at 300 mm below the surface (or at surface level in rock outcrops).
- Stockpiling stripped topsoil and any cleared vegetation (where required) at the edge of drill pads for later respreading. Topsoil will be stockpiled for a relatively short period (up to two months), thereby maintaining the viability of the soil seed bank.
- Decommissioning campsites by removing all surplus and waste material off site to approved disposal sites. Ground soakage pits used to store grey water will be filled in.
- Rehabilitation of access tracks will be agreed with the landholder. Where tracks are to be rehabilitated, materials stacked alongside pads and tracks at intervals will be pushed back over disturbed ground during rehabilitation works. Topsoil will be stockpiled for a relatively short period, thereby maintaining the viability of the soil seed bank.



### 3. ENVIRONMENTAL ATTRIBUTES

The relevant environmental attributes for the Gulf Rivers Strategic Environmental Area are set out in section 9 of the Regional Planning Interests Regulation 2014. These are:

- The natural hydrologic processes of the area characterised by –
  - (i) natural, unrestricted flows in and along watercourses and estuaries;
  - (ii) overflow from watercourses onto the flood plains of the area, or the other way; and
  - (iii) natural flow paths of water across flood plains connecting waterholes, lakes and wetlands in the area; and
  - (iv) natural flow in and from groundwater and springs.
- The natural geomorphic processes of the area characterised by –
  - (i) natural erosion; and
  - (ii) the transport and deposit of sediment by water throughout the catchments and along the watercourse systems and estuaries;
- The functioning riparian processes of the area characterised by native riparian vegetation associated with watercourses, estuaries, lakes, floodplains and wetlands;
- The functioning wildlife corridors of the area characterised by –
  - (i) natural habitat in the watercourse systems; and
  - (ii) permanent waterholes and springs.
- The natural water quality in the watercourse channels and aquifers and on floodplains in the area characterised by physical, chemical and biological attributes that support and maintain natural aquatic and terrestrial ecosystems.

This section addresses the specific environmental attributes of the D8 and Thornton South East target areas in relation to the above.

#### 3.1. Climate

The exploration area (EPM25239) is located approximately 160 km northwest of Mount Isa in a region characterised by a semi-arid climate with monsoonal influences. The region typically experiences hot summers and mild to warm winters with daily temperatures ranging from 23°C to 37.2°C in summer and from 8.6°C to 27.3°C in winter.

Average annual rainfall in the region totals 503.9 millimetres, with the majority of this rain falling during the summer months although summer wet seasons do not occur every year (DNPRSR 2013). The El-Nino Southern Oscillation (ENSO) exerts significant influence on inter-annual climate variability across the region, producing marked fluctuations in the amount, timing and distribution of rainfall. As such, there is considerable year-to-year variation, particularly during the summer months, ranging from 'failed' wet seasons, to 'normal' conditions and above average rainfall and tropical cyclone activity (Davis and Dowe 2005).

Rainfall data for nearby Calton Hill Station (approximately 65 km to the southeast) is summarised in **Table 3.1**.

**Table 3.1 Rainfall data for Calton Hills Station (1900-current)**

Month	Rainfall (mm)		
	Mean	10 <sup>th</sup> percentile	90 <sup>th</sup> percentile
January	120.6	14.2	251.5
February	115.7	12.6	256.2
March	77.1	0.0	177.6
April	18.0	0.0	69.9
May	11.8	0.0	42.5
June	11.3	0.0	41.3
July	3.6	0.0	9.0

Month	Rainfall (mm)		
	Mean	10 <sup>th</sup> percentile	90 <sup>th</sup> percentile
August	2.3	0.0	4.1
September	10.2	0.0	32.9
October	18.8	0.0	54.6
November	37.0	0.0	86.9
December	81.9	14.5	183.6
<b>Annual</b>	<b>503.9</b>	<b>251.3</b>	<b>761.7</b>

Source: Bureau of Meteorology 2014

### 3.2. Land use

Land tenure underlying the EPM is leasehold. Existing land uses comprise low intensity cattle grazing on native pastures and native vegetation. Electricity easements run across both properties (see map **Strategic Environmental Areas**).

### 3.3. Surface water

The exploration area is located in the headwaters of the Nicholson River catchment. It comprises the Thornton River and a number of smaller tributaries. All are intermittent streams, with stream flow variability reflecting the decreasing rainfall gradient with distance from the coast (refer Davis and Dowe 2005). **Table 3.2** summarises historical flow data for the Thornton River at Rosehill Bore, which is located approximately 55 km downstream of the target area.

**Table 3.2 Historical flow data for gauging station 912110A (Thornton River at Rosehill Bore)**

Gauging station	Period of record	Annual flow (Megalitres)		Average no. of cease to flow days
		Minimum	Maximum	
912110A Thornton River at Rosehill Bore	01/10/1970 to 01/10/1988	1,911	459,634	201.5

Source: Davis and Dowe 2005

Limited water quality data is available from the Thornton River gauging station (912110A) (approximately 55 km downstream of the target area). Limited sampling between 1974 and 1987 (DNRM 2015) indicates the following:

- Predominantly low salinity (EC levels ranged from 600 to 800 uS/cm).
- pH levels are neutral to slightly alkaline (range 7.6-8.1)
- Turbidity and total suspended solids were low however, levels would be expected to increase significantly during significant flow events due to erosion from grazing activity in the catchments.
- No elevated concentrations of nutrients or heavy metals are evident (all recordings were well within Queensland Water Quality Guideline target values).

Note that there is unlikely to have been any significant changes in land use since this data was collected (i.e catchment land use is predominantly grazing and native forest).

### 3.4. Groundwater

The exploration area is located at the south-eastern extent of the Nicholson Groundwater Management Area (GMA). Significant regional groundwater resources are associated with Cambrian-age limestone and dolomite formations located to the north and west and, to a lesser extent, adjacent sandstone formations (see Davis and Dowe 2005). However, geology underlying the Thornton River area comprises lower porosity Proterozoic siltstone and no significant groundwater is

expected in the target area (Dr Simon Beams, pers. comm.). It is thus considered unlikely that drilling will intercept a significant groundwater aquifer.

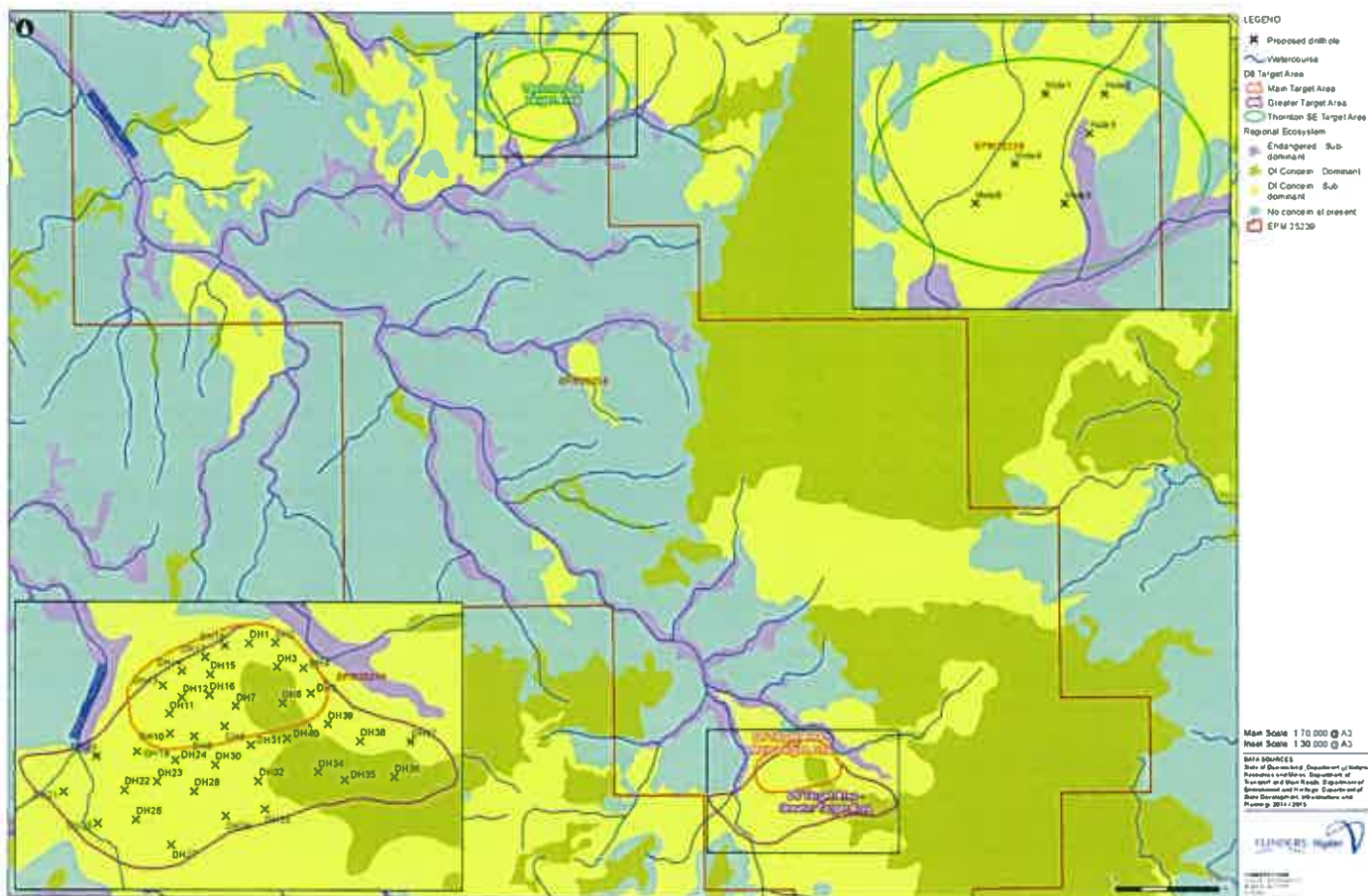
The absence of significant groundwater resources in the target area is supported by the apparent absence of baseflow to the Thornton River during dry periods (see **Table 3.2**).

### 3.5. Vegetation communities

Regional ecosystem (RE) mapping and aerial photography indicate that vegetation communities in the exploration area are characteristic of those elsewhere in the bioregion – very sparse, low open eucalypt woodlands on skeletal soils with an understorey of spinifex (*Triodia* spp.). Closer to waterways, mapped vegetation comprises sparse woodlands with an overstorey of eucalypt species, shrub layer and a ground layer of tussock grasses.

The extent of riparian vegetation associated with the Thornton River and its tributaries broadly corresponds to those areas mapped as containing endangered RE1.3.7b (refer map **Regional Ecosystems (Biodiversity Status)**). No exploration drilling is proposed in these areas. Where required, the field camp and laydown storage areas will also be located outside from the 500 metre buffer zone set out in the conditions of the Environmental Authority.

Exploration drilling proposed in mapped REs is summarised in **Table 3.3** and **Table 3.4**.



Regional Ecosystems (Biodiversity Status)

Table 3.3 Summary of exploration drilling in Regional Ecosystems (D8 target area)

Mapped as	RE codes	Summary description	Biodiversity status	Structure category	No. of drillholes proposed
Of concern (sub-dominant)	1.11.2a	Low open woodland of <i>Eucalyptus leucophloia</i> with shrub layer of <i>Acacia</i> spp. and ground layer of <i>Triodia</i> spp. Occurs on steep hills and strike ridges.	No concern at present	Very sparse	23
	1.7.1	Low open woodland of <i>Eucalyptus leucophloia</i> (snappy gum) and/or <i>Corymbia aspera</i> and/or <i>E. normantonensis</i> over <i>Triodia</i> spp. Occurs on scarps and dissected areas of eroded Tertiary plateaus; skeletal soils formed largely on the exposed weathered zone.	No concern at present	Very sparse	
	1.11.2x2a	Low woodland to open forest of <i>Acacia shirleyi</i> . Occurs on metamorphic hills.	No concern at present	Very sparse	
	1.5.4x1a	Low open woodland of <i>Eucalyptus pruinosa</i> with a sparse mixed shrub layer and a mid-dense ground layer dominated by <i>Aristida</i> spp. with some areas of <i>Triodia</i> spp. Occurs on sandsheet.	Of concern	Very sparse	
Of concern (sub-dominant)	1.7.1	Low open woodland of <i>Eucalyptus leucophloia</i> and/or <i>Corymbia aspera</i> and/or <i>E. normantonensis</i> over <i>Triodia</i> spp. Occurs on scarps and dissected areas of eroded Tertiary plateaus; skeletal soils formed largely on the exposed weathered zone.	No concern at present	Very sparse	11
	1.7.2b	<i>Lysiphylum cunninghamii</i> low open woodland +/- <i>Eucalyptus pruinosa</i> with scattered shrub layer and ground layer of tussock grasses. Occurs on eroded Tertiary surfaces; calcareous red-brown earths.	Of concern	Very sparse	
Of concern (sub-dominant)	1.7.1x3	Low open woodland of <i>Corymbia capricornia</i> +/- <i>Eucalyptus leucophloia</i> with mixed shrub layer usually including <i>Grevillea wickhamii</i> and ground layer of <i>Triodia pungens</i> and <i>Schizochyrium fragile</i> . Occurs on silcrete.	No concern at present	Very sparse	1
	1.7.2b	<i>Lysiphylum cunninghamii</i> low open woodland +/- <i>Eucalyptus pruinosa</i> with scattered shrub layer and ground layer of tussock grasses. Occurs on eroded Tertiary surfaces; calcareous red-brown earths.	Of concern	Very sparse	
Of concern (dominant)	1.5.1	<i>Eucalyptus miniata</i> woodland on red earths on laterised plateaus	Of concern	Sparse	5
	1.7.2x1	Low open woodland of <i>Eucalyptus miniata</i> and/or <i>Corymbia capricornia</i> +/- <i>Eucalyptus pruinosa</i> with a dense shrub layer and sparse mixed ground layer Occurs on sandsheets overlying Tertiary surfaces.	Of concern	Very sparse	

Table 3.4 Summary of exploration drilling in Regional Ecosystems (Thornton South East target area)

Mapped as	RE codes	Summary description	Biodiversity status	Structure category	No. of drillholes proposed
Of concern (sub-dominant)	1.7.1	Low open woodland of <i>Eucalyptus leucophloia</i> (snappy gum) and/or <i>Corymbia aspera</i> and/or <i>E. normantonensis</i> over <i>Triodia</i> spp. Occurs on scarps and dissected areas of eroded Tertiary plateaus; skeletal soils formed largely on the exposed weathered zone.	No concern at present	Very sparse	1
	1.5.4x4	<i>Eucalyptus leucophloia</i> low open woodland often with <i>Corymbia terminalis</i> , <i>Eucalyptus pruinosa</i> or <i>Acacia cambagei</i> to low open woodland with a sparse to mid-dense ground layer dominated by <i>Triodia</i> spp. and/or <i>Eulalia aurea</i> . Occurs on valley floors and flats amongst low metamorphic hills.	Of concern	Very sparse	
Of concern (sub-dominant)	1.7.1x1				
	1.11.2a	Low open woodland of <i>Eucalyptus leucophloia</i> often with <i>Corymbia</i> spp., <i>Terminalia aridicola</i> and <i>E. leucophylla</i> with shrub layer of <i>Acacia</i> spp. and ground layer of <i>Triodia</i> spp. Occurs on steep hills and strike ridges.	No concern at present	Very sparse	5
	1.5.4x4	<i>Eucalyptus leucophloia</i> low open woodland often with <i>Corymbia terminalis</i> , <i>Eucalyptus pruinosa</i> or <i>Acacia cambagei</i> to low open woodland with a sparse to mid-dense ground layer dominated by <i>Triodia</i> spp. and/or <i>Eulalia aurea</i> . Occurs on valley floors and flats amongst low metamorphic hills.	Of concern	Very sparse	
	1.7.1	Low open woodland of <i>Eucalyptus leucophloia</i> and/or <i>Corymbia aspera</i> and/or <i>E. normantonensis</i> over <i>Triodia</i> spp. Occurs on scarps and dissected areas of eroded Tertiary plateaus; skeletal soils formed largely on the exposed weathered zone.	No concern at present	Very sparse	

## 4. POTENTIAL IMPACTS ON ENVIRONMENTAL ATTRIBUTES

This section considers the potential impacts of the exploration drilling program on the environmental attributes of the exploration area with reference to the assessment criteria contained in *RPI Act Guideline 05/14 – Carrying out resource activities and regulated activities in a strategic environmental area*.

### 4.1. Hydrologic processes

The drilling program will be timed to coincide with the onset of the dry season in northern Australia and to avoid periods of flow in the Thornton River and its tributaries. No exploration is proposed in or immediately adjacent to watercourses. All proposed drill sites are located at least 50 metres from a watercourse and will not encroach on the minimum setbacks (3 metres from top of bank, 5 metres from toe of bank) set out in the *Code of environmental compliance for exploration and mineral development projects* (the Code).

Infrastructure associated with the exploration program is largely temporary. With the exception of any access tracks and non-artesian drill holes that may remain on site at the request of the leaseholder, surface disturbance and associated infrastructure will be decommissioned and rehabilitated prior to the onset of the wet season (October-November). Drill holes are to be capped at 300 mm below surface (or at surface level in rock outcrops) and will not impede surface water flows into or out of adjacent watercourses.

Due to the non-porous nature of the underlying geology relative to other areas of the Nicholson GMA, the risk of encountering significant groundwater resources in the target area is considered low. In the unlikely event that drill holes do intersect water-bearing strata, flows will be managed as follows:

- Non-artesian aquifers that intersect more than one water-bearing strata will be isolated by casing or plugging as soon as practical after the hole is no longer required (but no more than 2 months after the hole was drilled) where the flow difference between aquifers exceeds 500L/hour; and
- Exploration drill holes that strike artesian flows that exceed 500L/hour for seven days will be decommissioned as soon as practical (but no later than one month after the hole was drilled); or converted into a controlled artesian bore by a licensed water bore driller (subject to agreement with the land owner and the Department of Natural Resources and Mines); or capped to allow for future conversion by a licensed driller.

Subject to appropriate management as described above, no widespread or irreversible impacts on hydrologic processes associated with the Thornton River and its tributaries are expected as a result of the drilling program.

### 4.2. Geomorphic processes

No widespread or irreversible impacts on natural erosion, sediment transport or deposition is expected as a result of the drilling program. No drilling is proposed in waterways, and the small areas of disturbance proposed in the catchment area would not significantly interfere with natural erosive processes. Existing tracks will be used or upgraded to facilitate site access, minimising the need to create additional disturbance in watercourses. Rehabilitation will be completed for all sites prior to the onset of the wet season.

### 4.3. Riparian processes and water quality

No exploration is proposed in areas containing riparian vegetation communities or within 50 metres of a watercourse. A limited number of drillholes are proposed within 300 metres of a watercourse in a designated precinct (refer map **Strategic Environmental Areas**). Due to the sparse nature of the vegetation in these areas, it is generally possible to orient drill pads to avoid mature trees and minimise the amount of clearing required. In this terrain, sweeping of rocks or ground cover (typically

spinifex) is usually that is needed and only minimal ground breaking is required. Exploration is therefore not expected to have a widespread or irreversible impact on riparian function.

The area of land disturbance is very small, so the potential for significant erosion or adverse effects on water quality is negligible. No release of wastewater directly or indirectly to waterways is proposed. A limited number of diamond drilling sites are proposed as part of the current exploration program. At these sites, drilling water will be directed to sumps; on completion of drilling, this water typically evaporates within three to four days.

#### **4.4. Wildlife corridor function**

Wildlife corridors in the target area are associated with the Thornton River and, to a lesser extent, its tributaries. Due to the nature of exploration drilling, only small areas (0.075 – 0.15 ha) will be disturbed at any one location, with the majority of these disturbances located away from riparian corridors. Vegetation communities in the target area, including those fringing waterways, are naturally sparse (see **Table 3.3** and **Table 3.4**) and are therefore less susceptible to damaging edge effects than, for example, closed forest environments. Further, these disturbances will be temporary, with sites to be rehabilitated prior to the onset of the wet season.

Given the naturally sparse to very sparse vegetation structure, fauna species would be adapted to relatively low cover environments. While the small areas of disturbance may trigger temporary displacement of individual animals, the drilling program would not seriously impede the use of terrestrial vegetation for migration, shelter and habitat associated with watercourses.

#### **4.5. Beneficial flooding**

Infrastructure associated with the exploration program is largely temporary, with surface disturbance and associated infrastructure to be completed and rehabilitated prior to the onset of the wet season. No alteration of natural flow paths or the natural extent of flooding across floodplains will occur as a result of the drilling program.



## 5. REFERENCES

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**ATTACHMENT 1**  
**DRILL SITE LAYOUT CHECKLIST**

# TERRA SEARCH DRILL PROGRAM SITE LAYOUT CHECKLIST

**Date:** \_\_\_\_\_

**Prospect:** \_\_\_\_\_

**Hole Number:** \_\_\_\_\_

**Contractor:** \_\_\_\_\_

**Contractor's Representative:** \_\_\_\_\_

**Terra Search Representative** \_\_\_\_\_

It is important that all personnel involved with the drilling program (including contractors) are aware of the requirements itemized below, and that all personnel participate in this assessment.

ITEM	YES	COMMENTS/ACTIONS	RESP	DATE
<b>SECTION A – Before Rig moves to Site</b>				
Does the drill site provide adequate access for personnel, equipment and vehicles?				
Has adequate provision been made for storm/water drainage from the site to maintain site and rig foundation stability?				
Has the last drill hole been capped?				
Have any cultural heritage areas been identified? If so are they clearly marked so as to avoid disturbance?				
Has the previous site been cleared of rubbish/ oils and have they been disposed of appropriately, including all cigarette butts?				
Is the site free of any potential overhead hazards? (cables, beams, trees etc)				
Is the driller satisfied the site is adequate to access and for the site specific risk assessment to be signed off?				
<b>SECTION B – Before Drilling Commences</b>				
Is there safe fundamentally stable parking for all vehicles that access site?				
Is the driller satisfied sumps are adequate, and are they fenced?				
Is there provision to contain any spill / overflow? If not, what additional measures are required?				

ITEM	YES	COMMENTS/ACTIONS	RESP	DATE
Are the drilling fluids biodegradable?				
If water flows from the hole are anticipated, what provision has been made to handle the water?				
Is there adequate gravel on all work areas in the event the hole should intersect excessive water or in the event of rainfall?				
Are fuel and other flammable materials stored away from working equipment preferably in a cleared area?				
Is Enretech on site?				
Are personnel familiar with the use of Enretech?				
Are MSDSs on site for all chemicals?				
Is Driller aware of current fire bans or restrictions for the area?				
If in high risk fire period is there a Fire Tender and/or fire extinguisher on site?				
Is the rig level and stable?				
Are rig jacks on a suitable foundation?				
If jacks can be locked in position, have they been secured?				
If working at heights, are the fall protection and prevention measures in place, securely fitted and in good working order?				
Is lighting adequate?				
Are No Entry and the obligatory PPE signs displayed at the site entrance?				
Is there adequate PPE on site eg: dust masks, glasses and hearing protection?				
Is there a first aid kit on site?				
Is the driller satisfied the site is adequate and safe for work to commence?				
<b>SECTION C – When Rig Leaves Site</b>				
Has the site been cleared of rubbish?				
Were there any fuel/oil etc spills?				
Have any spills been cleared and disposed of properly?				
Have drains/sumps etc been filled adequately?				
Has the site been levelled adequately?				