APPENDIX C ECOLOGICAL ASSESSMENT

Environmental Management Plan

Wiso Basin

Seismic Survey EP200, 205 & 207

Ecological Assessment for Wiso Basin Seismic Program on EP200, EP205 and EP207

BLUE ENERGY

DOCUMENT CONTROL RECORD

Job	EZ21217
Document ID	211165-65
Author(s)	Tom Ewers-Reilly and Sarah Ryan

DOCUMENT HISTORY

Rev	Reviewed by	Approved by	Issued to	Date
1	Glen Ewers	Tom Ewers-Reilly	Client	21/10/2022

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RELIANCE, USES and LIMITATIONS

EXECUTIVE SUMMARY

EcOz Environmental Consultants (EcOz) was commissioned by Blue Energy to undertake an ecological assessment of a proposed (2D) seismic survey within the exploration permits (EP) 200, 205 and 207 (known as the Wiso Seismic Program), located in the Victoria River District (VRD) in the Northern Territory. This assessment has been undertaken to support the Environmental Management Plan for the seismic program.

The seismic program includes five seismic lines (01A, 02A, 03B, 06A and 06C) (approximate total acquisition length 575 km) and 6 or 7 seismic camps (noting that 10 camp locations have been proposed for planning purposes – most are located in existing cleared areas). The establishment of access tracks will not be required because there are suitable existing access option via public roads and station tracks.

This report provides ecological baseline information that will inform management decisions for the project risk to be 'as low as reasonably possible' (ALARP). It consolidates all matters of conservation significance identified from desktop research and field investigations, with particular consideration of threatened species and significant or sensitive habitat/vegetation which may require management actions beyond the general minimal impact standards.

The assessment was conducted in April 2022, and included land type survey of areas proposed to be cleared, as well as targeted survey and assessment of significant biodiversity values, weeds and land condition.

The main findings of the survey are as follows:

- Greater Bilby were confirmed to occur within the southern parts of lines 03B and 06C, and may be encountered when on Buntine Highway and Lajamanu Roads.
- Snappy Gum are present on the western part of line 06C. These trees can be hollow-bearing (important habitat) and also may be utilised for nesting by Gouldian Finch (threatened species).
- Bullwaddy thickets (important habitat) are present in the northern 5 km of line 03B.
- Riparian vegetation (sensitive vegetation) and waterways are present; however, most intersections will not require clearing because existing road crossings will be utilised.
- A soakage (wetland feature) was identified on the edge of the study area for line 03B.
- Gilgai (wetland feature) are present on line 03B.
- Weed infestation levels are very low within the study area. The northern 50 km of line 02A was the only location where existing weed infestations were observed.
- Land condition was generally in good in areas proposed for clearing, with minor exceptions close to cattle water points/yards and existing tracks / fence lines.

It is noted that line 06A was originally located in bushland area that would have required line preparation activities (i.e. vegetation clearing). This line has been moved to close-by station tracks to avoid significant impact to Aboriginal sacred sites, cultural heritage values and ecological values. Similarly, the western 10km of line 06C has been abandoned to avoid steep terrain, cultural heritage values and riparian vegetation.

The report provides recommendations to avoid significant impact to ecological values identified. If these recommendations are implemented, impacts to ecological values will reduce project risk to be 'as low as reasonably possible' (ALARP).

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1 INTRODUCTION

EcOz Environmental Consultants (EcOz) was commissioned by Blue Energy to undertake an ecological assessment of a proposed (2D) seismic survey within the exploration permits (EP) 200, 205 and 207 (the Wiso Seismic Program), located in the Victoria River District (VRD) in the Northern Territory (Figure 1-1). This assessment has been undertaken to support the Environmental Management Plan (EMP) for the seismic program.

This report provides ecological baseline information that will inform management decisions for the project risk to be 'as low as reasonably possible' (ALARP). It consolidates all matters of conservation significance identified from desktop research and field investigations, with particular consideration of threatened species and significant or sensitive habitat/vegetation which may require management actions beyond the general minimal impact standards.

Field work and report authorship was led by Tom Ewers-Reilly (Senior Ecologist, EcOz), who has worked as an ecological consultant in the NT since 2002.

1.1 Project description / brief

Project components are shown on Figure 1-1. The seismic program includes five seismic lines (01A, 02A, 03B, 06A and 06C) (approximate total acquisition length 575 km) and 6 or 7 seismic camps (noting that 10 camp locations have been proposed for planning purposes) (see Table 1-1). The establishment of access tracks will not be required because there are suitable existing access option via public roads and station tracks (potential access tracks to be used are shown on Figure 1-1)

Three seismic lines are positioned on main roads / station tracks and will not require vegetation clearing – 01A (Buchanan Highway), 02A (Lajamanu Road) and 06A[1] (station tracks on Riveren Station). The remaining two lines (03B and 06C) are located within open bushland areas and will therefore require vegetation clearing as part of line preparation works. Seismic lines will have an approximate width of 5m.

Camp pad dimensions will be approximately 80 x 100 m. Of the ten locations selected, four will require pad to be cleared (camp options 1a, 1b, 2 and 3), and six are within existing clearings (camp options 4, 5, 6, 7, 8 and 9). Locations are strategically positioned to minimise the number of camps required for the seismic survey (i.e. centrally positioned), to minimise vegetation clearing (i.e. positioned within existing cleared / disturbed areas), to avoid significant habitat areas or threatened species, and to avoid impacts to cultural heritage values (as identified by AAPA and Archaeological Assessment).

Table 1-1. Seismic program details

Line	EP	Stations	Length	Camps	Notes
01A	EP200	Bunda, Inverway, Riveren	15 km	7, 8, 9	Buntine Highway corridor
02A	EP207	Wave Hill	140 km	4, 5, 6	Lajamanu Road corridor
03B	EP205	Cattle Creek	120 km	1a, 1b, 2	Will require line preparation
06A	EP200	Riveren	80 km	None	Will require line preparation
06C	EP205, EP207	Wave Hill, Cattle Creek	95 km	3	Riveren station tracks

[1] It is noted that seismic line 06A was previously located in a bushland area that required vegetation clearing; however, the AAPA survey (and subsequent reconnaissance cultural heritage assessment) identified the entire corridor to be a Restricted Works Area (RWA) due to presence of sacred sites and Aboriginal archaeological sites that could not be suitably avoided. Subsequently, Blue Energy decided to abandon that alignment and utilise existing station tracks so that land and vegetation disturbance will not be required (and thereby avoid impacts to cultural sites). A subsequent Authority Certificate for this re-alignment is being sought with AAPA.

1.2 Study area

The ecological *study area* consists of a 500 to 600 m corridor for seismic lines within bushland areas (line 03B and 06C), and a 300 m corridor for lines to occur on existing roads (lines 01A, 02A and 06C). This is the same clearance area that was used for the Aboriginal Areas Protection Authority (AAPA) Authority Certificate(s). The seismic line is generally expected to be positioned within the centre of the currently proposed corridor; however, assessment of the wider corridor area provides flexibility for final alignment to avoid/minimise impacts to environmental and cultural heritage values.

The original alignment of line 06A occurred within bushland areas; however, this alignment has since been abandoned and moved to close by station tracks (to avoid impacts to sacred sites, cultural heritage values, and ecological values). Survey results of the original line have been included in this report; but only high-level details are included in order to validate reasoning for moving the line to existing tracks is the best approach to minimise impacts. This line has been referred to as 06A (abandoned) and the proposed alignment on station tracks is referred to as 06A.

1.3 Scope

The ecological assessment mainly focused on seismic lines 03B and 06C because these lines and the associated camps will require vegetation clearing.

The scope of this ecological assessment is to:

- Conduct a desktop review to provide general environmental overview of the study area, and to identify key ecological values that potentially occur within the study area (that require field investigation).
- Describe and map land types for seismic lines and camps that will require vegetation clearing (seismic lines 03B and 06C, and associated camp locations). Land type mapping was not undertaken for 01A, 02A and 06A because they are positioned on existing roads or tracks.
- Assess the likelihood of occurrence (within the study area) of threatened species or threatened ecological communities protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or the *Territory Parks and Wildlife Conservation Act* (TPWC Act). This may involve field investigations where appropriate.
- Describe and map sensitive or significant vegetation communities within the study area (as defined by the Northern Territory *Land Clearing Guidelines*; DEPWS 2021).
- Describe and map the presence of drainage areas, wetlands and waterways within the study area.
- Describe and map the existing level of weed infestation within the study area
- Recommend strategies to avoid or mitigate potential impacts to ecological values identified by the above scope items.

The survey was conducted under the following permits / licences:

- A20009: fauna studies in the Northern Territory (Animal Ethic Permit, CDU)
- Permit No. 68560: Permit to Interfere with Wildlife for Commercial Purposes (Parks and Wildlife)
- Licence No. 038: Licence to use premises for teaching or research involving animals (DITT).

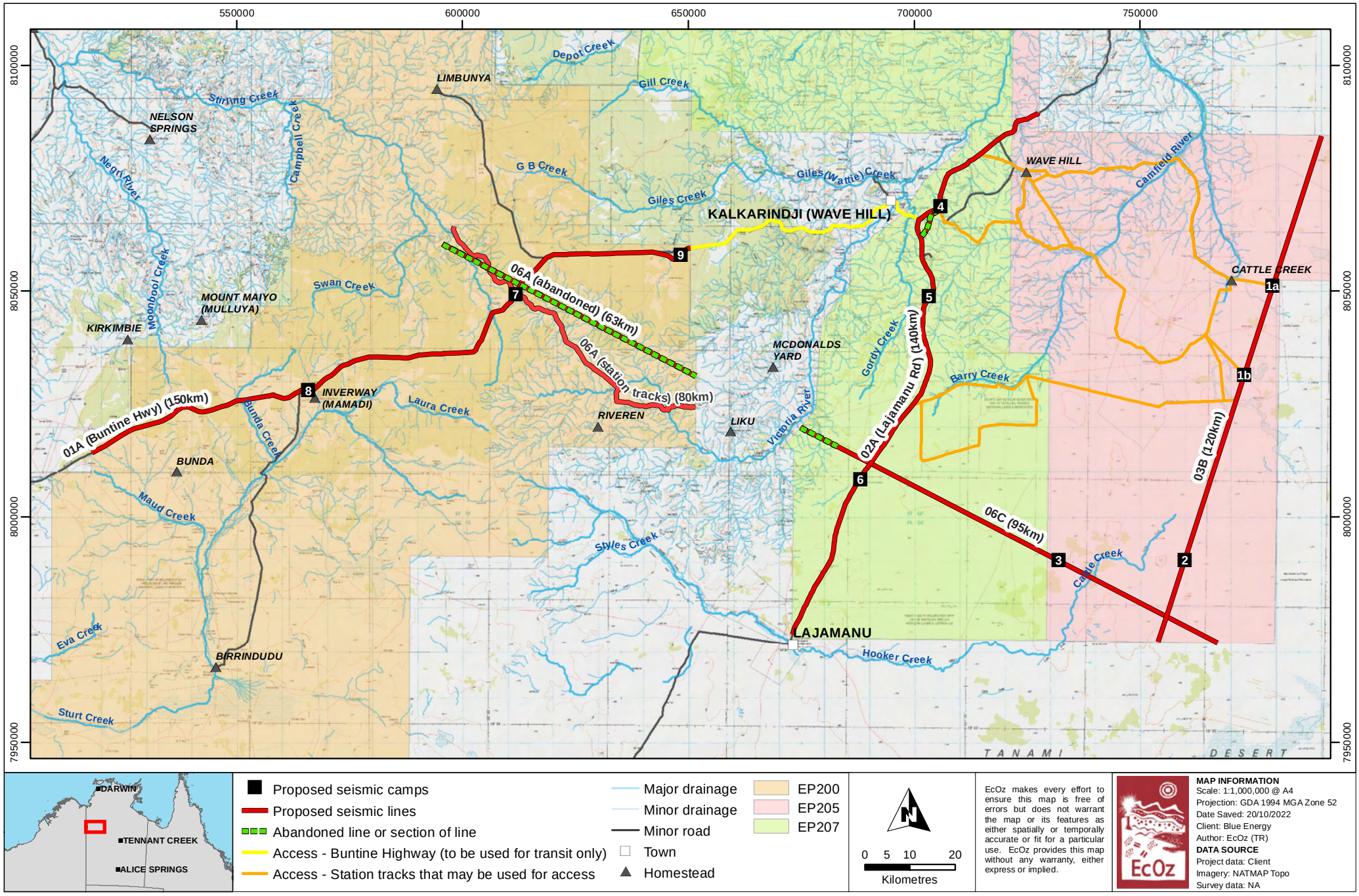

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Figure 1 1. Map of Wiso seismic program

2 LEGISLATIVE FRAMEWORK

Key legislation relevant to ecological components of the project is described in this chapter.

2.1 Commonwealth

Environment Protection and Biodiversity Conservation Act 1999 (*EPBC Act*)

Assessment under this Act is required for actions that are likely to have a significant impact on a prescribed Matter of National Environmental Significance – the most common of which, in Central Australia, are migratory and threatened species.

The Department of Climate Change, Energy, the Environment and Water (DCCEEW) administers the Act and has established a formal referral and assessment process. If DCCEW determines that a project will likely significantly impact a matter of national significance it is declared a 'controlled action' and is required to undergo assessment and approval under the *EPBC Act*. In the Northern Territory this will be through the bilateral agreement between the Northern Territory and Commonwealth governments. If the project is not a controlled action, assessment will proceed under the Northern Territory legislative approvals process.

2.2 Northern Territory

Territory Parks and Wildlife Conservation Act (TPWC Act) and Regulations

The *TPWC Act* makes provision for, and in relation to, the establishment of Parks and the study, protection, conservation and sustainable utilisation of wildlife. All native wildlife cannot be removed or interfered with without a permit. The Act also provides for additional protection for listed threatened species.

Environment Protection Act (*EP Act*)

The *EP Act* establishes the framework for the assessment of potential or anticipated environmental impacts of a development. The object of the *EP Act* is to ensure that matters affecting the environment to a significant extent are fully examined and taken into account in decisions by the Northern Territory Government. The Northern Territory Minister for DEPWS is responsible for administering the Act, and determines the appropriate level of assessment for new developments or material changes to existing operations, based on the sensitivity of the local environment, the scale of the proposal and its potential impact upon the environment.

Weeds Management Act and Regulations

The *Weeds Management Act* is administered by the DEPWS. The Act provides for certain species of plant to be declared weeds. All declared weeds must be managed according to their classification and all attempts must be made to prevent the introduction of weeds on to and off site. Section 9 of the Act establishes the responsibilities of land-owners and occupiers for managing 'declared weeds'.

Petroleum (Environment) Regulations

The Petroleum (Environment) Regulations require submission of an Environment Management Plan (EMP) prior to any petroleum exploration or production activity. This ecological assessment constitutes a component of the EMP for the proposed seismic program. The EMP must demonstrate how the requirements of the *Code of Practice: Onshore Petroleum Activities in the Northern Territory* will be met. The Code stipulates that the planning, design, location and construction of petroleum infrastructure must have regard to the considerations in the *Land Clearing Guidelines* (DEPWS 2021).

3 DESKTOP REVIEW

The desktop review has been undertaken to provide regional context for the ecological assessment, provide relevant background information on existing environment, and to identify key ecological values that may require field studies and/or management considerations.

3.1 Climate

The seismic program is located within the Victoria River District (VRD), which has a hot semi-arid monsoonal climate distinguished by two main seasons, the Wet and Dry (Napier & Hill 2012). The Wet season usually occurs between November to April and is characterised by high temperatures, humidity and rainfall. The Dry season usually occurs between May and October and is characterised by lower humidity, cooler temperatures, minimal rainfall and regular east to south-easterly winds.

The closest long-term Bureau of Meteorology weather station is Wave Hill (station number 014840). Average annual rainfall is 687.7 mm; however, the amount of rainfall across the region can be highly variable across the region and across years. For example, 2001 experienced 1,201.8 mm of rain, while 2002 experienced 343.3 mm of rain. Average maximum temperatures range from 28.2ºC in June to 38.7ºC in November, and average minimum temperatures range from 10.9ºC in July to 24.6ºC in December.

3.2 Land use

The primary land use within the region of the study area is cattle grazing of native pastures. The locality (VRD) is regarded as the most productive pastoral district in the NT (Napier & Hill 2012). The seismic project occurs within five pastoral stations – Cattle Creek, Wave Hill, Riveren, Invermay (Mamadi) and Bunda (see Figure 1-1). Ecologically speaking, pastoralism can result in adverse impacts such as increased weeds, erosion development, degradation of wetlands and riparian habitats, changes to soil surface structure/infiltration, water source degradation and altered fire regimes (DEWHA 2009). However, the level of impacts on biodiversity will be dependent on the management of station (i.e. stocking rates, provision of artificial water-points and prescribed burns), and also the sensitivity of vegetation communities to grazing. The level of pastoral impact on the environment within the study area was described during field studies.

Although Aboriginal Land Trusts (ALT) and Indigenous Protected Areas (IPA) are present in the area surrounding the seismic program, no seismic works are planned to occur within these areas.

3.3 Bioregion

The study area occurs within three bioregions – Ord River Plain, Tanami and Sturt Plateau (Figure 3-1). The majority of the study area occurs within the Ord River Plain bioregion which is characterised by scattered hills and plains, with sparse trees and short to medium grass layer (Baker et. al. 2005). The adjacent Sturt Plateau is characterised by gently undulating plans with *Eucalypt* woodlands with tussock grasses and areas of *Acacia* thickets and bull waddy woodlands (Baker et. al. 2005). The Tanami is mainly comprised of desert sandplains with small areas of exposed hills and ranges, supporting mixed shrub steppes, shrublands and hummock grass communities (Baker et. al. 2005).

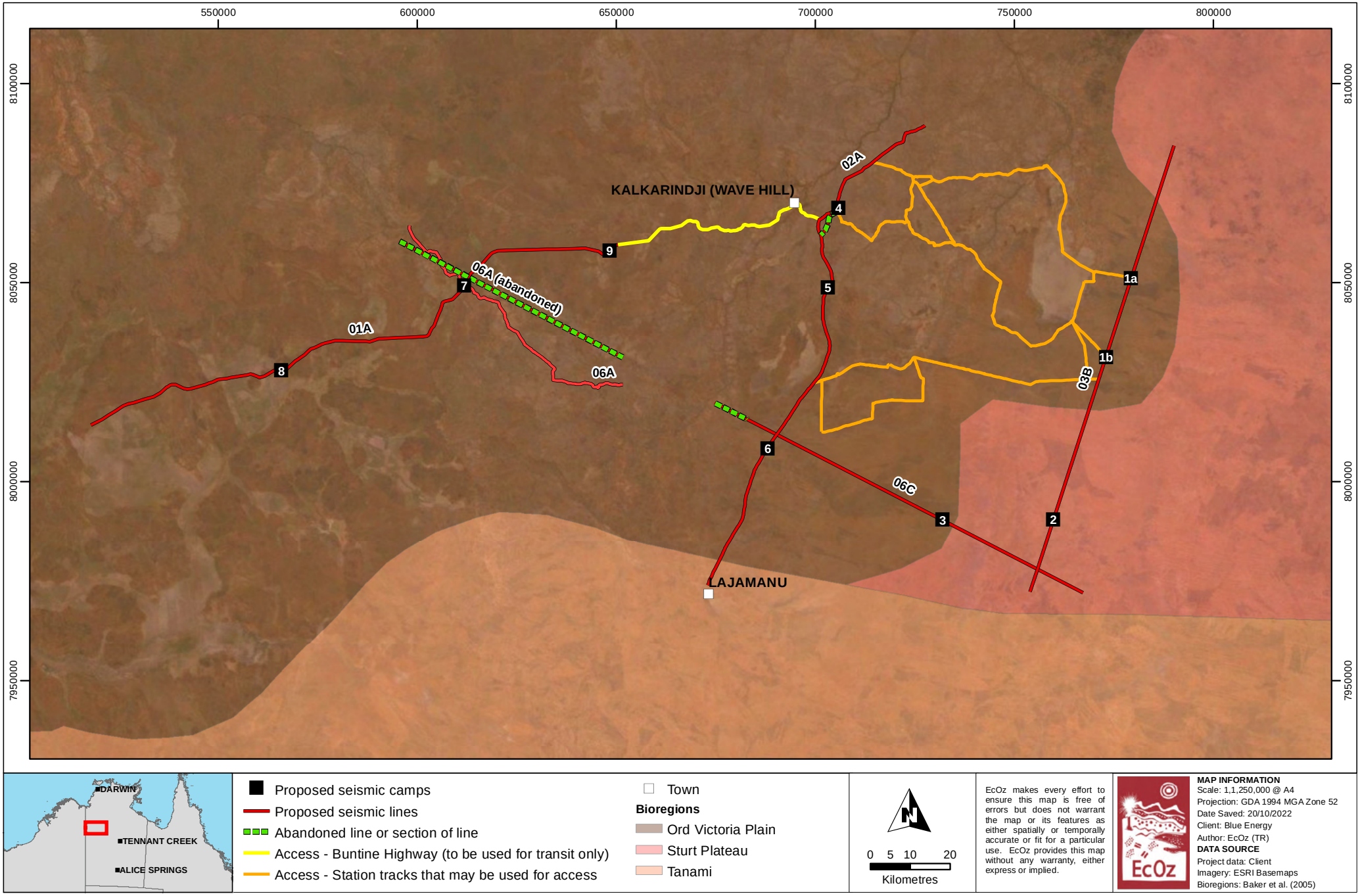

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Figure 3 1. Map of bioregions relevant to the seismic program

3.4 Land resource information

3.4.1 Land systems

Land system mapping is available within the region at a scale of 1:1,000,000 (Stewart et al. 1970). The study area for the seismic program intersects 12 land systems (described in Table 3-1; mapped in Figure 3-2). Seismic lines 03B and 06C are mainly situated within the desert sandplains associated with the northern Tanami Desert, while lines 01A, 02A and 06A are situated within the plateau and elevated land systems (which have more variation in topography and drainage networks).

Table 3-1. Summary of the land systems relevant to the proposed seismic program

Land system	Landform	Soil	Vegetation
Desert sandplains			
Redsan	Undulating plains comprising of gentle slopes, low crests, and shallow linear depressions.	Deep sandy soil predominantly deep red or deep yellow in colouration, superimposing laterised Lower Cretaceous sediments and lacustrine sandstones.	Sparse low woodland dominated by *Corymbia polycarpa, Eucalyptus agrillacea, Corymbia setosa*, *Eucalyptus microtheca,* and/or *Corymbia ferruginea*. The understorey is typically comprised of hummock grassland (*Triodia pungens*) or *Aristida pruinosa*.
Desert dunefields			
Soils Atlas_B32	Dune fields of parallel linear dunes, reticulate dunes and/or irregular dunes.	Chief soils are the red siliceous sands of the dunes which have stable flanks and partially mobile crests. Associated are sands in the swales with small areas of soils with calcrete; soils; shallow soils on calcrete; some gypsum deposits; and some soils. Some narrow valleys with areas of calcrete and gypsum deposits may be included	Not available
Clay plains			
Inverway	Flat fluvial and swamp plains, with very small areas of low linear rises, depressions, and stream channels.	Grey cracking clays, with some brown cracking clays.	Dominated by *Astrebla pectinata*. Very small areas of low woodland comprising *Eucalyptus microtheca* and *Acacia stenophylla. Themeda avenacea* and *Eulalia aurea*, and *Chenopodium auricomum* and *Duma florulenta* associations are also present.
Limestone plains and rises			
Barry	Gently sloping undulating dunes.	Predominantly brown sandy loam transitioning into dark red clay, with areas of grey sandy loams transitioning into yellow clay. Limestone outcrops are sparsely distributed.	Predominantly shrubland (or sparse low woodland) with *Triodia pungens* the dominant understorey species. Arid short grass (*Enneapogon* spp.) may also be present.
Gordan	Low hills and undulating slopes with stream lines.	Mostly shallow grey to yellow-brown calcareous loamy soils. Exposed limestone outcrops also common. Grey and brown cracking clays are present, although only seen in small areas.	Predominantly low woodland characterised by *Eucalyptus brevifolia* and *Enneapogon spp.* association.
Limestone hills			
Humbert	Mostly boulder limestone hills, with small areas with gentle slopes and stream lines.	Exposed limestone boulders and outcrops. Shallow grey to yellow-brown calcareous loamy soils, brownish loam transitioning into dark red clay, and greyish sandy-loam transitioning into yellow clay is also present.	Low woodland characterised by *Eucalyptus brevifolia* and *Enneapogon spp.* association on limestone hills. *Eucalyptus pruinosa* and *Corymbia terminalis* may be present on the gentle slopes.

Land system	Landform	Soil	Vegetation
Basalt hills			
Antrim	Flat-topped and rounded hills, with some areas characterised by moderate to gentle slopes and stream channels.	Predominantly exposed basalt boulders and outcrops with some red clayey soils. Small areas of brown loam transitioning into red clay, grey and brown cracking clays, and miscellaneous alluvial soils are also present.	Predominantly low woodland characterised by *Eucalyptus brevifolia* and *Enneapogon* spp. association or Corymbia terminalis and *Sorghum stipoideum* association. *Eucalyptus agrillacea* may also be present.
Basalt plains and rises			
Frayne	Predominantly undulating terrain, with moderate to gentle slopes. Hills, alluvial floors, and stream channels are also present, although uncommon.	Brown loam transitioning into dark red clay is common, although grey and brown cracking heavy clay and shallow grey to yellow-brown calcareous loamy soils can be observed. Rocky outcrops and alluvial soils are also present.	*Corymbia terminalis, Eucalyptus agrillacea* or *Eucalyptus pruinosa* dominated low woodland with *Themeda australis, Sehina nervosum,* and *Chrysopogon fallax* is the most abundant vegetation community.
Wave Hill	Undulating terrain, comprising mostly of moderate to gentle slopes.	Predominantly grey and brown cracking clays. Shallow grey to yellow-brown calcareous loamy soils and brown loam transitioning into dark red clay are present in small areas. The underlying substrate is largely basalt.	Predominantly grasslands dominated by *Astrebla pectinata*, *Dichanthium fecundum*, *Panicum* spp. and *Yakirra* spp.
Lateritic plateaux			
Franklin	Rugged, hilly terrain with flat-topped peaks and small gullies. Small dissection scarps, stream channels, valley floors, and gentle slopes are present in some areas.	Predominantly shallow reddish soils superimposing laterised sediments and volcanics. Red brown clay loam, grey cracking clay, brown cracking clay, and brown loam transitioning into dark red clay can also be observed. Ferruginous gravel is present throughout.	Low woodland characterised by *Eucalyptus brevifolia and Triodia pungens* association. *Corymbia terminalis* and *Corymbia dimicrophloia* may also constitute part of the overstorey. *Themeda australis* and *Sorghum australiense* are present on the upper and lower slopes, whilst *Astrebia pectinata* and *Aristida latifolia* can be observed on the valley floors.
Elevated plateaux surfaces			
Geebee	Undulating slopes comprising mostly of upper slopes and crests. Gentle lower slopes and shallow linear depressions with stream lines may also be present.	Red-brown clay loam overlying laterite, with gravel interspersed throughout. Some areas contain brown or grey sandy loam merging into dark red or yellow clay.	Sparse low woodland, typically comprising of *Eucalyptus brevifolia* or *Corymbia dimicrophloia* (or occasionally *Eucalyptus pruinosa* or *Eucalyptus agrillacea). Triodia pungens* is commonly observed.
Rugged quartz sandstone plateaux and hills			
Wickham	Rugged terrain comprising of flat-topped hills, cuestas, ridges, and gentle slopes.	Mainly rocky outcrops with very small areas of grey loam transitioning into yellow clay, shallow calcareous loamy soils, and miscellaneous alluvial soils.	Low woodland characterised by *Eucalyptus brevifolia* with *Triodia pungens* and *Triodia bitextura*. Very small areas of *Corymbia terminalis* and *Eucalyptus agrillacea*.

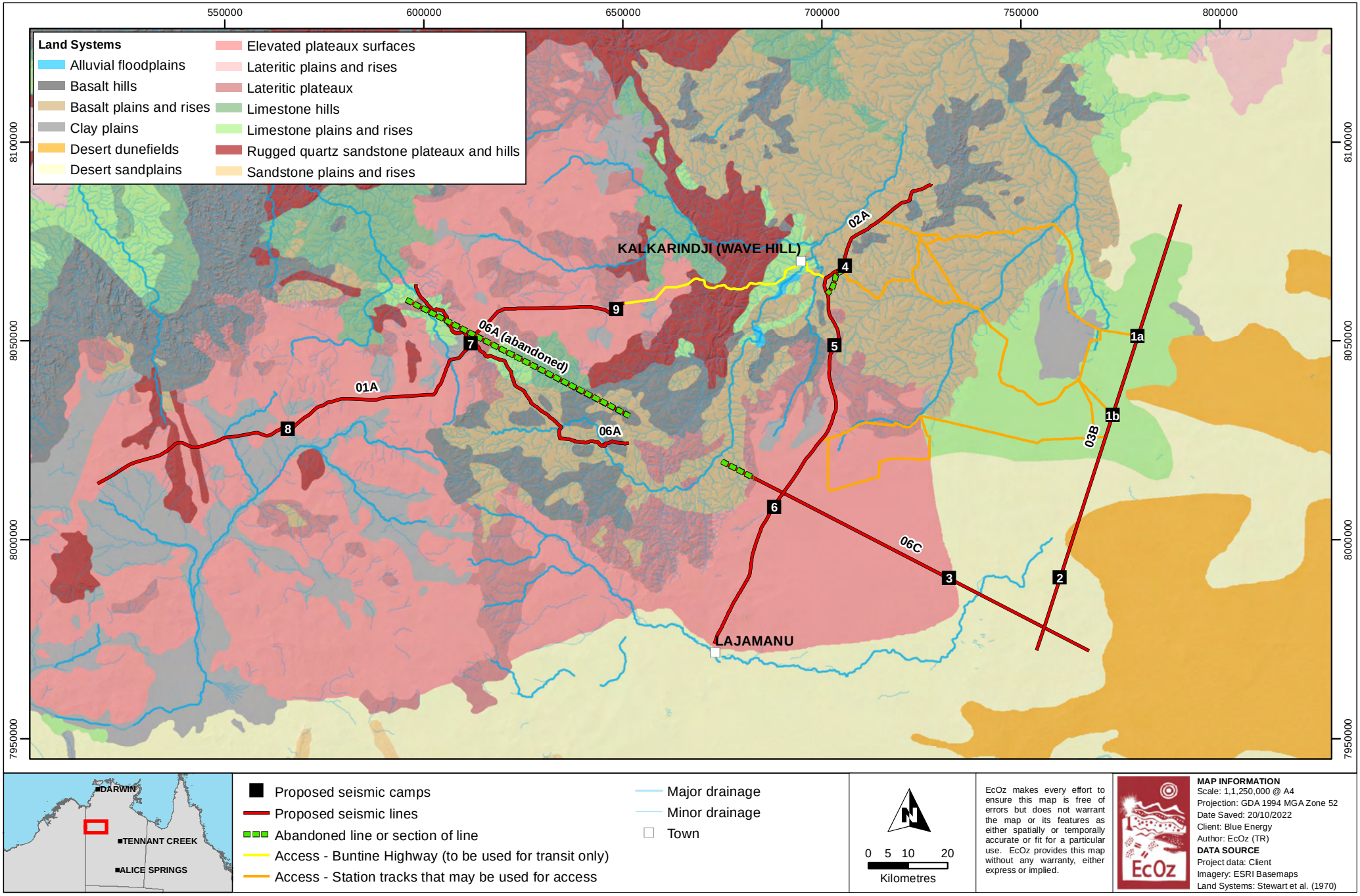

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Figure 3-2. Map of land systems within and surrounding the study area

3.4.2 Land units

Land unit mapping is available within the project area at a scale of 1:100,000 (*Land Resources of the Victoria River District*, Napier & Hill 2012). This dataset provides a finer scale dataset (than Land Systems) on landform types, soils and vegetation. Land units will be used as a key resource for the land type survey for the project area (see Section 4.1), and also for identifying areas (at the desktop stage) that may support habitat suitable for threatened species, sensitive vegetation types, drainage potential and erosion risk.

A total of 61 land units occur within in the study area (mapped in Figure 2-3). This dataset confirms that landscape complexity is higher within the northern region of the study area, associated with plateau, rises, hills, scarp, side slopes, alluvial plains and drainage systems. This is in contrast to the ubiquitous desert plains present in the southern and western region of the study area. It is noted that seismic activity proposed in the northern area has been positioned to occur on existing roads and tracks to avoid new disturbances within this area (i.e. lines 01A, 02A and 06A).

A total of 18 land units occur within the two seismic lines positioned in areas that will require vegetation clearing (lines 03B and 06C), most of which are associated with plains within the desert sandplain land systems and small intersection of an alluvial plain drainage system. The western 10 km of seismic line 06C intersects scarp, rises, low hills, side slopes and numerous associated drainage lines, and Blue Energy have since advised that this section of line will be abandoned for this phase of the project.

3.4.3 Vegetation communities (NVIS)

Vegetation communities within, and surrounding, the study area are summarised in Table 3-1 and mapped in Figure 3-4 (sourced from National Vegetation Information System NVIS version 5.1). The main communities intersected by seismic lines that require vegetation clearing (lines 03B and 06C) are woodland communities (334, 348, 1020, and 1043) and hummock grasslands (418 and 1032). The remaining areas are located on existing roads and will not require vegetation clearing.

Table 3-2. NVIS vegetation community descriptions within the study area

NVIS ID	Vegetation description	Landform	Seismic lines
WOODLAND COMMUNITIES			
334	*Eucalyptus* low woodland (*Eucalyptus pruinosa*, +/- *Corymbia terminalis, Melaleuca citrolens*); mid-sparse shrubland (*Carissa lanceolata, Flueggea virosa*); over tussock grassland understorey (*Chrysopogon fallax, Sehima nervosum*, +/-*Themeda triandra*)	Flat to gently undulating plains and on lower slopes of hills, deep red or yellow earths, some clayey loam to clay soils	03A 06A (road) 06C
348	*Eucalyptus* low open woodland (*Eucalyptus brevifolia*, +/- *Corymbia dichromophloia*, *Corymbia ferruginea*); mid-sparse shrubland (*Grevillea parallela, Acacia lysiphloia, Acacia alleniana*); over hummock grassland (*Triodia pungens*)	Well drained rises, dissected plateaux and rocky low hills. Gravelly loams and sandy red earths	01A (road) 02A (road) 06A (road) 06C (western abandoned section)
394	*Macropteranthes* low woodland (*Macropteranthes kekwickii, +/- Acacia shirleyi*) over tussock grassland (*Chrysopogon fallax, Paspalidium rarum, Mnesithea formosa*)	Shallow depressions	03A (northern)
1043 (linked to 394)	*Macropteranthes* low woodland / tall shrubland (*Macropteranthes kekwickii)* with open-tussock grassland understorey (*Aristida inaequiglumis, Setaria apiculata, Melhania oblongifolia*). Other shrub and low trees species include *Bauhinia cunninghamii, Gyrocarpus americanus,*	Undulating plains, sandy or gravelly lateritic soils, flanking shallow drainage floors	03A (northern)

NVIS ID	Vegetation description	Landform	Seismic lines
	Corymbia dichromophloia, Eucalyptus pruinosa, Atalaya hemiglauca.		
1020	*Eucalyptus* low woodland (*Corymbia terminalis*, *Eucalyptus chlorophylla, Eucalyptus pruinosa*); mid-sparse shrubland (*Carissa lanceolata, Hakea arborescens, Terminalia canescens*); over tussock grassland understorey (*Sehima nervosum*, *Chrysopogon fallax*, *Heteropogon contortus)*	Gently undulating or flat plains with clays or yellow earth and some gravelly loam soils	02A (road) 06A (road) 06A (western)
OPEN WOODLAND COMMUNITIES			
392	*Acacia* mid-woodland (*Acacia shirleyi, Eucalyptus spp.*) over tussock grassland (*Eriachne ciliata, Chrysopogon fallax, Paspalidium rarum*)	Lateritic sandstone outcrops, plateaux, breakaways, plains	01A (road 06A (road)
TUSSOCK GRASSLAND COMMUNITIES			
388	*Astrebla* tussock grassland (*Astrebla squarrosa, Dichanthium fecundum, Chrysopogon fallax*) with scattered trees and shrubs (*Terminalia arostrata, Corymbia terminalis*, +/- *Terminalia volucris*)	Plains with mainly grey and brown cracking clay soils over basic volcanic rocks	02A (road) 06A (road)
428	*Astrebla* tussock grassland (*Astrebla pectinata, Iseilema vaginiflorum, +/- Iseilema membranaceum*) with Acacia tall sparse shrubland (*Acacia victoriae, Vachellia farnesiana*)	Plains, deep grey cracking clays over tertiary alluvium	01A (road) 06A (road)
HUMMOCK GRASSLAND COMMUNITIES			
418	*Triodia* hummock grassland (*Triodia pungens*), +/- *Triodia schinzii, Eragrostis eriopoda*) with Acacia tall sparse-shrubland overstorey (*Corymbia deserticola, Acacia torulosa, Acacia stipuligera, Brachychiton paradoxus*). Some areas support a distinct *Corymbia setosa* dominated overstorey	Sand dunes	03A
1032	*Triodia* hummock grassland (*Triodia pungens*, *Triodia schinzii, +/- Yakirra australiensis*) with Acacia tall sparse-shrubland overstorey (*Acacia stipuligera, +/- Grevillea wickhamii*); low isolated trees (*Eucalyptus pruinosa, Corymbia opaca, +/- Eucalyptus setosa*)	Red siliceous sandy soils	03A 06C

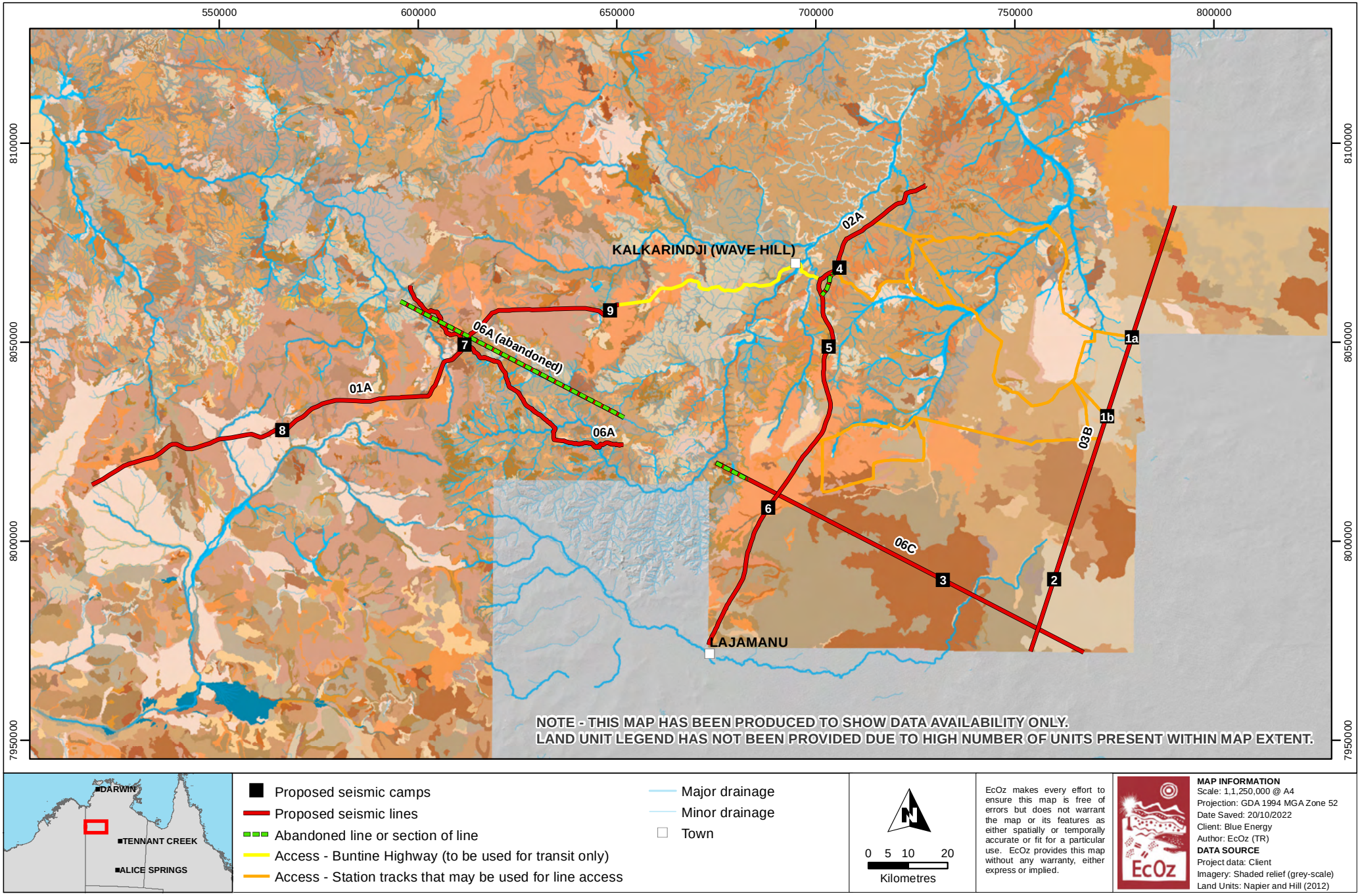

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Figure 3-3. Map of land unit data available in the region of the seismic program

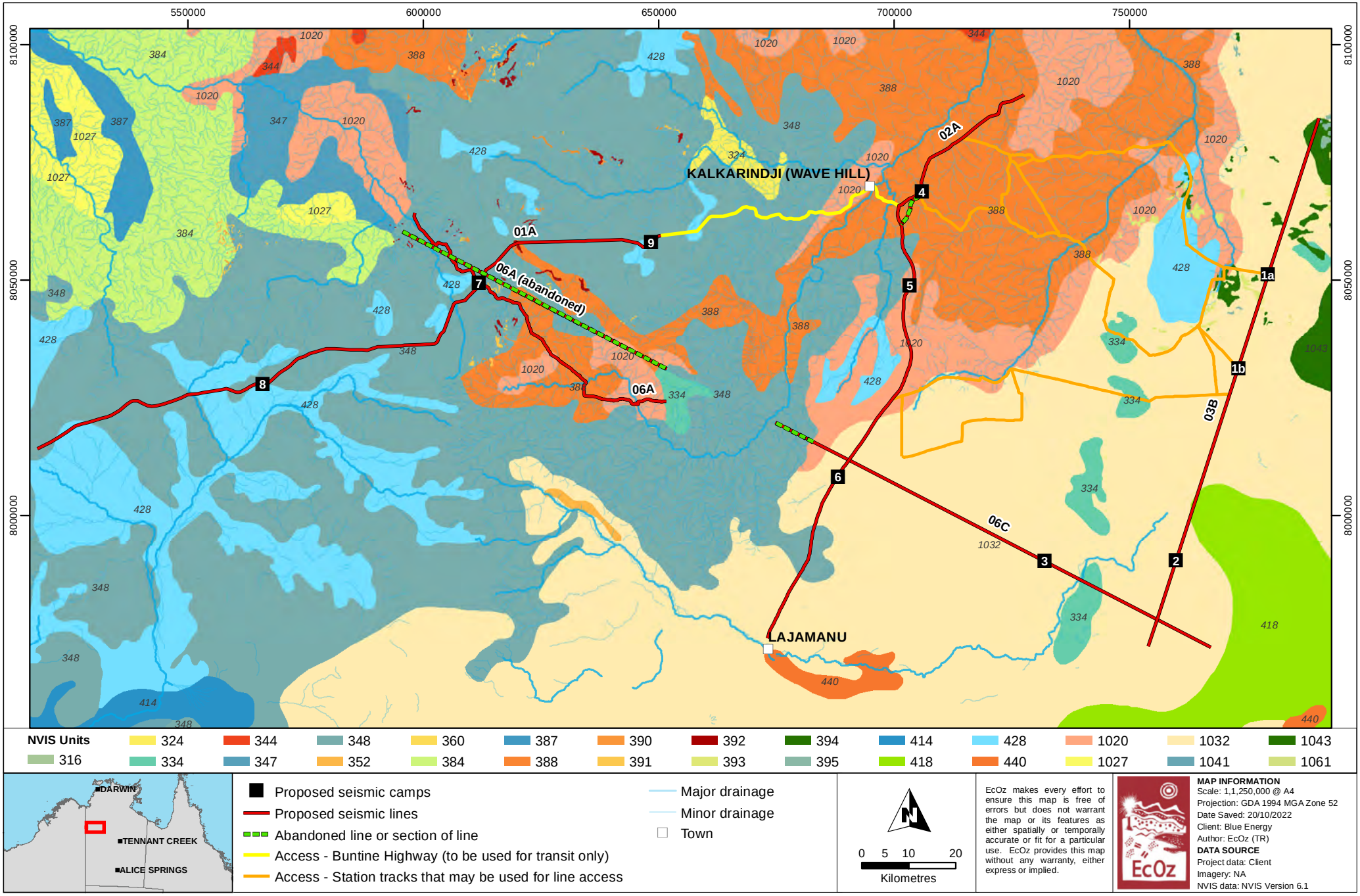

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Figure 3-4. Map showing NVIS vegetation communities within the study area and surrounds

3.5 Significant biodiversity values

3.5.1 Threatened species

A desktop threatened species 'likelihood of occurrence' assessment was undertaken to identify which species have a reasonable chance of occurring within the study area, and those that can be reasonably excluded from further consideration because likelihood of occurrence is inherently low (procedure explained in Appendix B).

A total of 32 threatened species were assessed (results summarised in Table 3-3; assessment provided in Appendix B). Four species are considered to have a reasonable chance of occurring within the study area (i.e. 'high' or 'medium' likelihood of occurrence) – Gouldian Finch, Greater Bilby, Grey Falcon and Purple-crowned Fairy-wren (NT Atlas records for these species are shown on Figure 3-5). As such, these species have been subject to field assessment to confirm likelihood of occurrence and (if applicable) recommend management options to avoid significant impact to these species (refer to Section 4.2).

The remaining 28 species are considered as unlikely to occur within the study area (i.e. 'low' or 'none') and as such do not require further assessment as potential occurrence/impacts to these species is considered to be inherently low (refer to Appendix B for justifications).

Table 3-3. Threatened species 'likelihood of occurrence' assessment summary

Likelihood	Species	Class	EPBC	TPWC
HIGH	Gouldian Finch *(Erythrura gouldiae)*	Bird	EN	VU
	Greater Bilby *(Macrotis lagotis)*	Mammal	VU	VU
MEDIUM	Grey Falcon (*Falco hypoleucos*)	Bird	VU	VU
	Purple-crowned Fairy-wren (western) *(Malurus coronatus coronatus)*	Bird	EN	VU
LOW	Red Goshawk *(Erythrotriorchis radiatus)*	Bird	VU	VU
	Partridge Pigeon (eastern) *(Geophaps smithii smithii)*	Bird	VU	VU
	Painted Honeyeater *(Grantiella picta)*	Bird	VU	VU
	Night Parrot (*Pezoporus occidentalis*)	Bird	EN	CR
	Princess Parrot *(Polytelis alexandrae)*	Bird	VU	VU
	Masked Owl (northern mainland) *(Tyto novaehollandiae kimberli)*	Bird	VU	VU
	Crested Shrike-tit (Northern) (*Falcunculus frontatus whitei*)	Bird	VU	NT
	Fawn Antechinus (*Antechinus bellus)*	Mammal	VU	EN
	Northern Quoll *(Dasyurus hallucatus)*	Mammal	EN	CR
	Pale Field-rat *(Rattus tunneyi)*	Mammal	-	VU
	Northern Brushtail Possum *(Trichosurus vulpecula arnhemensis)*	Mammal	VU	NT
	Plains Death Adder *(Acanthophis hawkei)*	Reptile	VU	VU
	Mertens' Water Monitor *(Varanus mertensi)*	Reptile	-	VU
	Mitchell's Water Monitor *(Varanus mitchelli)*	Reptile	-	VU
	Yellow-spotted Monitor *(Varanus panoptes)*	Reptile	-	VU
	Largetooth Sawfish *(Pristis pristis)*	Fish	VU	VU
	Behn River Keeled Snail *(Ordtrachia australis)*	Invertebrate	-	EN
NONE	Curlew Sandpiper *(Calidris ferruginea),* Australian Painted-snipe *(Rostratula australis),* Western Quoll *(Dasyurus geoffroii),* Golden Bandicoot *(Isoodon auratus),* Bare-rumped Sheath-tailed Bat *(Saccolaimus saccolaimus nudicluniatus),* Common Brushtail Possum (central) *(Trichosurus vulpecula vulpecula),* Gulf Snapping Turtle *(Elseya lavarackorum),* Hawksbill Turtle *(Eretmochelys imbricata),* Great Desert Skink *(Liopholis kintorei),* Fitzroy Land Snail *(Mesodontrachia fitzroyana),* Rosewood Keeled Snail *(Ordtrachia septentrionalis),* Victoria River Squat Snail *(Trachiopsis victoriana)*			

CR = Critically Endangered; EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern' "-" = not listed

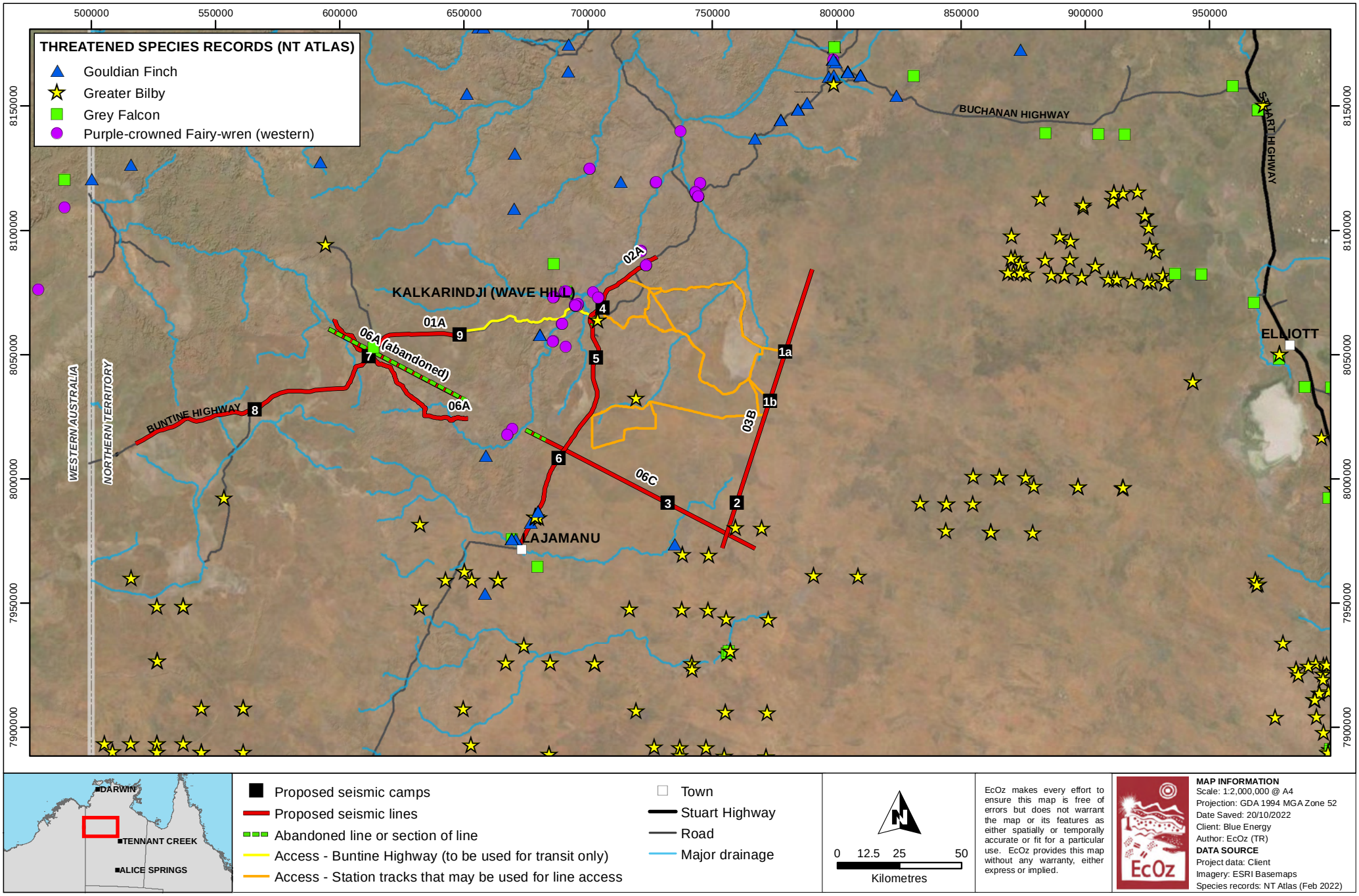

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Figure 3 5. Map of regional records for threatened species considered to have a high or medium likelihood of occurrence within the study area (desktop phase)

3.5.2 Migratory species

The EPBC Protect Matters Search Tool report identified 16 listed migratory species that are known, or have potential, to occur in the region (see Appendix A). However, very few migratory species have been recorded within the region because it does not support habitat typically utilised by migratory species that can occur in the region. There are no recent records of migratory species within the study area.

3.5.3 Conservation areas

The study area does not intersect any recognised conservation areas; however, several occur in the surrounding region (see Figure 3-6). The only conservation area that is proximate to the seismic project is the Hooker Creek and Floodout Sites of Botanical Significance (SOBS) which is considered to hold bioregional significance (White et al. 2000) (shown on Figure 3-6). It borders the southern end of line 02A (which is located on Lajamanu Road so no vegetation clearing is required). Lajamanu township also occurs within this SOBS.

3.5.4 Sensitive or significant vegetation types

Sensitive or significant vegetation types are those considered as significant under the *Land Clearing Guidelines* (DEPWS 2021) due to their unique and/or inherently high biodiversity values. They include rainforest, vine thicket, closed forest or riparian vegetation, mangroves, monsoon vine forest, sand sheet heath and vegetation containing large trees with hollows suitable for fauna.

The desktop analysis indicates that two sensitive or significant vegetation types are likely to occur of the study area – riparian vegetation (discussed further in Section 3.5.5) and large trees with hollows. Available datasets have been used to map extent within the region of the study area (shown on Figure 3-6). These were investigated as part of field studies.

Land unit mapping and NVIS data indicates that the study area does not support vegetation communities with species that are known to bear large tree hollows (such as *Eucalyptus miniata* and *E. tetrodonta*). However, there are several communities that support smaller hollow-bearing tree species that may be of significance – such as Snappy Gum (*Eucalyptus brevifolia*) and Bullwaddy (*Macropteranthes kekwickii*) (available mapping presented on Figure 3-6.

3.5.5 Riparian areas and vegetation

Riparian vegetation is ‘a distinct forest community occurring on the banks of rivers or streams that directly influences the adjacent water body’ (DENR 2018). When in good condition, riparian vegetation is considered as a sensitive vegetation type as it supports a unique selection of habitat features that are relied upon by a range of flora and fauna species. Riparian vegetation provides refuge habitat and habitat corridors; improves water quality by filtering terrestrial run-off; stabilises banks and reduces erosion; and supports terrestrial and aquatic habitats by maintaining natural light, temperature and oxygen levels within waterways (DENR 2018).

Riparian areas are uncommon within the two seismic lines that will require vegetation clearing (lines 03B and 06C), with the exception of the western 10 km of line 06C where drainages become more common due to presence of steep terrain and close proximity to the Victoria River (however, seismic works have been abandoned in this section for this stage of the project due to steep terrain) (Figure 3-6). Riparian areas and vegetation will be described and mapped as part of the field activities so potential impacts can be assessed and that appropriate protection buffers (and other mitigations) can be implemented.

Seismic lines 01A, 02A and 06A are positioned on existing roads or tracks, and as such no clearing of riparian vegetation is expected. Nonetheless, riparian areas will be mapped as part of field activities so that appropriate protection buffers (and other mitigations) can be implemented to ensure that impacts can be suitably mitigated.

3.5.6 Significant natural land features

A review of land unit data and aerial imagery indicates that the study area is likely to contain a range of significant natural land features including caves, rocky overhangs and scarps containing boulders. These are only expected to occur within seismic line 06A and the western 10 km of seismic line 06C – typically associated with land unit 2f1 (steep lateritic scarps) in Napier and Hill (2012) (shown in Figure 3-6). Sink holes are also scattered throughout the region; however, there are no existing records with the study area (sink holes shown on Figure 3-6). Field studies described and mapped all significant land features within the study area.

3.5.7 Wetlands and Groundwater Dependant Ecosystems

The *Land Clearing Guidelines* (DEPWS 2021) considers the following landscape features as (but not exclusive to) wetlands – swamps, lakes, claypans, billabongs, close depressions, salt lakes, springs and mangroves. Riparian areas may also be considered as wetlands; however they are covered (and managed for) separately. Desktop review of the study area indicates there are no wetlands present – this will be confirmed as part of the field assessment.

Groundwater-dependent ecosystems (GDE's) also include those landscape features typically referred to as wetlands or riparian areas/vegetation; however, they may also include this ecosystems dominated by native plant species that require groundwater resources for survival. A review of the Atlas of Groundwater Dependent Ecosystems (http://www.bom.gov.au/water/groundwater/gde/map.shtml) indicates there are numerous potential GDE's within the region of the study area (GDE intersections shown on Figure 3-6). All potential GDE's within and adjacent to the study area are associated with waterways. Potential GDE's within the study area are described in Table 3-4.

For the purpose of this assessment, GDE's have not been specifically assessed because they are suitably covered in wetlands and riparian vegetation aspects. Native plants that depend on groundwater reserves may be present in the wider landscape (outside of riparian zones) (such as *Corymbia spp*. and *Eucalyptus spp*.); however, this project does not propose to use groundwater reserves so risk to these species is inherently low and will be only limited to direct clearing for the establishment of lines. This impact will be minimised by avoiding trees as a general environmental mitigation.

Table 3-4. Potential GDE's within the study area

Seismic line	GDE intersections with proposed lines
01A (Buntine Highway)	1. Low potential aquatic GDE on Bunda Creek (GDE-1) 2. Low potential aquatic GDE on Burtawurta Creek (GDE-2)
02A (Lajamanu Road)	3. Low potential aquatic GDE on 5-mile Creek (GDE-3) 4. Moderate potential aquatic GDE on Croker Creek (GDE-4) 5. Nigh potential aquatic GDE on Kelly Creek (GDE-5)
03B	No potential GDE's present
06A (station tracks) (original alignment not shown as it has been abandoned)	6. Low potential aquatic GDE on Victoria River (upper) (GDE-6) 7. Low potential aquatic GDE on Hut Creek (GDE-7) 8. High potential aquatic and terrestrial GDE on Victoria River (GDE-8) 9. Low potential aquatic GDE on Gum Creek (GDE-9)
06C	10. Low potential aquatic GDE on Sambo Creek (tributary of Victoria River) (within abandoned section) (GDE-10) 11. Low potential aquatic GDE on Hooker Creek floodout (also referred to as Cattle Creek) (GDE-11)

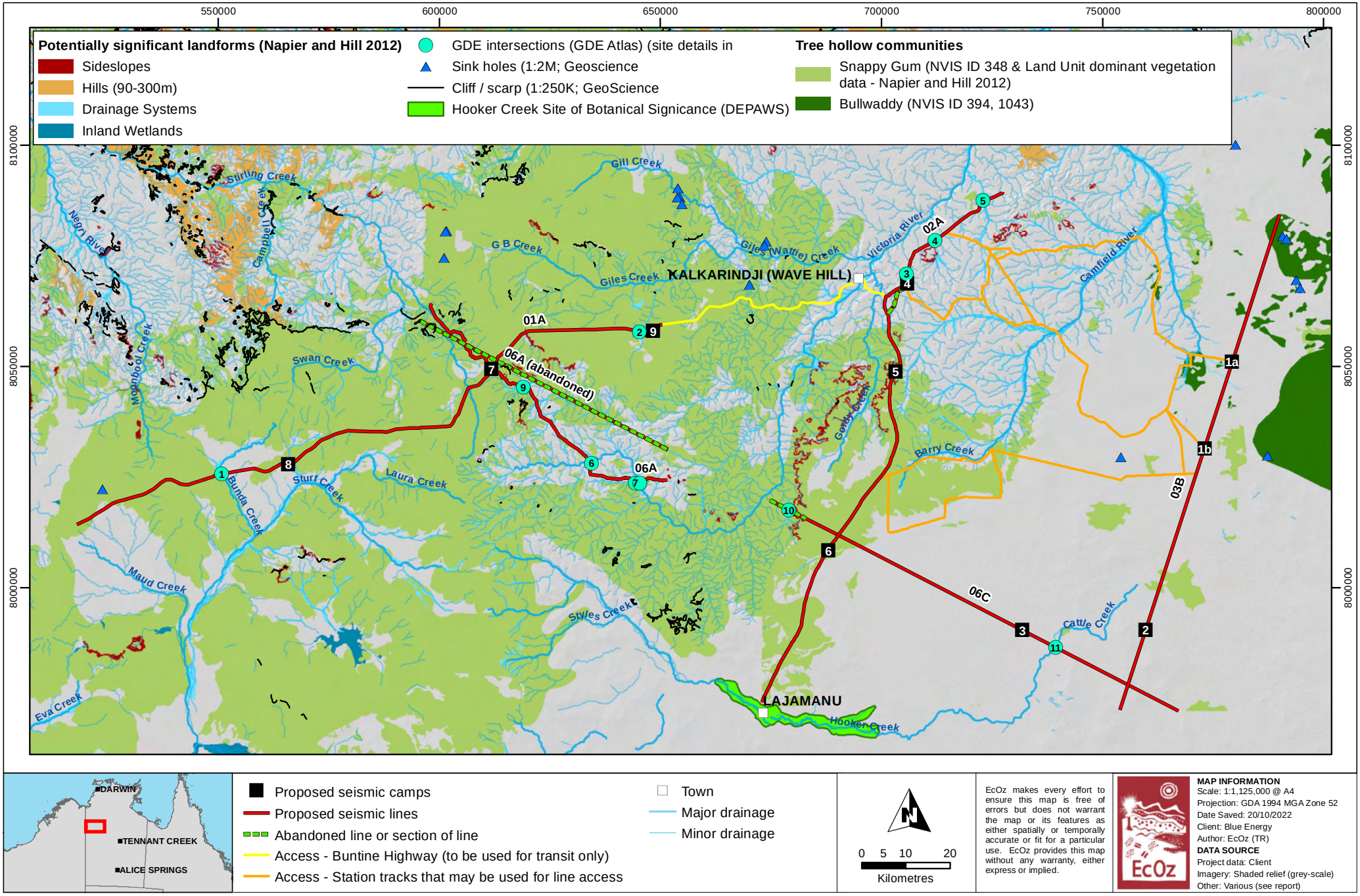

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Figure 3-6. Map of significant biodiversity values / features within the region of the study area

3.6 Potential threatening processes

3.6.1 Fire

The northern savannas constitute the most fire-prone landscapes in Australia (Russell-Smith & Whitehead 2015), and regular fires have always been a natural part of the environment across northern Australia. However, frequent fires can result in fewer flora species and reduced structural complexity (McKay 2017), both of which can also significantly diminish the habitat quality for fauna and facilitate weed invasion.

Regional fire history and fire scar mapping was obtained through the Northern Australia and Rangelands Fire Information website and is presented in Figure 3-7 and Figure 3-8. Fire history data indicate that the majority of the study area (and surrounds) have been burnt multiple times since 2000, including in the past decade. Fires are a regular occurrence in the region of the study area, and as such, fire management (and safety precautions in the event of a wildfire) will need to be considered in the EMP.

3.6.2 Feral animals (pests)

According to the NT Fauna Atlas, a range of introduced fauna species have been recorded within the region of the study area (listed in Table 3-5). These species can adversely impact native species (described in Table 3-5) and should be considered in risk assessment for the project to ensure that proposed actions do not contribute to these impacts.

Table 3-5. Pest animals that may occur within the study area (NT Atlas)

Common name	Scientific name	Habitats	Impacts
Feral Cattle	*Bos taurus*	Various	Erosion of soil and watercourses, weed spread, trampling and consumption of native flora, and sedimentation and increased nutrient levels in watercourses
Water Buffalo	*Bubalus bubalis*	Riparian areas and wetlands	
Donkey	*Equus asinus*	Various	
Horse	*Equus caballus*	Grassland and shrubland	
Feral Cat	*Felis catus*	Various	Prey on many species of native animals
House Mouse	*Mus domesticus*	Various	Compete with native species. May impact upon native vegetation via seed predation
One-humped Camel	*Camelus dromedarius*	Various	Trampling, suppression of plant recruitment, damage to wetland and riparian areas, and competition with native animals for food and shelter
Cane Toad	*Rhinella marina*	Various	Known to cause population reductions in a range of predatory species (due to poisoning by ingestion)

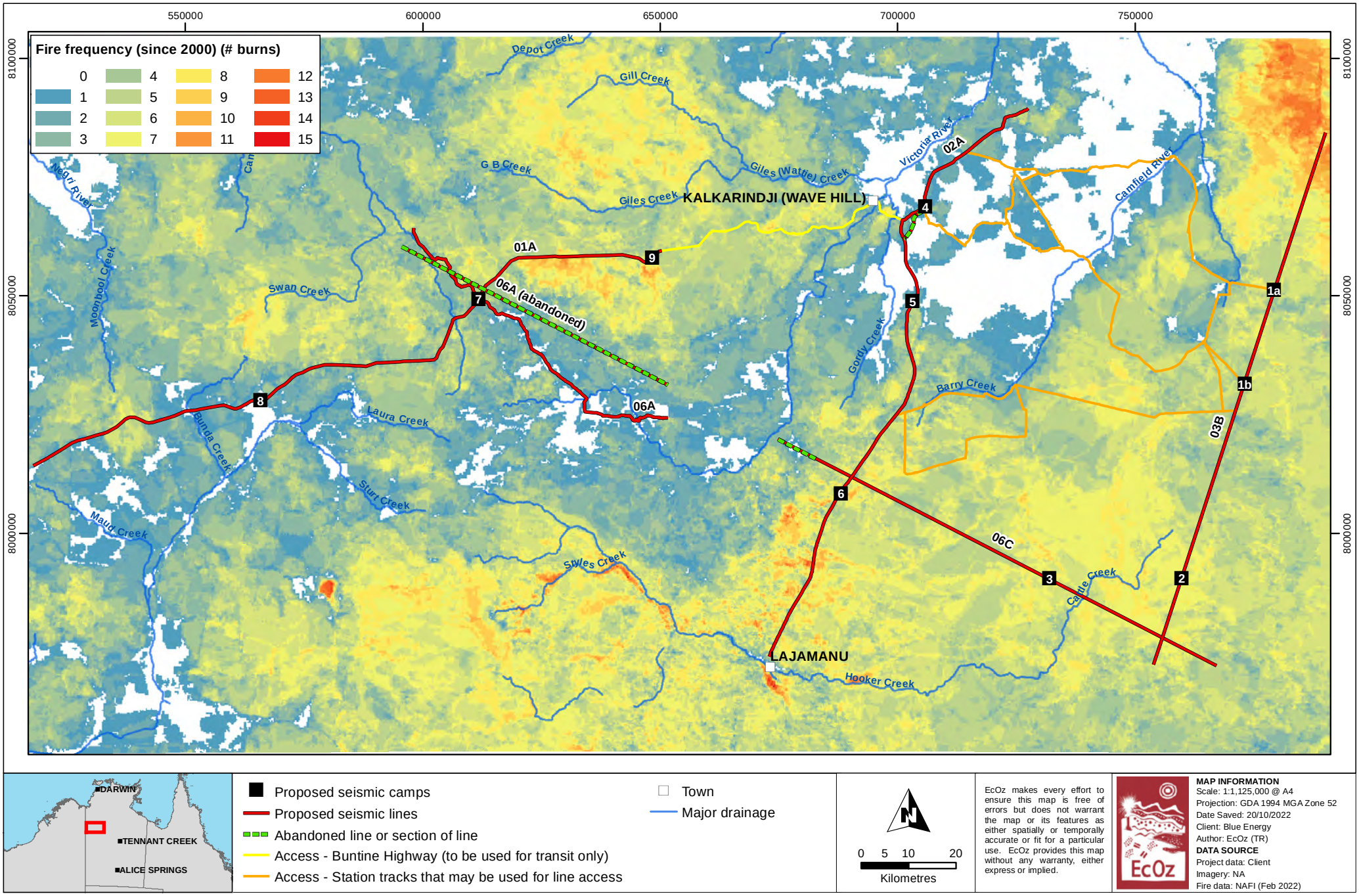

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Figure 3-7. Map of fire frequency (since 2000) within the region of the study area

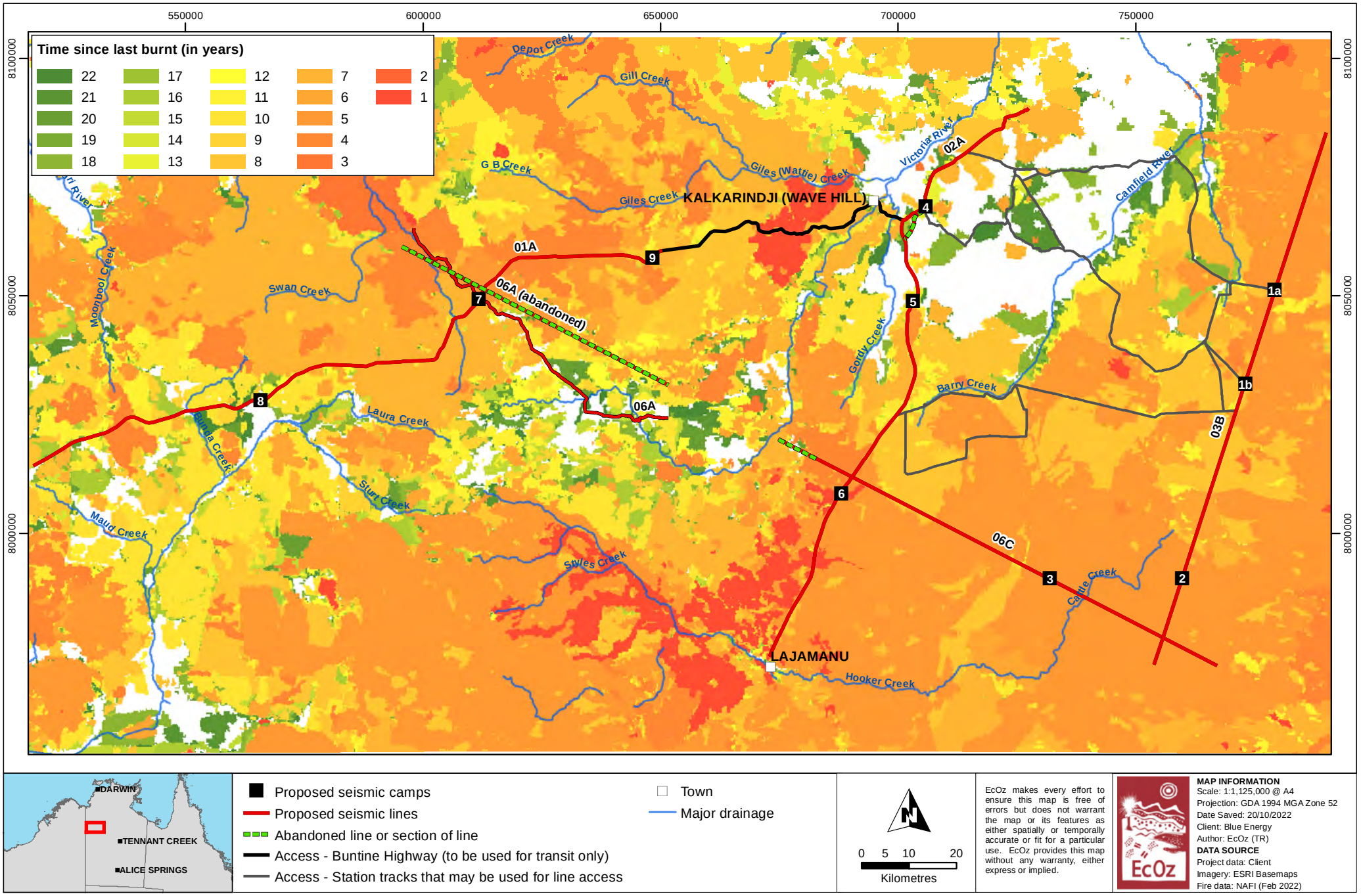

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Figure 3-8. Map of time since last burn within the region of the study area

3.6.3 Weeds

Some species of introduced flora are declared to be weeds under the NT *Weeds Management Act* because of the environmental and/or economic 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).

The study area lies predominantly within the *Katherine Regional Weed Strategy 2021-2026 (DEPWS 2021)* with a small portion covered by the *Alice Springs Regional Weed Strategy 2021 – 2026* (shown on Figure 3-9). These strategies focus on weeds that are most important to the region, categorising them as either:

- Category 1: Priority weeds for eradication
- Category 2: Priority weeds for strategic control (including eradication of outliers)
- Category 3: Weeds of concern
- Category 4: Hygiene and biosecurity weeds
- Category 5: Alert weeds.

A review of the NT Weed Branch weed dataset indicates a high number of weed records within a 100 km radius of the proposed seismic lines – 8,864 for 78 species. It is noted that these records include both current or former extent as some infestations have been since been controlled, and as such, may not indicate an existing infestation.

The most frequently reported species is Parkinsonia (*Parkinsonia aculeata*) (listed as a Class B species and WoNS), of which most records are within waterways and alluvial flood-outs.

Other key weed species with over 100 records within the search area include Prickly Acacia (*Vachellia nilotica*), Rubber Bush (*Calotropis procera*), Bellyache Bush (*Jatropha gossypiifolia*), Neem (*Azadirachta indica*) and Coffee Senna (*Senna occidentalis*).

The priority weed species for the study area are listed in Table 3-6 (i.e. species that are either declared or listed in the regional weed management plan), and point records are shown in Figure 3-9. A weed survey as undertaken during fieldwork – see Section 4.4.

Table 3-6. Key weed species relevant to the study area (in order of number of records)

Scientific name	Common name	WoNS	Class	Weed Strategy Category		Number of records (with 100 km)
				Alice Springs	Katherine	
Parkinsonia aculeata	Parkinsonia	Y	B	2	3	5138
Vachellia nilotica	Prickly Acacia	Y	A	1	-	1276
Calotropis procera	Rubber Bush	-	B	-	3	1113
Jatropha gossypiifolia	Bellyache Bush	Y	A	-	2	284
Azadirachta indica	Neem	-	B	-	2	227
Senna occidentalis	Coffee Senna	-	B	-	4	100
Cenchrus ciliaris	Buffel Grass	-	-	2	-	58
Andropogon gayanus	Gamba Grass	Y	A	-	2	49
Themeda quadrivalvis	Grader Grass	-	B	-	2	49
Eragrostis minor	Lovegrass - minor	-	-	3	-	45
Leonotis nepetifolia	Lions Tail	-	B	-	3	39
Martynia annua	Devils Claw	-	A	2	2	35
Xanthium strumarium	Noogoora Burr	-	B	4	4	21
Mesosphaerum suaveolens	Hyptis	-	B	4	4	20
Senna obtusifolia	Sicklepod Senna	-	B	-	4	17
Prosopis pallida	Mesquite	Y	A	-	1	15
Sida acuta	Spiny-head Sida	-	B	-	4	12
Tribulus terrestris	Caltrop - terrestris	-	B	4	-	8
Tamarix aphylla	Athel Pine	Y	A	-	2	7
Cenchrus echinatus	Mossman River Grass	-	B	4	4	5
Datura inoxia	Thornapple - inoxia	-	C	-	3	4
Sida cordifolia	Flannel Weed Sida	-	B	-	4	4
Leucaena leucocephala	Coffee Bush	-	-	-	3	3
Acanthospermum hispidum	Star Burr	-	B	-	4	2
Datura ferox	Longspine Thornapple	-	A	-	3	2
Ziziphus mauritiana	Chinee Apple	-	A	2	2	2
Cascabela thevetia	Yellow Oleander	-	-	-	3	1
Stachytarpheta sp	Snake Weed	-	B	-	4	1

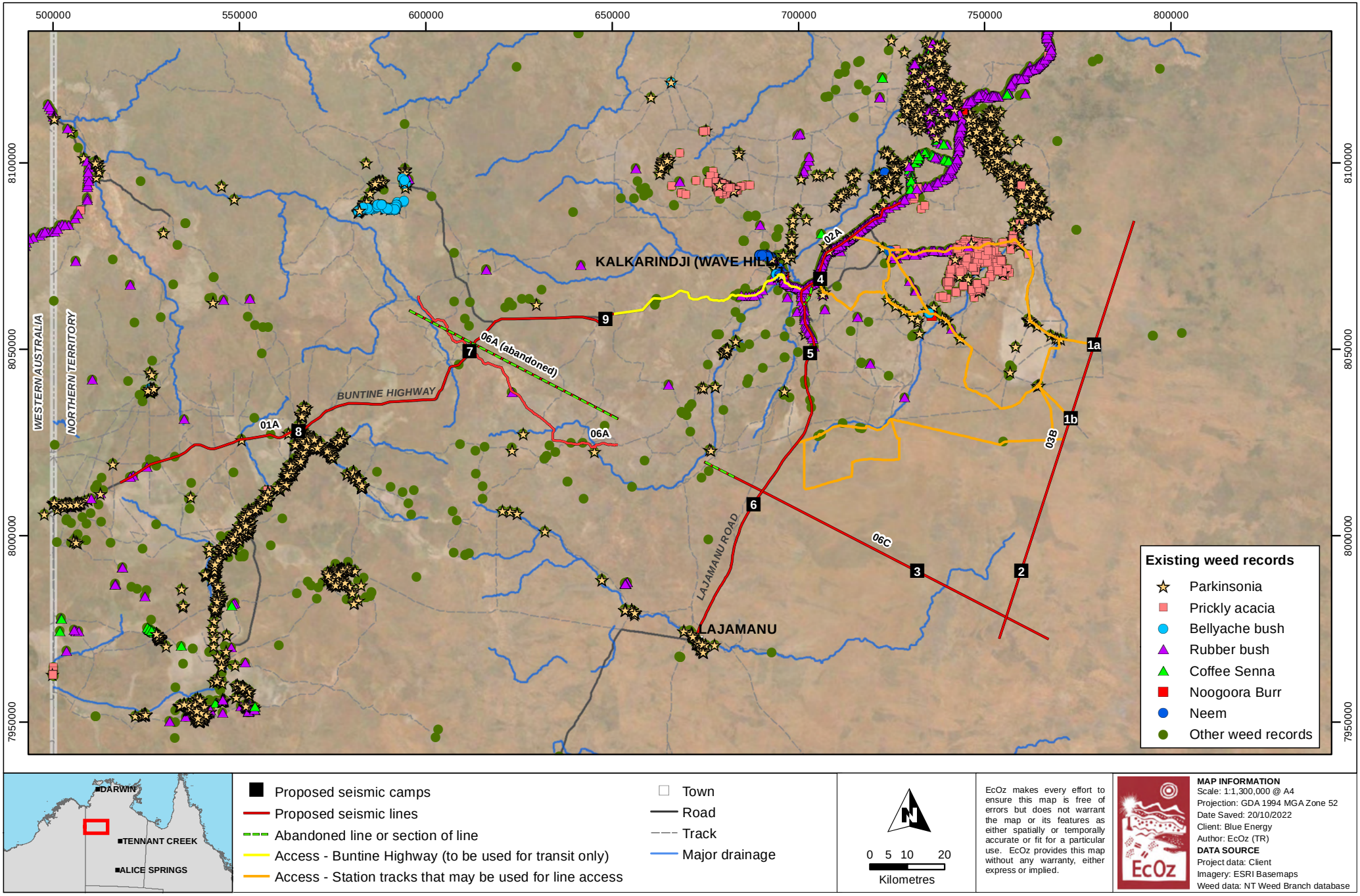

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Figure 3-9. Map of existing weed records within the region of the study area

4 FIELD ASSESSMENT

The ecological field assessment aimed to describe the following aspects within the study area:

- Land types / habitats (i.e. areas of similar landform, vegetation and soil type)
- Threatened species likelihood of occurrence
- Presence of sensitive or significant vegetation
- Presence of critical or important habitats
- Existing level of weed infestation
- Land condition assessment / evaluation.

The survey was undertaken by helicopter (R44, Heli-Muster). Field work was conducted by Tom Ewers-Reilly (Senior Ecologist, EcOz) in April 2022, in conjunction with an archaeological survey by Silvano Jung (Ellengowan Heritage Consultants) and a seismic line logistics assessment by a representative from Terrex (Andy Brett, Crew Manager). All land access approvals/permits were sought by the client.

4.1 Land type survey

The objective of the land type survey was to describe, map and evaluate land within the study area. This provides essential baseline data on landforms, soil types and vegetation to assist with planning of the seismic program to minimise environmental impacts to ALARP.

Land type descriptions and mapping were undertaken for lines 03B and 06C, and for the proposed camp sites. Land type mapping was not undertaken for lines 01A, 02A or 06A because they are either located on existing roads/tracks or have been abandoned and, as such, no land clearing will be required. However, sensitive or significant habitat features have been described and mapped for those study area because additional controls may need to be implemented to ensure significant impacts are avoided (covered separately in Section 4.3).

4.1.1 Methodology

The field survey was designed to comply with the *Land Clearing Guidelines* (DENR 2020) and used methodology based on those referenced in *NT Guidelines and Field Methodology* (Brocklehurst et al. 2017).

Survey preparation involved a detailed review of available resources and mapping datasets (summarised in Chapter 3), in conjunction with aerial imagery (using ESRI Basemaps) to select sites of interest to be targeted during field studies. The key data source was the land unit mapping by Napier and Hill (2012).

Sites were selected to be spatially representative and provide suitable level of data to describe each land type. Additional detail and sampling effort was undertaken in land types that could potentially be defined as sensitive vegetation/habitat (i.e. drainages or wetlands).

A combination of aerial and ground-based sites were undertaken (survey effort provided in Figure 4-1; site coordinates provided in Appendix C). Ground-based sites (26 sites) involved recording landform, dominant flora species, vegetation structure, soil type, slope (%), drainage potential, rock cover and presence/absence of outcrop at each ground-based site. At least one ground site was surveyed within each land type. Aerial-based sites (65 sites) involved recording landform, vegetation structure and dominant species. Additional to site data, observers made visual aerial assessments and collected regularly spaced geo-tagged photographs to provide general context data for the variety of vegetation types and landforms within the study area.

Aerial imagery (using ESRI Basemaps) was used to delineate land type boundaries, and linework and editing was performed using GIS software (ArcGIS 10.2). Land type boundaries were reviewed in the field using AVENZA maps before being finalised. Land types have been generally mapped at an approximately scale of 1:25,000. Finer-scale mapping was conducted for land types (or specific components within land types) considered to be potential significant or that may require specific mitigations (such as erosion controls).

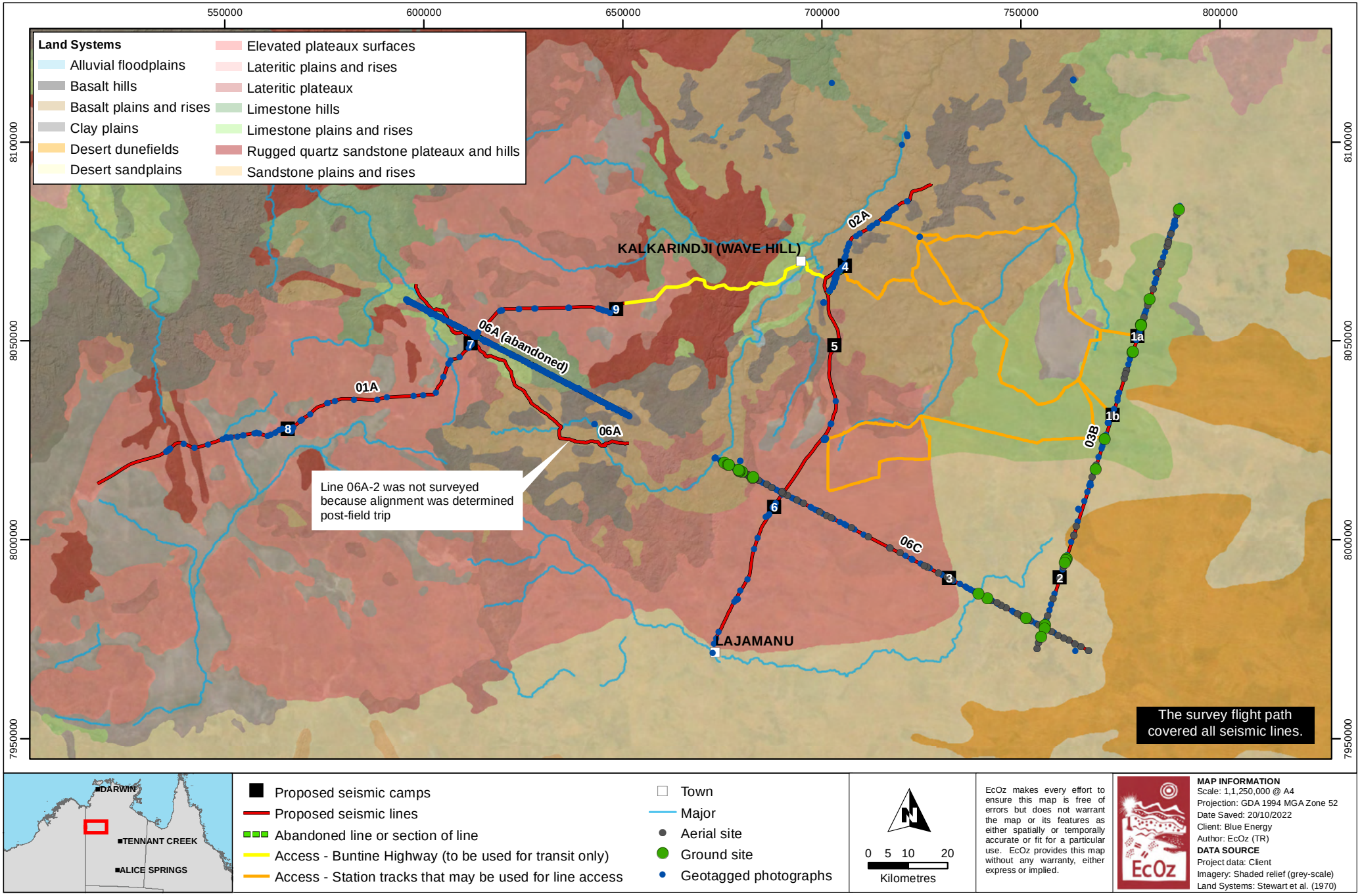

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Figure 4-1. Map of survey effort

4.1.2 Land types within seismic line 03B

Seven land types (LT) are present within the 03B study area (descriptions in Table 4-1; mapped in Figure 4-2; site data in Appendix C):

- **LT-1:** Flat to gently undulating red earth plains with a low open woodland (*Corymbia opaca/terminalis, Eucalyptus pruinosa*) over spinifex (*Triodia pungens*). Includes thickets of *Macropteranthes kekwickii* over tussock/herbage understory (in localised shallow depressions).
- **LT-2:** Flat to gently undulating sandplains with a low open to sparse woodland (*Corymbia opaca/terminalis, Eucalyptus pruinosa*), sparse to patchy shrubs (*Acacia lysiphloia, Acacia stipuligera, Terminalia canescens, Grevillea refracta*) over spinifex (*Triodia pungens*).
- **LT-3:** Flat to gently undulating red earth plains with a low open to sparse woodland (*Eucalyptus pruinosa* or occasionally *Corymbia terminalis, Bauhinia cunninghamii*), sparse shrubs over tussock grassland (mainly *Aristida hygrometrica* and *Chrysopogon fallax*).
- **LT-4:** Limestone plains and rises with a low open to sparse woodland (*Corymbia opaca/terminalis* and/or *Eucalyptus pruinosa*) over spinifex grassland (mostly *Triodia pungens*); some areas dominated by tussocks (mainly *Aristida holathera*).
- **LT-5:** Lateritic plains and rises with a low open to sparse woodland (*Corymbia opaca/terminalis* and/or *Eucalyptus pruinosa*), patchy *Acacia lysiphloia* shrubland over spinifex (*Triodia pungens*). Lateritic rises may also support *Acacia adoxa*, *Grevillea wickhamii* and *Acacia hilliana*.
- **LT-6:** Indistinct (ephemeral) drainages and associated floodplains (some with Gilgai) with a mixed low woodland (*Corymbia terminalis, Eucalyptus pruinosa, Terminalia platyphylla, Corymbia flavescens, Bauhinia cunninghamii, Melaleuca viridiflora*) over tussock grassland (*Chrysopogon fallax, Dichanthium fecundum, Eulalia aurea, Aristida hygrometrica*) and sedges (*Fimbristylis* spp.)
- **LT-7:** Alluvial plains and depressions with open to sparse Melaleuca shrubland over spinifex (*Triodia pungens*). Scattered *Corymbia opaca/terminalis.*

The study area mostly comprises of flat to gently sloping plains, with scattered low rises (calcrete or laterite) and drainage/alluvial areas (associated with Cattle Creek). Vegetation is mainly hummock (spinifex) grassland with sparse to open low *Eucalyptus/Corymbia* trees and scattered patches of *Acacia* or *Grevillea* shrubs.

The northern parts are dominated by red earth plains (land type 1) and sandplains (land types 2 and 3); the central parts are dominated by limestone plains (land type 4) and alluvial / drainage areas (associated with Cattle Creek) (land types 6 and 7); and southern parts are dominated by lateritic plains and rises (land type 5).

Three types of sensitive habitat / vegetation are present within this study area – Bullwaddy thickets, riparian vegetation and Gilgai (described in Section 4.3). A soak that held water at time of survey was observed to the east of the study area (described in Section 4.3); and several minor depressions that were dry at time of survey were also visited; however, these features do not occur within the study area.

Erosion risk is considered to be low to moderate for all land types, and will require erosion and sediment control planning to minimise gully erosion along cleared lines. Flat plains and sandplains have a lower erosion risk than rises (i.e. lateritic rises and calcrete rises within land types 4 and 5).

Greater Bilby (*Macrotis lagotis*) (a threatened species) sign is present within the southern part of this line associated with lateritic plains and rises (land type 5) – this species is covered separately in Section 4.2.1.

Table 4-1. Land type descriptions for seismic line 03B

ID	Landform	Vegetation community(s)	Other common species		
LT-1	Flat to gently undulating plains Deep red earths	Low open woodland (*Corymbia opaca/terminalis, Bauhinia cunninghamii, Eucalyptus pruinosa*) and sparse shrubland (*Acacia lysiphloia, A. holosericea, A. hemignosta*) over spinifex (*Triodia pungens*). Scattered thickets of Bullwaddy (*Macropteranthes kekwickii*) over tussock/herbage understory (present in localised shallow depressions). Also support *Gyrocarpus americanus, Terminalia volucris, Eucalyptus pruinosa*	*Carissa lanceolata* *Hakea arborescens* *Gyrocarpus americanus* *Ehretia saligna* *Atalaya hemiglauca* *Terminalia canescens* *Corymbia dichromophloia*		
LT-2	Flat to gently undulating sandplains. Occasional low rise (to south). Deep sandy red earths	Low open woodland (Corymbia *opaca/terminalis* and/or *Eucalyptus pruinosa*) with sparse to patchy shrubs over spinifex (*Triodia pungens/bitextura*). Occasional patch of shrubs (*Acacia lysiphloia*, *Acacia stipuligera, Acacia sericophylla, Terminalia canescens, Grevillea refracta*)	*Corymbia setosa* *Ehretia saligna* *Acacia hemignosta* *Brachychiton multicaulis* *Hakea arborescens* *Carissa lanceolata*		
LT-3	Flat to gently undulating plains Deep red earths	*Eucalyptus pruinosa* low open woodland (or occasionally *Corymbia terminalis, Bauhinia cunninghamii*) and sparse shrubs over tussock grassland (mainly *Aristida hygrometrica* and *Chrysopogon fallax).*	*Gyrocarpus americanus* *Acacia lysiphloia* *Carissa lanceolata* *Atalaya hemiglauca* *Brachychiton multicaulis* *Ehretia saligna* *Terminalia canescens.*		

ID	Landform	Vegetation community(s)	Other common species		
LT-4	Flat to gently undulating limestone plains and rises. Minor outcrop. Shallow loam	*Corymbia opaca/terminalis* or *Corymbia terminalis* and *Eucalyptus pruinosa* low open woodland over spinifex grassland (mostly *Triodia pungens,* potentially also *T. bitextura*); some areas dominated by tussocks (mainly *Aristida holathera*). Ephemeral forbs, daisies and tussock grasses also present on rises (minor outcrop) and localise run on areas.	*Corymbia flavescens* *Hakea arborescens* *Acacia lysiphloia* *Brachychiton multicaulis* *Atalaya hemiglauca* *Grevillea wickhamii* *Acacia sericophylla*		
LT-5	Lateritic plains and rises	Low open woodland (*Corymbia opaca/terminalis* and/or *Eucalyptus pruinosa*) with patchy *Acacia lysiphloia* shrubland over spinifex (*Triodia pungens/bitextura*). Low rises may also support *Acacia adoxa* and *Grevillea wickhamii* (*Acacia hilliana* rarely observed)	*Petalostigma nummularia* *Mirbelia viminalis* *Brachychiton multicaulis* *Carissa lanceolata* *Acacia sericophylla*		
LT-6	Indistinct drainages & associated floodplains Ephemeral. No banks. Gilgai may be present	Mixed low open woodland (*Corymbia terminalis, Eucalyptus pruinosa, Terminalia platyphylla, Corymbia flavescens*, *Bauhinia cunninghamii, Melaleuca viridiflora*) over tussock grassland (*Chrysopogon fallax, Dichanthium fecundum, Eulalia aurea, Aristida hygrometrica*) and sedges (*Fimbristylis spp*.)	*Acacia holosericea* *Hakea arborescens* *Carissa lanceolata* *Ehretia saligna* *Acacia lysiphloia* *Corymbia setosa* *Eucalyptus brevifolia*		
LT-7	Alluvial plain Grey/brown loams, minor crusting and cryptogam	Open to sparse Melaleuca shrubland (*Melaleuca nervosum/viridiflora*) over spinifex (*Triodia pungens*). Scattered *Corymbia opaca/terminalis* (emergents).	*Acacia elachantha* *Acacia hemignosta* *Cassytha filiformis* (vine) *Acacia stipuligera* (rare) *Acacia lysiphloia* (rare)		

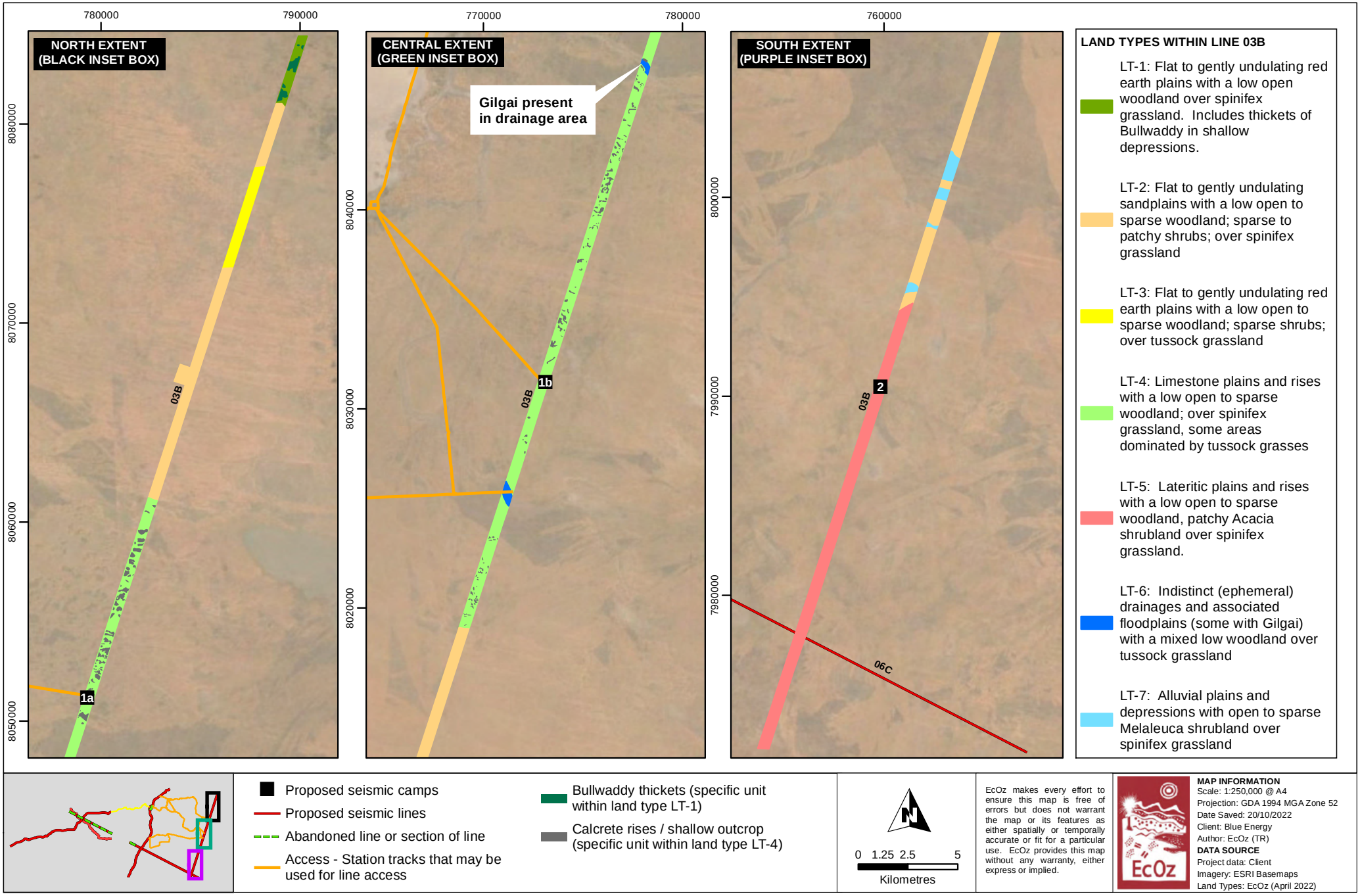

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Figure 4-2. Map of land types within study area 03B

4.1.3 Land types within seismic line 06C

Eleven land types are present within the 06B study area (descriptions in Table 4-2; mapped in Figure 4-3; site data in Appendix C):

- **LT-2:** Flat to gently undulating sandplains with a low open to sparse woodland (*Corymbia opaca/terminalis, Corymbia setosa, Eucalyptus pruinosa*), sparse to patchy shrubs (*Acacia lysiphloia, Acacia stipuligera, Grevillea refracta*) over spinifex (*Triodia pungens*). Open stands of *Corymbia setosa* are relative common within this section of line.
- **LT-5:** Lateritic plains and rises with a low open to sparse woodland (*Corymbia opaca/terminalis* and/or *Eucalyptus pruinosa*), patchy *Acacia lysiphloia* shrubland over spinifex (*Triodia pungens*). Lateritic rises may also support *Acacia adoxa*, *Grevillea wickhamii* and *Acacia hilliana*.
- **LT-6:** Indistinct (ephemeral) drainage lines with a mixed low woodland (*Corymbia opaca/terminalis, Eucalyptus pruinosa, Corymbia flavescens*) over tussock and spinifex grassland.
- **LT-7:** Alluvial plains and depressions with open to sparse Melaleuca shrubland over spinifex (*Triodia pungens*). Scattered *Corymbia opaca/terminalis.*
- **LT-8:** Localised shallow depressions with a low open woodland (*Eucalyptus victrix, Acacia sericophylla, Corymbia opaca/terminalis*); sparse shrubs; over spinifex (*Triodia pungens*).
- **LT-9:** Flat lateritic plateau (close to scarp) with a low open woodland (*Eucalyptus brevifolia*, *C. dichromophloia*, *Eucalyptus chlorophylla*); sparse to patchy shrubs (*Acacia lysiphloia, Eucalyptus odontocarpa, A. acradenia*) over spinifex (*Triodia bitextura*).
- **LT-10:** Steep lateritic scarps with a low open woodland (*Eucalyptus brevifolia*); patchy shrubland (*A. acradenia, Senna glutinosa*) over spinifex (*Triodia bitextura*).
- **LT-11:** Undulating lateritic plains with an open tussock grassland (*Sporobolus australasicus, Enneapogon spp., Aristida holathera*); patches of Spinifex grassland and sparse to isolated trees.
- **LT-12:** Gently undulating laterite, plains and rises with a patchy spinifex grassland (Triodia bitextura); patches of Acacia lysiphloia and sparse to isolated trees (*Corymbia terminalis* and *Eucalyptus brevifolia*). Tussock grasses in minor tributaries (*Chrysopogon fallax*, *Aristida spp*.).
- **LT-13:** Gently undulating black soil (clay) plains with an open tussock grassland (including *Brachyachne convergens, Chrysopogon fallax, Aristida latifolia, Astrebla spp*.); sparse to isolated trees (*Corymbia terminalis* and *Eucalyptus brevifolia*) typically restricted to minor drainages.
- **LT-14:** Major drainage line and associated floodplain with mixed woodland (*Eucalyptus camaldulensis, Lophostemon grandiflorus, Terminalia platyphylla*) over tussock grass (*Chrysopogon fallax, Dichanthium fecundum, Heteropogon contortus*)

The western 10 km comprises of steep lateritic scarps (land unit 10), major drainage (land unit 14), cracking clay plains (land unit 13) and undulating laterite plains and rises (land units 11 and 12). Seismic works within this section have been abandoned due to steep terrain associated with land unit 10.

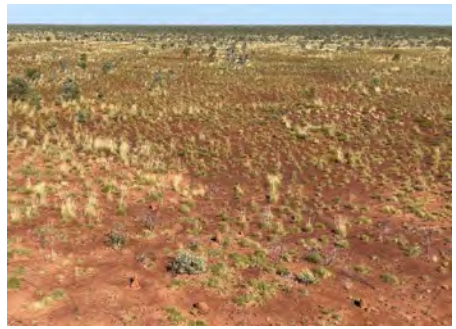
The remaining parts of this line comprise of flat to gently sloping sandplains (land type 2) and laterite plains (land type 5), with minor drainage features (land types 6, 7 and 8) and lateritic plateau (land type 9). Vegetation is mainly hummock (spinifex) grassland with sparse to open low *Eucalyptus/Corymbia* trees and scattered patches of *Acacia* or *Grevillea* shrubs.

Two types of sensitive habitat / vegetation are present within this study area – hollow-bearing trees (Snappy Gum) and riparian vegetation (described in Section 4.3).

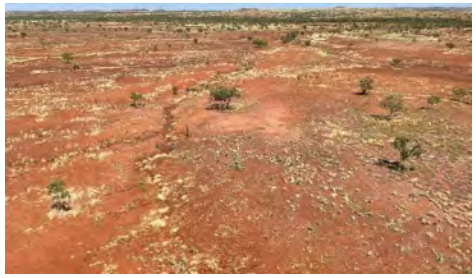
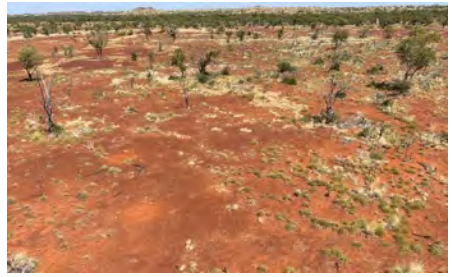
Greater Bilby (*Macrotis lagotis*) (a threatened species) sign is present within the southern part of this line associated with lateritic plains and rises (land type 5) – this species is covered separately in Section 4.2.1.

Erosion risk is considered to be low to moderate for all land types within this study area, and will require erosion and sediment control planning to minimise gully erosion along cleared lines.

Table 4-2. Land type descriptions for seismic line 06C

ID	Landform	Vegetation community(s)	Other common species		
LT-2	Flat to gently undulating sandplains. Occasional low rise. Deep sandy red earths	Low open woodland (Corymbia *opaca/terminalis* and/or *Eucalyptus pruinosa*) with sparse to patchy shrubs over spinifex (*Triodia pungens/bitextura*). Occasional patch of shrubs (*Acacia lysiphloia*, *Acacia stipuligera, Acacia sericophylla, Terminalia canescens, Grevillea refracta*) Open stands of *Corymbia setosa* are relatively common within 06C	*Ehretia saligna* *Acacia hemignosta* *Brachychiton multicaulis* *Hakea arborescens* *Carissa lanceolata* *Corymbia flavescens* *Acacia ancistrocarpa* *Wrightia saligna*		
LT-5	Lateritic plains and rises	Low open woodland (*Corymbia opaca/terminalis* and/or *Eucalyptus pruinosa*) with patchy *Acacia lysiphloia* shrubland over spinifex (*Triodia pungens/bitextura*). Low rises may also support *Acacia adoxa* and *Grevillea wickhamii* (*Acacia hilliana* rarely observed)	*Petalostigma nummularia* *Brachychiton multicaulis* *Carissa lanceolata* *Acacia sericophylla* *Acacia stipuligera*		
LT-6	Indistinct drainages and associated floodplains Ephemeral. No banks.	Mixed low open woodland (*Corymbia terminalis, Eucalyptus pruinosa, Terminalia platyphylla, Corymbia flavescens*, *Bauhinia cunninghamii, Melaleuca viridiflora*) over tussock grassland (*Chrysopogon fallax, Dichanthium fecundum, Eulalia aurea, Aristida hygrometrica*) and sedges (*Fimbristylis spp*.)	*Acacia holosericea* *Hakea arborescens* *Carissa lanceolata* *Ehretia saligna* *Acacia lysiphloia* *Corymbia setosa* *Eucalyptus brevifolia*		

ID	Landform	Vegetation community(s)	Other common species		
LT-7	Alluvial plain Grey/brown loams, minor crusting and cryptogam	Open to sparse Melaleuca shrubland (*Melaleuca nervosum/viridiflora*) over spinifex (*Triodia pungens*). Scattered *Corymbia opaca/terminalis* (emergents).	*Acacia elachantha* *Acacia hemignosta* *Cassytha filiformis* (vine) *Acacia stipuligera* (rare) *Acacia lysiphloia* (rare)		
LT-8	Localised shallow depressions adjacent to lateritic rises (associated with LT-5)	Low open woodland (*Eucalyptus victrix, Acacia sericophylla*, *Corymbia opaca/terminalis*), sparse shrubs over spinifex (*Triodia pungens/bitextura*).	*Grevillea wickhamii* *Hakea arborescens*		
LT-9	Flat lateritic plateau (close to scarp) (east of Lajamanu road)	Low open woodland (*Eucalyptus brevifolia* and/or *C. dichromophloia*, *Eucalyptus chlorophylla*), sparse to patchy *Acacia* shrubs (*Acacia lysiphloia, A. acradenia*) over spinifex (*Triodia bitextura*). *Eucalyptus odontocarpa* became co-dominant in the mid-layer when close to the scarp edge (i.e. within 500m)	*Grevillea striata* *C. opaca/terminalis* *Grevillea wickhamii* *Eucalyptus chlorophylla* *Corymbia flavescens*		
LT-10	Steep lateritic scarps with very shallow soils Small caves and overhangs present	Low open woodland (*Eucalyptus brevifolia*) and over spinifex (*Triodia bitextura*).	*Senna glutinosa* *Acacia acradenia* *Eucalyptus odontocarpa* *Acacia wickhamii* *Acacia holosericea*		

ID	Landform	Vegetation community(s)	Other common species		
LT-11	Undulating lateritic plains at foothill of scarp with numerous small drainages	Tussock grassland (including *Sporobolus australasicus, Cleome viscosa, Enneapogon spp., Aristida holathera*); Patches of Spinifex grassland Sparse to isolated trees	*Corymbia terminalis* *Eucalyptus brevifolia* *Eucalyptus microtheca*		
LT-12	Gently undulating laterite, plains and rises	Spinifex grassland (*Triodia bitextura*) with patches of *Acacia lysiphloia*. *Chrysopogon fallax* and *Aristida inaequiglumis* in minor gullies and tributaries. Sparse to isolated emergent trees (*Corymbia terminalis* and *Eucalyptus brevifolia*)	*Carissa lanceolata* *Eucalyptus tectifica* *Grevillea striata* *Terminalia arostrata* *Acacia sericophylla*		
LT-13	Gently undulating basalt plains Deep cracking clay soils	Tussock grassland (including *Brachyachne convergens, Chrysopogon fallax, Aristida latifolia, Astrebla spp.*) Sparse to isolated trees (*Corymbia terminalis* and *Eucalyptus brevifolia*); typically restricted to minor drainage gullies	*Bauhinia cunninghamii*		
LT-14	Major drainage line and associated floodplain. (Sambo Creek)	Creek banks distinctly lined with mixed trees up to 12m (Woodland including *Eucalyptus camaldulensis, Lophostemon grandiflorus,* and *Terminalia platyphylla*). Tussock grass understory (*Chrysopogon fallax, Dichanthium fecundum, Heteropogon contortus*)	*Eucalyptus microtheca* *Corymbia terminalis* *Bauhinia cunninghamii* *Hakea arborescens* *Corymbia bella* *Carissa lanceolata* *Excoecaria parviflora* *Vachellia farnesiana*		

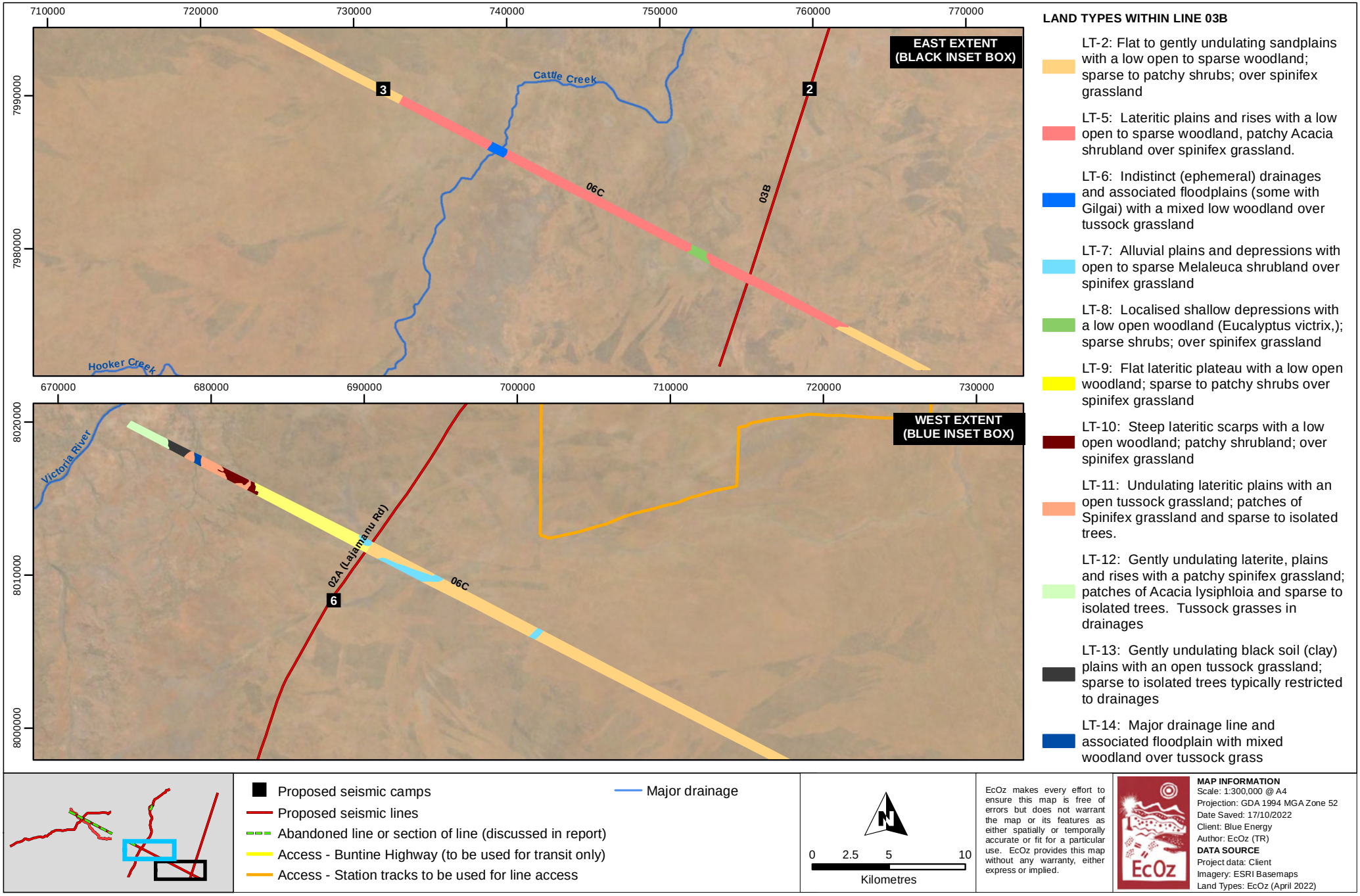


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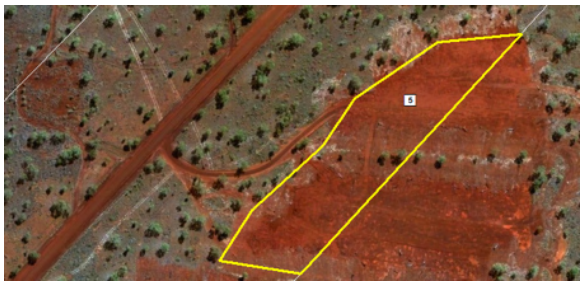
Figure 4-2. Map of land types within study area 06C

4.1.4 Land types within camp site options

Ten camp pad options have been proposed (locations shown on Figure 1-1). General descriptions and photographs for each camp site are provided in Table 4-3. The four proposed camps for lines 03B and 06C will require a pad to be cleared; and the six proposed camps for lines 01A, 02A and 06C will not require vegetation clearing because they are positioned on existing road maintenance areas adjacent to Buntine Highway and Lajamanu Road. None occur within sensitive vegetation; however, sites 2 and 3 will require bilby pre-clearance inspection to ensure that active burrows are not disturbed (covered in Section 4.2.1).

Table 4-3. Camp site descriptions

ID	Line	Description	Photograph / image
1a	03B	• Limestone plain and rises (land type 4). • Sparse low trees and open shrubs over spinifex. • Situated adjacent to a station road (to be used as access to camp). • Pad to be selected in location that minimises disturbance to trees and shrubs.	
1b	03B	• Limestone plain and rises (land type 4). • Open low trees and shrubs over spinifex. • Situated adjacent to a station road (to be used as access to camp). • Pad to be selected in location that minimises disturbance to trees and shrubs.	
2	03B	• Lateritic plain (land type 5) • Open low trees and shrubs over spinifex. • Seismic line to be used as access. • Situated in Greater Bilby occurrence area, as such, implement mitigations to avoid direct impacts to Greater Bilby are required (see recommendations in Section 5). • Pad to be selected in location that minimises disturbance to trees and shrubs	
3	06C	• Lateritic plain (land type 5) • Open low trees and shrubs over spinifex. • Seismic line to be used as access. • Situated in Greater Bilby occurrence area, as such, implement mitigations to avoid direct impacts to Greater Bilby are required (see recommendations in Section 5). • Pad to be selected in location that minimises disturbance to trees and shrubs	
4	02A	• Existing cleared area adjacent to Buntine Highway (see yellow arrow on photograph). • Approximate dimension 70x150m • No vegetation clearing required. • If selected, camp will be established within existing cleared / disturbance areas.	

ID	Line	Description	Photograph / image
5	02A	• Existing cleared area adjacent to Lajamanu Road (road maintenance area). • Approximate dimension 80x300m (see yellow polygon within image) (white line represents current AAPA clearance area for project) • No vegetation clearing required. • If selected, camp will be established within existing cleared / disturbance areas.	
6	02A	• Existing cleared area adjacent to Lajamanu Road (road maintenance area). • Approximate dimension 60x100m • No vegetation clearing required. • If selected, camp will be established within existing cleared / disturbance areas.	
7	01A	• Existing cleared area adjacent to Buntine Highway (road maintenance area). • Approximate dimension 100x150m • No vegetation clearing required (trees will be avoided) • If selected, camp will be established within existing cleared / disturbance areas.	
8	01A	• Existing cleared area adjacent to Buntine Highway (road maintenance area). • Approximate dimension 60x200m. • Also numerous large cleared areas in surrounds (outside of current AAPA clearance area). • Location falls within AAPA RWA 7 (C2021_088); however, because it is located within an existing cleared bushland, the RWA will not be impacted. • No vegetation clearing required (trees will be avoided) • If selected, camp will be established within existing cleared / disturbance areas.	
9	01A	• Existing cleared area adjacent to Buntine Highway (road maintenance area). • Approximate dimension 80x230m. • No vegetation clearing required (trees will be avoided) • If selected, camp will be established within existing cleared / disturbance areas.	

4.2 Threatened species survey

The following threatened species been subject to field investigations because the desktop assessment indicated they have a reasonable chance of occurring within the study area (see Section 3.5.1; Appendix B):

- Greater Bilby (*Macrotis lagotis*)
- Gouldian Finch (*Erythrura gouldiae*)
- Purple-crowned Fairy-wren (western) (*Malurus coronatus coronatus*)
- Grey Falcon (*Falco hypoleucos*).

Field investigations have been undertaken to assess current/recent species occurrence and/or presence of important habitat within the study area.

Prior to field work, Tom Reilly (EcOz) met with Alistair Stewart and Lauren Young from DEPWS Flora and Fauna (in March 2022) to ensure that selected species and proposed methodologies are suitable for the study area and associated threatened species assessment.

4.2.1 Greater Bilby *(Macrotis lagotis)*

The study area occurs at the northern extent of the current Greater Bilby distribution and subsequently any occurrence of the species will be considered to be an important population (as defined in the EPBC Significant Impact Guidelines 1.1, DOE 2013). As such, the objective of this survey is to confirm if Greater Bilby currently occur (or have recently occurred) with the study area and to map the extent of suitable habitat.

Survey area

The survey focused on the lines 03B and 06C because these lines will require vegetation clearing and intersect land systems that are known to support suitable habitat for Greater Bilby (Redsan, Atlas_B32 and Geebee) (shown in Figure 4-5).

Seismic lines 01A and 02A also occurs within bilby distribution and supports areas of suitable habitat in the Geebee land system; however, these lines will not require vegetation clearing because they are positioned on Lajamanu road. Subsequently, a detailed survey of 01A and 02A was not undertaken because potential impacts can be suitably managed by implementing a range of standard controls (i.e. no night driving, speed restrictions, staff awareness etc.).

Line 06A (also positioned in existing tracks/roads) is not considered to support suitable habitat for Greater Bilby, and was not part of this survey.

Methodology

The survey involved strategic searches for Greater Bilby sign (i.e. tracks, burrows, diggings, scats) using a combination of aerial and ground-based observations. Survey design is based on protocols developed by Southgate et al. (2018), and follows key elements of the Commonwealth survey guidelines for the species in terms of tracking and species detection in areas of suitable habitat (DSEWPaC 2011). Other general references used to inform survey design included Moseby et al. (2012) and Southgate et al. (2005).

Aerial transects

The survey was undertaken using a R44 helicopter (company HeliMuster). A single aerial transect was flown for seismic lines 03B and 06C (at a speed of 40 to 60 km/hr and 20 to 30 m above the ground), with the helicopter centred on the proposed seismic line alignment. Observers were positioned either side of the helicopter to maximise survey coverage. It is estimated that a survey extent 'strip' of 20 to 40 m was achieved (with width dependant on vegetation cover and helicopter speed due to wind conditions). In areas of thicker vegetation (i.e. thickets of Turpentine *Acacia lysiphloia* or Bullwaddy *Macropteranthes kekwickii*), the pilot was asked to reduce speed and/or do a 'fly-around/loop' to improve detection probability due to lower visibility in these areas.

The aerial transect sampled all landform and vegetation types within 03B and 06C study area; however, additional effort and focus was applied to habitats that are generally known to support, or be favourable for, bilbies (i.e. laterite rises, patches of shrubs that support root-dwelling larvae such as *Acacia lysiphloia*, drainage areas that may support food plants such as *Cyperus bulbosus*). At the time of survey, the fire pattern (age) within the 03B and 06C study area was fairly uniform with the majority being burnt between 4 and 6 years ago, and no recently burnt areas. As such, site selection did not need to account for fire stratification (sometimes bilbies are attracted to freshly-burnt locations due to presence of fire ephemeral plant species).

Previous Greater Bilby records (see Figure 4-5) were also checked if located close to study area (i.e. within 1 km). This only occurred on 02A (Turpentine patch on eastern side of Lajamanu Road). All proximate records to 03B and 06C were from 1982 and were not visited (records were also >2 km from study area).

Site categories

During aerial transects, when putative (i.e. suspected / potential) Greater Bilby sign was observed (such as a burrow/hole, large spoil heap, diggings), the pilot was informed to loop back around to conduct a hover check of the sign. If the hover check clearly identified the sign was from another species, the site was marked as 'not bilby' (as per site categories defined in Table 4-4). If the observers suspected the sign could potentially be from bilby, a ground check was conducted to confirm identification (based on protocols developed by Southgate et al. 2018, summarised in Table 4-5).

If Greater Bilby sign was confirmed or highly likely at a site, a wider search was conducted within the study area corridor to determine the extent of the activity, and importantly, the location of any active (or inactive) burrows so they can be suitably avoided at the line preparation phase.

In addition to sign-based observations, ground checks were also conducted when favourable habitat conditions were observed (i.e. *Acacia hilliana* or *A. lysiphloia* patches on laterite rises). This aims to test if false negative observations are being made during aerial survey (previous experience with aerial survey also indicates that old sign can be difficult to detect from the helicopter if the sign is totally or partially obstructed from view – this is because the soil colour of spoil has become bleached to blend in with surrounding soils. Fresh sign is generally very obvious).

Table 4-4. Site categories used for the Greater Bilby aerial survey

Site category	Criteria
Confirmed bilby	• There is sufficient evidence that the sign is made by Greater Bilby (as per Table 3.2). • This rating can only be made during a ground inspection (not solely via aerial inspection).
Likely bilby	• There is strong evidence that the sign belongs to a Greater Bilby – such as a large round burrow with large characteristic spoil heap – however, there is no definitive sign present (i.e. scats, fresh tracks, RDL diggings – as described in Table 3.2). • This rating can only be made during a ground inspection (not solely via aerial inspection).
Potential bilby	• The sign has characteristics of Greater Bilby but there is not enough evidence to provide a definitive assessment (as per Table 3.2) (might be due to old degraded sign). • This may be based on aerial or ground-based observations.
Unlikely bilby	• The sign is most likely attributed to another species (e.g. *Varanus gouldii* or *V. panoptes*); however, ground inspections were not conducted (due to landing concerns or other reason) to enable observers to make a definitive assessment.
Not bilby	• There is clear evidence (from aerial or ground inspections) that sign was not Greater Bilby. • This may be based on aerial or ground-based observations.

** RDL – Root-dwelling larvae; RDL vegetation are flora species that are known to support RDL.*

Table 4-5. Protocol used to assess confidence of Greater Bilby sign

(Information presented in this table is adapted from Southgate et al. 2018)

Sign type and description	Recommended actions
Sign can be used to confirm presence of Greater Bilby	
Multiple diggings into roots of RDL vegetation Hole or diggings (usually less than 50cm in depth) under shrubs that support RDL. Direction or conical in shape with spoil evening distributed around the dig. Usually obvious and numerous. Can remain evident for months to years, depending on substrate and rainfall. Plants that are known to be targeted by Greater Bilby (in the NT) include *Acacia hilliana, A. lysiphloia, A. monticola, A. acradenia, A. melleodora, A. bivenosa, Senna notabilis* and *Indigofera georgei*. No other species in arid / semi-arid Australia is known to expose and rip open plant roots containing larvae.	• Identify plant species harbouring RDL, collect botanical specimen if uncertain for identification post field trip, and assess age of diggings. • For further confidence, search surrounding areas for scats, clear tracks and multiple diggings into roots of RDL vegetation.
Scats Typically in groups of 2 to 5 pellets and usually contain sand, plant and invertebrate material. They are firm, oblong-shaped, almost round in cross section, have a smooth coating, and rounded ends. Commonly found hidden within spoil of diggings; rarely found away from some form of digging activity. Can persist for several months. No other extant species in arid / semi-arid Australia produces scats with these characteristics.	• Collect several scats, store each set dry in separate paper bags or vials with silica gel beads and cotton wool; determine if juveniles are present (i.e. small pellets). • For further confidence, search surrounding areas for scats, clear tracks and multiple diggings into roots of RDL vegetation.
Clear tracks (generally limited to fresh tracks only) Bilbies move with a quadrupedal bounding overstep gait; with the front imprints staggered and the hind imprints mostly parallel. The presence of fresh and clear tracks that have three distinct parallel marks (representing toes) from front feet, and slender (narrow) hind foot imprints with indistinct side toes are necessary to confirm presence using track-based sign. It is not sufficient to rely on gait pattern alone.	• Record group width and length of several sets, assess if juveniles present, photograph with a scale; estimate age of tracks. • For further confidence, search surrounding areas for scats, clear tracks and multiple diggings into roots of RDL vegetation.
Sign can only be used to identify potential bilby presence / activity only	
Diggings other than for RDL These are similar to those described above for RDL, however they in the open targeting termites, spiders or bush onion bulbs. Several other taxa (including varanid lizards) can also produce similar diggings, as such presence cannot generally be confirmed solely on the detection of these type of diggings.	• Continue to search surrounding areas for scats, clear tracks and multiple diggings into roots of RDL vegetation. • Record age and characteristics of diggings (i.e. identify what diggings are into – termites, spider burrows, seed stores of ants etc.)
Burrow or burrows Burrows are round, and may be single or multiple entrances. An apron of spoil of excavated sand is usually present. Several separate burrows are often found within a foraging area. Presence cannot generally be confirmed solely on the detection of a bilby-like burrow because other species can re-work inactive bilby burrows and make them appear active; as such, additional sign is often required to confirm presence.	• Continue to search surrounding areas for scats, clear tracks and multiple diggings into roots of RDL vegetation. • Record dimensions of burrow circumference, photograph with scale, describe presence of soil apron and age since last activity.
Unclear tracks If tracks do not have features as described above (i.e. only the gait pattern is visible), there is insufficient evidence to confirm that the track is made from Greater Bilby as there are several other taxa that can produce similar gait patterns – such as rabbits, mulgara and rodents / rats.	• Continue to search surrounding areas for scats, clear tracks and multiple diggings into roots of RDL vegetation. • Measure the length and width of several track groups, photograph with a scale. • Determine any other species responsible for tracks detected, estimate the age of tracks.

Survey conditions

Conditions were excellent for tracking, with sunny days experienced during the survey (i.e. good shadows for identifying tracks and other features in the sand) and no rainfall within the study area in the week prior to survey (rain prior to surveys can cover up tracks and remove sign). Vegetation cover was mainly open shrubs/woodland (good aerial visibility) within only a few relatively dense patches of shrubs (average to poor aerial visibility), with also the occasional stands of Bullwaddy (poor aerial visibility). In the cases of low visibility, repeat fly-overs were undertaken if potential food plants were observed (i.e. *Acacia lysiphloia*), as well as several ground-based pedestrian transects.

Fresh burrows and diggings (from a range of species) were highly conspicuous from the air because excavated soil had a richer (red) colour in contrast to the sun-bleached paler surface soils (Figure 4-4).

Figure 4-4. Photograph showing that fresh spoil was easily detectable during the aerial survey

Results

Approximately 225 km of aerial transect were surveyed within the study area (see Figure 4-5). The survey confirms that Greater Bilby currently inhabit the southern parts of 03B and 06C. Greater Bilby was '*confirmed*' at two sites, '*likely*' at three sites and '*potential*' at one site (details provided in Table 4-6; locations shown on Figure 4-5; photographs in Figure 4-6 to Figure 4-12). It is noted that no false negative detections occurred (i.e. habitat-based ground checks, when putative sign was not aerially observed, did not result in a detection). The burrow dataset is provided in Appendix E.

All detections were located on lateritic rises and/or plains (land type LT-5) that supported a spinifex grassland (*Triodia pungens*) with scattered to patchy shrubs (including *Acacia lysiphloia, Acacia stipuligera* and *Grevillea wickhamii).* Sign included burrows, tracks, scats and diggings (in the open and under shrubs for RDL).

Site 47 had the highest level of activity – four active burrows, two inactive burrows, and numerous fresh (and old) diggings and scats (see photographs in Figure 4-11; close-up map of site and search effort provided in Figure 4-5). Evidence indicates that this site is regularly occupied by Greater Bilby due to present of fresh and old sign. All diggings observed at this site were in the open rather than under shrubs for RDL (diggings in the open were confidently identified as bilby due to presence of scats in spoil piles and fresh tracks). The range of scat and track sizes at this site indicates that at least three individuals are currently present, including a juvenile and adults. As such, burrow avoidance mitigations will need to be implemented at this site in order to avoid direct impact to the species. Site 52 falls very close to site 47, and indicates the western extent of bilby activity within the 06C study area during the current survey (potential diggings observed, no burrows).

One active burrow was observed at Site 40, along with numerous diggings for RDL under Turpentine (*Acacia lysiphloia*) (see photographs in Figure 4-9; close up map of site and search effort provided in Figure 4-5). Scat size observed in this area indicates that only one or two adults is are likely present (only adult scats observed with very little size variance). No small (juvenile) scats were observed. As such, burrow avoidance mitigations will need to be implemented at this site in order to avoid direct impact to the species.

Potentially-active burrows were observed at Sites 30 and 31 (see photographs in Figure 4-6 and Figure 4-7). The round shape and size of the burrow entrances are characteristic of Greater Bilby; however, the absence of scats, RDL diggings or tracks at these sites meant that bilby identification could not be confirmed.

Similarly, an inactive burrow was observed at Site 34 (see photographs in Figure 4-8). This burrow did not have any recent spoil at the entrance and no diggings or tracks could be observed in the local area. Nonetheless, because the survey confirmed the presence of bilby in relatively close proximity to these sites, as a precaution these burrows should be treated as bilby and suitably avoided by the seismic operation.

Aerial observations along seismic line 01A (Buntine Highway) and 02A (Lajamanu Road) did not record any evidence of Greater Bilby (including checking 2003 NT Atlas record locations); however, suitable habitat is present in areas outside of the existing road corridor.

Food resource observations

The study area currently supports low levels of seed, fruit and bulbs of ephemeral plants species that are known as food sources for bilby in the Tanami Desert (i.e. *Yakirra australiense, Scaevola parvifolia* and *Cyperus bulbosus* – Pavey 2006; Southgate et al. 2018; Southgate & Carthew 2007) – this is likely due to low rainfall and no recent fires within the past 4 to 6 years. The occurrence of these food sources can dramatically change in response to fire and subsequent rainfall.

Turpentine (*Acacia lysiphloia*) has a consistent but patchy occurrence within the study area (i.e. scattered shrubs to dense patches). It was noted that patches of Turpentine were more common on the lateritic plains and rises within the southern parts of the survey area. Turpentine is a known target plant by Greater Bilby for RDL (Southgate et al. 2018; Southgate & Carthew 2006; Southgate 1990); however, diggings under Turpentine were uncommon during the current survey, with only one site (site 40) having clear evidence of RDL diggings (only observed in younger shrubs).

Few other RDL species were observed (low numbers of *Senna notabilis* was also present, another RDL food source), which again may be due to recent fire history. *Acacia hilliana* was observed on a lateritic rise within the 06C study area (site 53), but no RDL diggings (or other putative bilby sign) were observed.

Occurrence assessment

Survey observations indicate that Greater Bilby (and associated burrows) are more likely to be encountered in the southern 30 km of seismic lines 03B and 06C – associated with land type 5 (shown on Figure 4-5), due to presence of active burrow sites, presence of lateritic plains and rises (known as favourable habitat for bilby), and presence of potential food resources (such as Turpentine and termites/invertebrates). As such, mitigation measures should be implemented to ensure that direct impacts are avoided and general impacts to species habitat is minimised.

It is possible that Greater Bilby could occur in other areas within lines 03B and 06C; however, the likelihood of encountering an active burrow is considered to be low. Nonetheless, it should be assumed that Greater Bilby occur in this area, and precautionary measures should be implemented to minimise potential impacts to active burrows and/or disturbance to active feeding areas.

It is also possible that Greater Bilby could be encountered within the elevated plateaux surfaces Land Systems within lines 01A and 02A; as such, mitigation measures should be in place to minimise chance of road kill when conducting seismic activities on Buntine Highway and Lajamanu Road corridors (this would include avoiding vehicle movements at night, or implementing strict speed limit and general awareness that bilbies could be active in these areas).

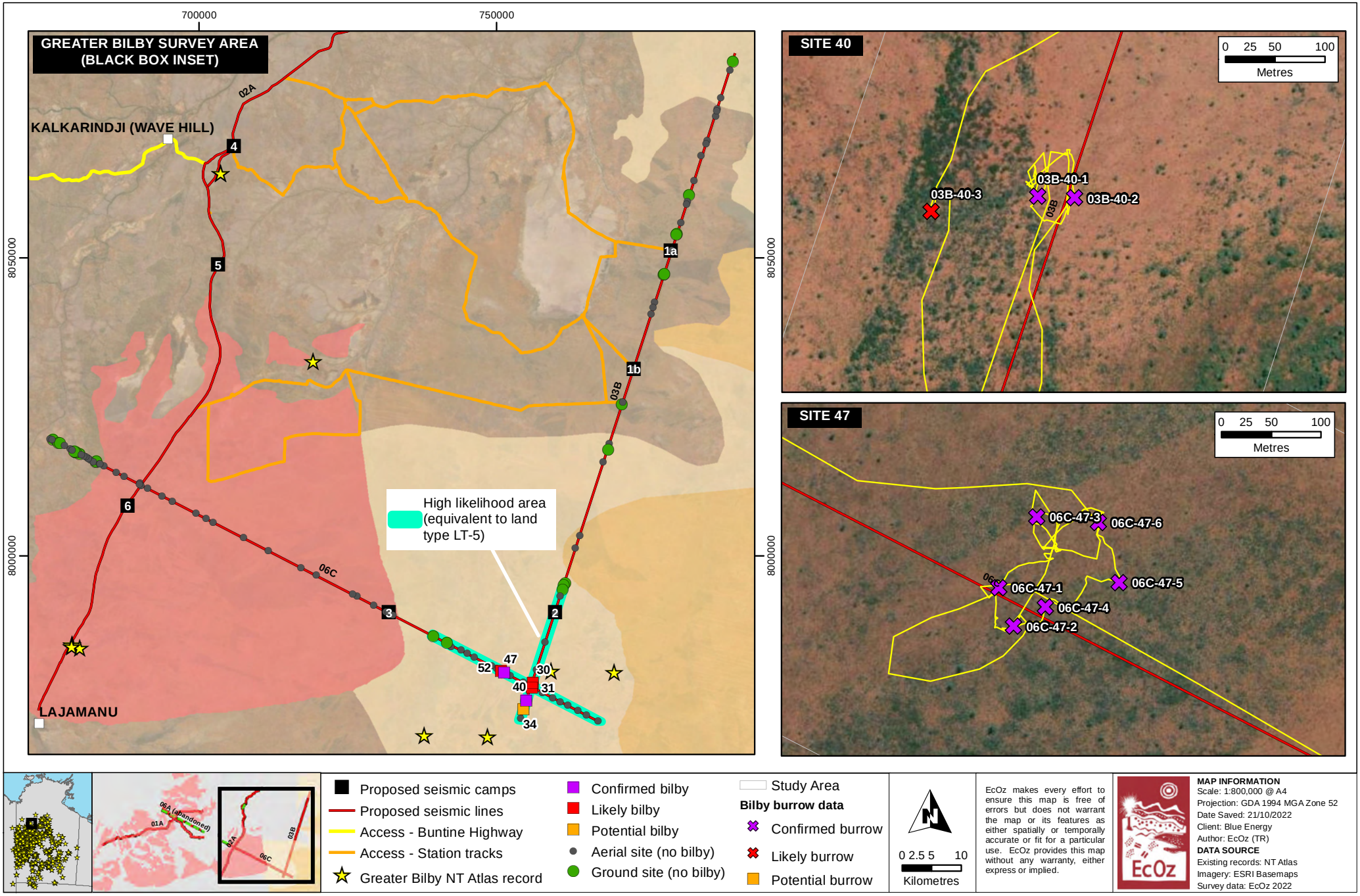


Figure 4-5. Map of Greater Bilby survey effort and results

Table 4-6. Greater Bilby survey results

Site	Coordinates (Zone 52)	Site type	Landform and soil	Vegetation	Results and observations	Site photograph
30	**E:** 756156 **N:** 7978606	Ground check (from putative aerial sign)	Lateritic rise Gravelly surface, red sandy loam	Open to sparse Blue Mallee (*Eucalyptus pruinosa),* scattered to patchy Turpentine *(Acacia lysiphloia*) and *A. adoxa* over spinifex grassland (*Triodia pungens*).	**LIKELY BILBY & POTENTIALLY ACTIVE**: • Potential burrow present (25cm diameter, round shape, fresh spoil) (see photograph in Figure 4-6). • Relatively recent diggings in open present (could not confirm if definitely made by bilby) (see photograph in Figure 4-6). • No RDL diggings observed at site; however, *Acacia lysiphloia* is present (species is known to be targeted by bilby for RDL). • No bilby scats observed.	
31	**E:** 755953 **N:** 7977815	Ground check (from putative aerial sign)	Lateritic rise Gravelly surface, sandy red earths	Scattered to patchy Turpentine *(Acacia lysiphloia*) and *A. adoxa* over spinifex grassland (*Triodia pungens*). Open to sparse Blue Mallee (*Eucalyptus pruinosa)* in the surrounding area.	**LIKELY BILBY & POTENTIALLY ACTIVE**: • Two potential burrows present that have fresh spoil but no other sign that can confirm bilby (see photograph in Figure 4-7). It was noted that Sand Goanna tracks are present at burrow entrances (so they may be currently occupied by goanna). • No suspected bilby diggings observed at site; however, *Acacia lysiphloia* is present (species is known to be targeted by bilby for RDL). • No bilby scats observed.	
34	**E:** 754495 **N:** 7974194	Aerial check	Lateritic plain Red earth sands with fine gravel	Open spinifex grassland (*Triodia pungens*). Patches of Turpentine *(Acacia lysiphloia*) close-by. Open Bloodwood (*Corymbia opaca*)	**POTENTIAL BILBY & NOT ACTIVE**: • Large burrow that could potentially from bilby (see photograph in Figure 4-8). • Burrow appears to have partially collapsed and there are is no sign of recent occupation (i.e. no fresh spoil, tracks or diggings in the vicinity of the burrow). • Assumed to be inactive. • Landing was not required as aerial assessment was conclusive.	

Site	Coordinates (Zone 52)	Site type	Landform and soil	Vegetation	Results and observations	Site photograph
40	**E:** 755038 **N:** 7975664	Ground check (from putative aerial sign)	Lateritic plain and low rise. Gravelly surface and sandy red earths	Spinifex grassland (*Triodia pungens*), patches of Turpentine (*Acacia lysiphloia*) +/- Holly Grevillea (*Grevillea wickhamii*) and Club-leaf Wattle (*Acacia hemignosta*). Open Bloodwood (*Corymbia opaca*)	**CONFIRMED BILBY & CURRENTLY ACTIVE**: • One active burrow observed (positioned amongst spinifex hummocks) (photograph in Figure 4-10). • One collapsed / infilled (?) burrow observed (positioned amongst spinifex hummocks) (see photograph in Figure 4-10). • Numerous RDL diggings, all under small *Acacia lysiphloia* (photograph in Figure 4-9). • Scats present at most diggings and also at burrow entrances (photograph in Figure 4-9). • Partial tracks observed at burrow entrances.	
47	**E:** 751248 **N:** 7980340	Ground check (from putative aerial sign)	Lateritic rise Red earth sands with a thin layer of fine surface gravel	Mixed open to patch shrubland (*Acacia lysiphloia, Grevillea wickhamii, Acacia stipuligera*) over spinifex grassland (*Triodia pungens*).	**CONFIRMED BILBY & CURRENTLY ACTIVE**: • Site highly active with numerous burrows and sign. • Four active burrows present (photograph in Figure 4-11). Would likely find more if more extensive search was undertaken. • Two inactive burrows (collapsed). • Burrows either established under *Acacia lysiphloia* or amongst spinifex hummocks. • Numerous recent tracks, diggings in open, RDL diggings and scats (photograph in Figure 4-11).	
52	**E:** 750766 **N:** 7980597	Aerial check	Lateritic plain Red earth sands with a thin layer of fine surface gravel	Spinifex grassland (*Triodia pungens*) with scattered Turpentine (*Acacia lysiphloia*) and Holly Grevillea (*Grevillea wickhamii*)	**LIKELY BILBY & POTENTIALLY ACTIVE**: • Several potential diggings observed (recent). • No burrows observed. • Ground-check was not undertaken due to close proximity to active bilby site 47, as such it was assumed that diggings were highly likely to be bilby.	

Potential Greater Bilby burrow (characteristic shape of bilby; however, no scats or tracks present to confirm identification)

Potential Greater Bilby digging in the open (however, no scats or tracks present to confirm identification)

Figure 4-6. Photographs of Greater Bilby evidence at site 30

Potential Greater Bilby burrow (characteristic shape of bilby; however, no scats or tracks present to confirm identification)

Potential Greater Bilby burrow (characteristic shape of bilby; however, no scats or tracks present to confirm identification)

Figure 4-7. Photographs of Greater Bilby evidence at site 31

Figure 4-8. Photographs of potential Greater Bilby burrow at site 34

Figure 4-9. Photographs of Greater Bilby diggings and scats at site 40

Active Greater Bilby burrow (fresh spoil, bilby tracks and scats; numerous diggings in area).

Collapsed / recently infilled(?) Greater Bilby burrow (scats in spoil, tracks and diggings close-by)

Figure 4-10. Photographs of Greater Bilby burrows at site 40

Figure 4-11. Photographs of active Greater Bilby burrows at site 47

Digging and scats

Digging, scats and tracks

Diggings and scats

Diggings and scats

Trench digging

Tracks

Figure 4-12. Photographs of Greater Bilby tracks, scats and diggings at site 47

4.2.2 Gouldian Finch *(Erythrura gouldiae)*

The study area occurs at the southern extent of the current Gouldian Finch distribution (see map inset in Figure 4-13), and there are NT Atlas records in close proximity to line 02A on Lajamanu Road (Figure 4-13). The seismic project has potential to impact Gouldian Finch if nest sites (or suitable nesting habitat) are cleared or disturbed, and/or if water sources are degraded. Localised clearing for seismic lines on feeding areas is not considered likely to result in a significant impact to the species due to the thin linear disturbances (that will be rehabilitated) and the low likelihood that the species will be directly harmed.

In this region, tree hollows in mature Snappy Gum (*Eucalyptus brevifolia*) trees are used by Gouldian Finch for nesting purposes (O'Malley 2006; Garnett et al. 2011; Tidemann et al. 1992). Subsequently, this survey aimed to map the extent of Snappy Gum within the study area, because avoiding impacts to potential breeding habitat will be the key mitigation measure for this project.

Methodology

Prior to survey, existing land unit mapping by Napier & Hill (2012) was reviewed to identify land units that may support Snappy Gum as dominant or co-dominant species (shown on Figure 4-13). Field work was then undertaken using aerial observations (R44 helicopter) to map the extent of Snappy Gum habitat within the study area. For the purpose of this assessment, all Snappy Gum trees were assumed to provide suitable nesting hollows for Gouldian Finch. It is assumed that all drainage lines may support post-wet season water sources suitable for Gouldian Finch. Suitable water source locations were recorded if encountered.

Birdwatching to observe Gouldian Finch was not undertaken as part of this survey. Instead, it was assumed the species is present in the area and nesting-habitat avoidance is considered as the key mitigation to avoid significant impact to the species.

Results and assessment

The survey confirms that nesting habitat for Gouldian Finch is present within the study area, and can be generally defined as mature hollow-bearing Snappy Gum (*Eucalyptus brevifolia*) trees.

The western 10 km of Seismic line 06C supports several areas of Snappy Gum that could be suitable nesting habitat for Gouldian Finch (noted on Figure 4-13). The escarpment and steep slopes (land type LT-10) are of particular importance as Snappy Gum were larger (higher likelihood to be hollow-bearing; see photographs in Figure 4-14) and are in better proximity to drainage lines that may provide suitable water sources (Gouldian Finch require suitable water source within 2 to 4 km of nest sites – O'Malley 2006). However, seismic activities in this area have been abandoned, so further assessment is not required.

Snappy Gum on the lateritic plateau east of scarp may be suitable for nesting (land type LT-9) but are considered to be less desirable due to smaller size (in general) and further distance to suitable water sources (see photograph in Figure 4-15). Nonetheless, mature Snappy Gum in this area should be considered as suitable nesting habitat, and avoided during vegetation clearing activities.

Seismic activities for lines 01A, 02A and 06A are positioned on existing roads or station tracks and therefore vegetation clearing is not proposed. Field observations confirm that Snappy Gum are common in the vegetation communities surrounding these roads (general extent shown in Figure 4-13 using existing land unit mapping by Napier & Hill 2012 and NVIS) (representative photographs provided in Figure 4-16). Subsequently, it is possible that Gouldian Finch could nest in Snappy Gum adjacent to these roads/tracks and any vegetation clearing will require assessment in terms of potential impacts to nesting habitat for Gouldian Finch. There are several Gouldian Finch records in the southern part of seismic line 02A which confirms that the species is known to utilise habitat with the road corridors.

Hollow-bearing Snappy Gum may occur in the surrounding vegetation at the proposed camps on lines 01A and 02A (camps 5, 6, 7, 8, 9). However, no trees will be cleared for the camp pad at these locations.

No suitable nesting habitat for Gouldian Finch was observed within the study area for seismic line 03B.

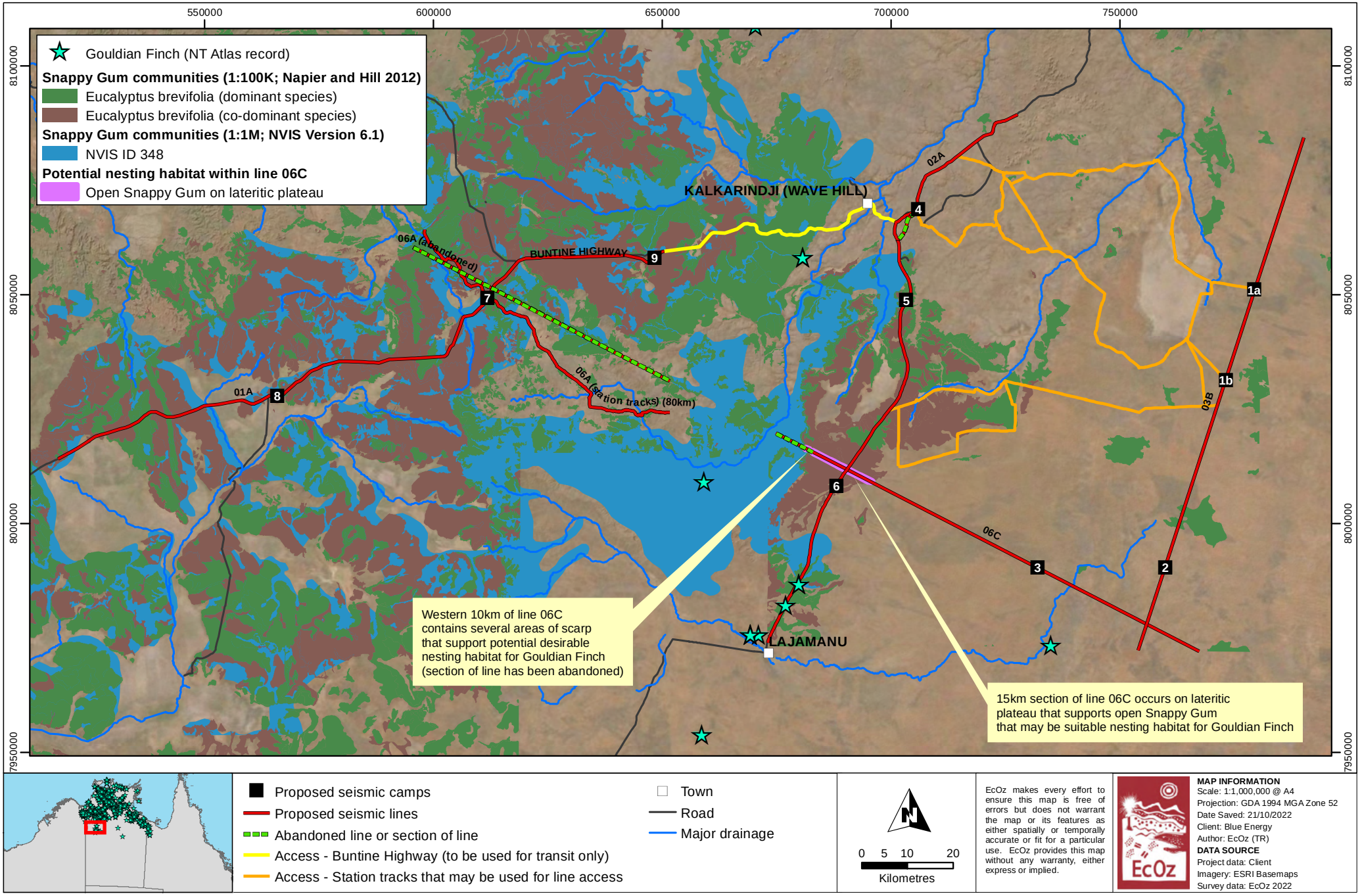


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Figure 4-13. Map of Gouldian Finch survey results

Figure 4-14. Photographs of Snappy Gum on steep slopes (Site 63, western end of seismic line 06C)

Figure 4-15. Photograph of open Snappy Gum community on lateritic plains / plateau (site 120)

Figure 4-16. Photographs of Snappy Gum present in road corridors (typical of lines 01A and 02A)

4.2.3 Purple-crowned Fairy-wren (western) *(Malurus coronatus coronatus)*

The Purple-crowned Fairy-wren (western) is almost entirely restricted to a narrow band around well-defined river channels and riparian habitats (with close-by permanent water). In this region it is mainly known from the Victoria River (and associated channels) in areas of dense river grass – *Chionachne cyathopoda* (Rowley 1993; van Doorn & Low Choy 2009) and/or *Pandanus aquaticus* (van Doorn & Low Choy 2009). Existing records are shown on Figure 4-17 (map inset indicates study area is on the south edge of current distribution).

The survey focused on identifying suitable habitat within the study area to inform management mitigations. It is noted that the seismic project will not require vegetation clearing on Victoria River because existing crossings will be utilised (i.e. Buntine Highway for access; and two station tracks crossings on 06A on Riveren Station).

Methodology

Prior to survey, aerial imagery was reviewed to identify major waterways within the study area. Field work was then undertaken using aerial observations (R44 helicopter) and ground survey to determine whether suitable habitat is present, and if present, the extent of the patch was mapped.

For the purpose of this assessment, suitable habitat is defined as well-defined river or creek channel that supports riparian vegetation. A higher level of suitability was allocated to areas that have permanent water close-by (i.e. within 500 m) and support dense river grass (*Chionachne cyathopoda*) and/or patches of *Pandanus aquaticus* as these areas are often favoured by the Purple-crowned Fairy-wren.

Birdwatching for Purple-crowned Fairy-wren was not undertaken. Instead, it was assumed that the species is present in the area and nesting-habitat avoidance is therefore considered to be the key mitigation to avoid a significant impact to the species.

Results and assessment

The field assessment confirmed that the study area does not support favourable habitat for Purple-crowned Fairy-wren, due to the absence of permanent water bodies, river grass thickets (*Chionachne cyathopoda*) and patches of *Pandanus aquaticus.* Nonetheless, it should be assumed that all riparian vegetation within the study area is suitable habitat for Purple-crowned Fairy-wren and that mitigations are in place to avoid impacts to riparian vegetation.

Seismic lines 01A and 02A cross several waterways that are considered as marginal habitat for Purple-crowned Fairy-wren and there are some historic records on drainages in the northern parts of 02A (shown on Figure 4-17). However, seismic works are proposed to occur on main roads, and therefore potential impact to the species on these lines is unlikely (assuming that indirect impacts will be suitably managed/mitigated).

Line 06A crosses the Victoria River on two occasions (site 181 and 186 – labelled on Figure 4-17), which were not assessed during field work (because alignment was decided upon post-field work). This alignment is located on existing station tracks, and therefore direct impacts to potentially suitable habitat is inherently low. Aerial imagery review indicates that site 186 is located within a major channel of Victoria River and should be treated as priority (in terms of habitat avoidance).

The original alignment of Line 06A would have required at least 10 crossings of riparian vegetation that were considered to be marginally suitable for Purple-crowned Fairy-wren; however, this alignment has been abandoned and will not be cleared as part of this seismic program.

Seismic line 06C crosses Sambo Creek (a major tributary of the Victoria River) and was considered as marginally suitable for the species (location on Figure 4-17; photograph on Figure 4-18). However, Sambo Creek occurs in the section of line that has been abandoned and will not be cleared as part of this program.

Seismic line 03B and 06C (excluding the 10 km abandoned section of 06C described above) do not support suitable habitat for Purple-crowned Fairy-wren.

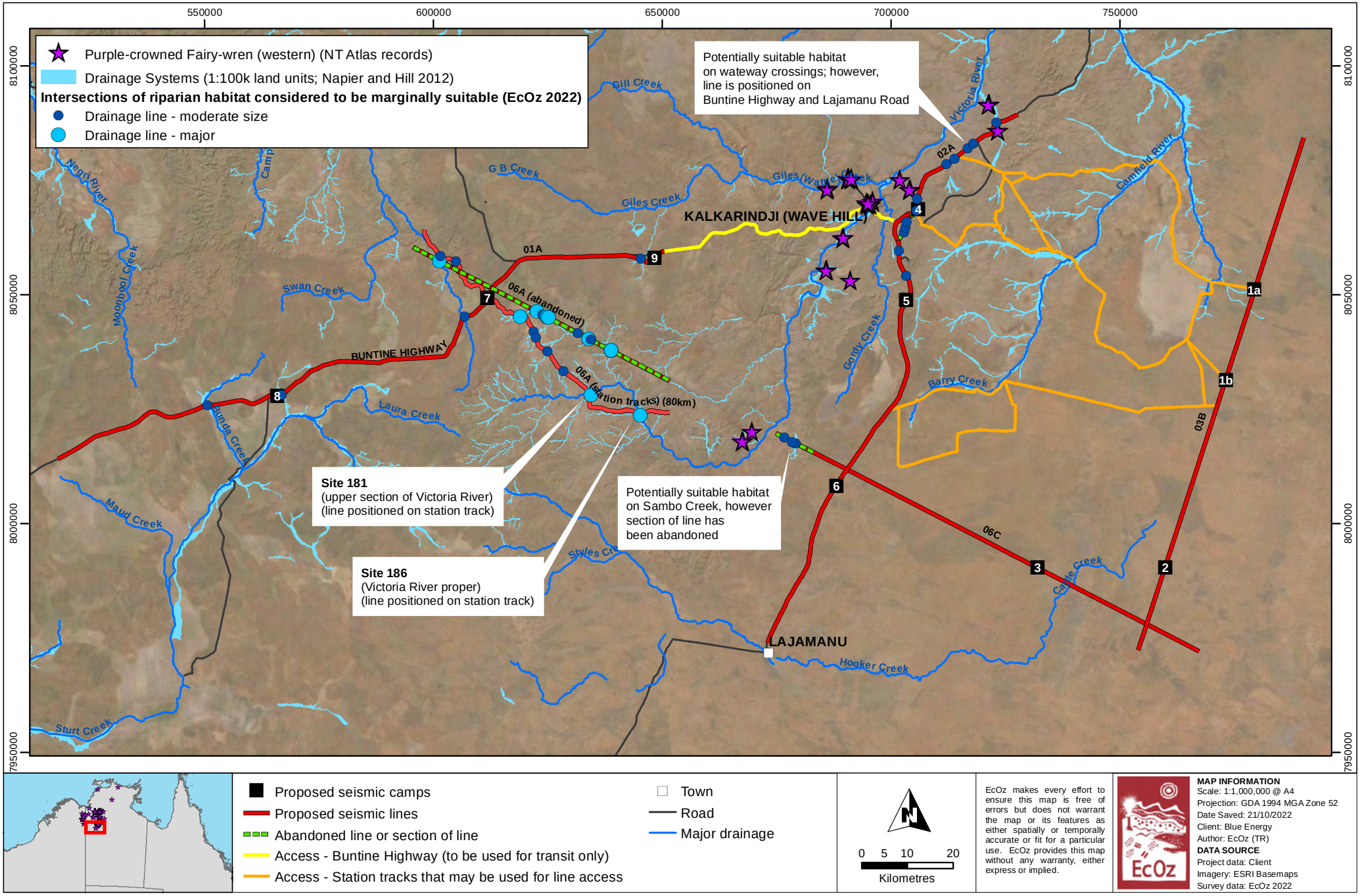

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Figure 4-17. Map of Purple-crowned Fairy-wren survey results

Figure 4-18. Photographs of riparian vegetation at Sambo Creek, which is considered as marginally-suitable habitat for the Purple-crowed Fairy-wren

4.2.4 Grey Falcon *(Falco hypoleucos)*

Potential impacts to Grey Falcon from the seismic project are primarily associated with direct clearing (or disturbance) of current or suitable nesting habitat; therefore, the survey and assessment for this species focused on identifying potentially suitable nesting habitat within the study area.

A study of breeding records from 2003 to 2011 documented 38 breeding events, with the northernmost record occurring south of Daly Waters (Schoenjahn 2013). This indicates that the study area may be outside the known breeding range of the species; however, for the purpose of this assessment, the potential for nesting is deemed possible (due to existing proximate records) and may be on the northern edge of the breeding range.

Methodology

Prior to survey, topographic data and aerial imagery were reviewed to identify major waterways and telecommunication towers within the study area because these areas are the most likely to contain suitable nesting habitat for the species.

Field work was then undertaken using aerial observations (R44 helicopter) to determine whether suitable habitat and/or potential nest sites are present (suitable nesting habitat for Grey Falcon is tall trees on major watercourses, and also on telecommunication towers – DEPWS 2021).

Birdwatching to observe Grey Falcon was not undertaken. Instead, it was assumed the species is occasionally present in the area and nesting-habitat avoidance is considered as the key mitigation to avoid significant impact to the species.

An existing record in close proximity to 01A was visited to determine if this location supports suitable nesting habitat (NT Atlas ID 400313). This particular record is from 1994 and is within 500 m of a telecommunications tower, which may indicate a nest site on the tower (designated as 'Tower 2' in this report).

Results and assessment

Two potential Grey Falcon nests were observed on the two telecommunication towers adjacent to Buntine Highway (within study area 01A) (photographs shown in Figure 4-19; locations shown on Figure 4-20):

- Tower 1 (latitude -17.613719; longitude 130.071533)
- Tower 2 (latitude -17.558297; longitude 130.394317)

No falcon or other raptors were observed at these nests, and a fly-over inspection of the nest did not indicate nests or recent activity. However, it is possible that these nests may belong to (or have been used by) Grey Falcon. Nonetheless, both towers are approximately 170 m from the edge of the Buntine Highway and so it is unlikely that temporary disturbance from seismic exploration at these locations will result in a significance disturbance or impacts to these potential nest sites.

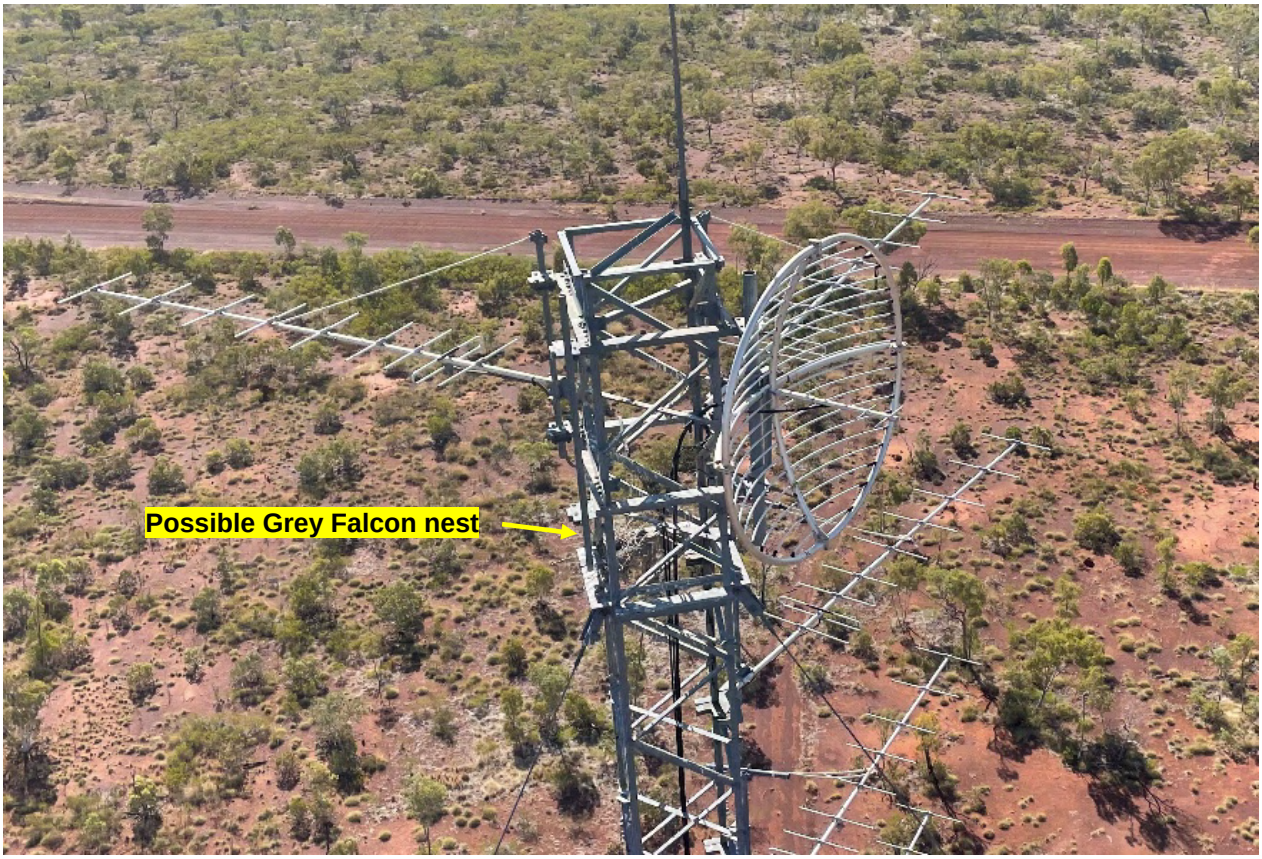
No other telecommunication towers are present within the study area.

Seismic lines 01A, 02A, 06A and the western end of 06C cross several waterways that support riparian vegetation that could contain suitable nesting trees for Grey Falcon (locations shown on Figure 4-20); however, no suspected/potential nest sites were observed, nor were large emergent trees typically used as nest sites were present. Nonetheless, vegetation clearing activities will not occur at these areas (because seismic works are positioned on existing tracks/road, or the section of line has since been abandoned by Blue Energy), and as such, potential impacts to nest sites or suitable nesting habitat in riparian vegetation are unlikely.

The original alignment of Line 06A would have required at least 10 crossings of riparian vegetation that may provide potential nesting habitat (although, no large emergent trees were observed during aerial surveys); however, this alignment has been abandoned and will not be cleared as part of this seismic program.

Seismic line 03B, and the eastern 95 km of seismic line 06C, may be used for foraging by Grey Falcon but does not support suitable nesting habitat for Grey Falcon (i.e. drainage crossings are minor and do not support tall emergent trees typically selected by Grey Falcon for nesting).

Tower 1 (Line 01A - Buntine Highway)



Tower 2 (Line 01A - Buntine Highway)

Figure 4-19. Photographs of potential Grey Falcon nests on towers along Buntine Highway

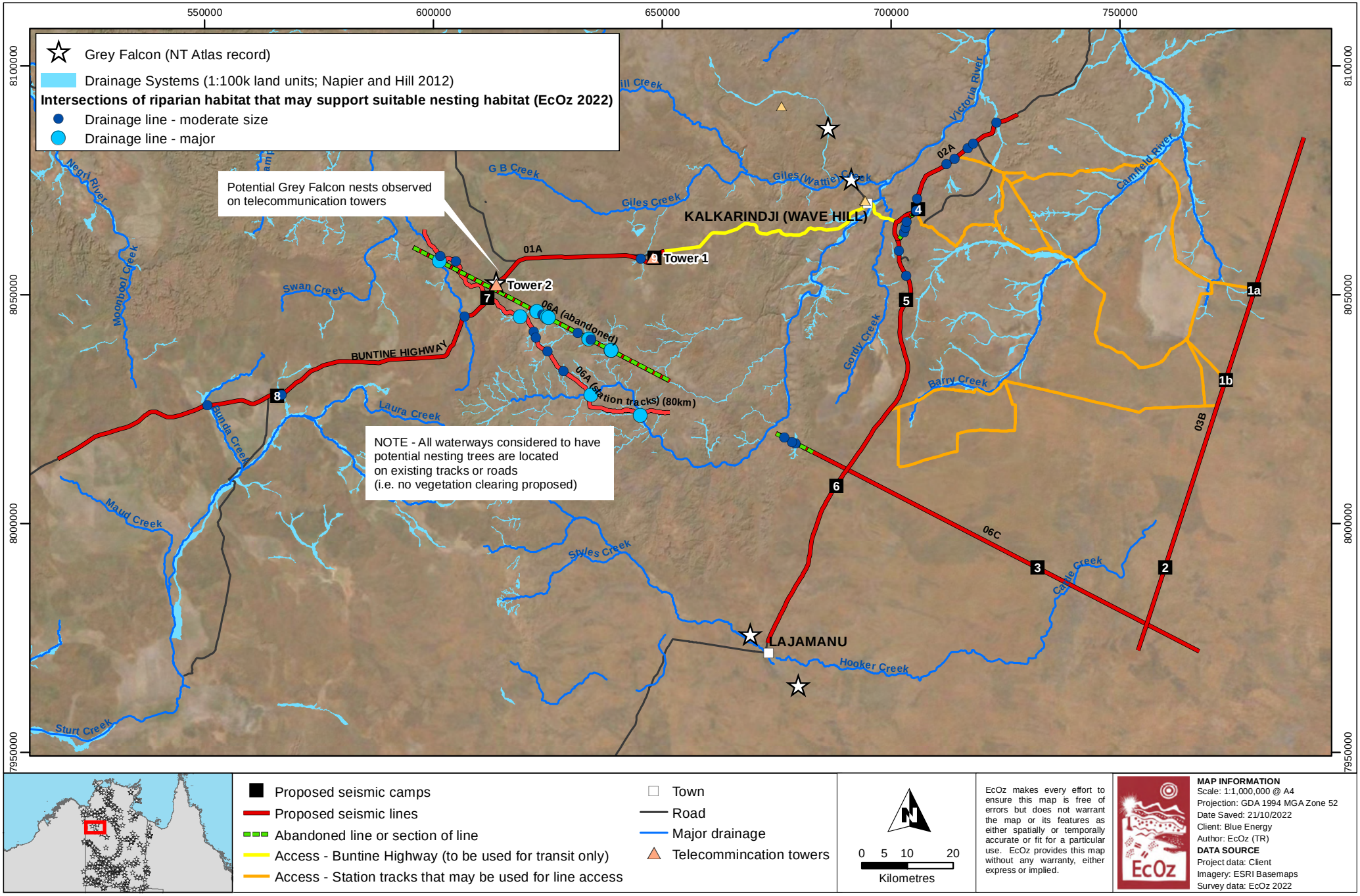


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Figure 4-20. Map of Grey Falcon survey results

4.2.5 Other notable observations

Night parrot

The field survey identified potential roost habitat for the Critically Endangered Night Parrot (patches of mature spinifex on low rocky rises) within the original alignment of seismic line 06A (see representative photograph in Figure 4-21). Night Parrot has not been previously recorded in the area; however, detection methods for this species have recently improved, which has opened up possibility of species presence across its former range. Because the original alignment of this line has been abandoned and moved to an existing track, direct disturbance of potential roost sites is unlikely (because vegetation clearing will not be required) and further assessment is not necessary / justified.

Figure 4-21. Photograph of patch of mature spinifex observed on line 06A (considered to be potential roost habitat for the endangered Night Parrot)

Short range endemic potential

The presence of Rock Fig (*Ficus platypoda*) in some outcrop areas was observed on the original alignment of seismic line 06A. This type of habitat has the potential to support short-range endemic snails (some of which are threatened species) and should be avoided, unless a targeted survey has been conducted to prove absence / low significance. As discussed above, this alignment has been abandoned and moved to existing station tracks, and as such, potential impacts to this type of habitat is not expected.

Figure 4-22. Photograph of Rock Fig (*Ficus platypoda*) on an isolated rocky outcrop. This type of habitat has the potential to support shirt range endemic (potentially threatened) snails.

4.3 Significant habitat / vegetation areas

The following significant habitat or vegetation areas were recorded within the study area.

- Riparian areas / vegetation
- Wetlands (including Gilgai)
- Large hollow-bearing trees
- Rocky habitat features (i.e. overhangs/caves, boulders and cliffs)

No sinkholes are present within the study area.

Waterways and riparian vegetation

The survey has confirmed that waterways and associated riparian vegetation are present within the study area and, as such, mitigation measures will need to be implemented to minimise direct and indirect impacts to these important areas. This section provides a description of waterways present within each seismic line surveyed.

Seismic line 03B intersects two indistinct drainage lines that support arid zone riparian vegetation (sites 18 and 21) (location shown on Figure 4-23; described in Table 4-7). These drainages support relatively open canopies, do not have formed banks and are ephemeral with no permanent (or semi-permanent) waterholes; they are only expected to contain water for short period during the wet season. Gilgai features are present on the southern side of drainage line at site 18. Gilgai are temporary wetland features and should be avoided during vegetation clearing activities (discussed in following sub-section).

The eastern part of seismic line 06C intersects one indistinct drainage line that supports arid zone riparian vegetation (site 55) (location shown on Figure 4-23; described in Table 4-7). This drainage does not have formed banks and is ephemeral with no permanent (or semi-permanent) waterholes observed; it is only expected to contain water for short period during the wet season.

Drainage crossing should be selected to minimise impacts to vegetation and soils. It is assumed that earthworks (cuts) will not be required due to absence of creek banks and steep terrain.

The western 10 km of seismic line 06C comprises of numerous drainage lines of varying sizes, including the Sambo Creek and some other moderate-sized drainages that support distinctive riparian vegetation (sites 66, 67, 69, 117, 118 and 125) (location shown on Figure 4-23; photographs provided in Figure 4-24). This section of line has been abandoned due to steep terrain and, therefore these sites will not be impacted.

Line 06A crosses several waterways that support riparian vegetation (shown on Figure 4-23), including significant waterways Victoria River and Gum Creek. However, no vegetation clearing activities will be required for this alignment due to positioning on existing and well-maintained station tracks (on Riveren Station). Locating seismic works on existing tracks will avoid direct impacts to riparian vegetation, and indirect impacts (such as from sedimentation or contamination via spills) can be managed via standard environmental controls.

The original alignment for seismic line 06A comprised of numerous drainage lines, including 10 crossings associated with Gum Creek and one associated with Stirling Creek that support riparian vegetation (see Figure 4-23; representative photographs provided in Figure 4-25). These creeks are also said to be associated with sacred sites in the region and have been made Restricted Works Areas (AAPA Certificate C2021_088). Descriptions of these drainages have not been presented in this report because this line has been re-aligned to occur along close-by station tracks (new alignment shown on Figure 4-23).

Seismic lines 01A and 02A intersect several waterways that support riparian vegetation (shown on Figure 4-23); representative photographs provided in Figure 4-26); however, no vegetation clearing activities will be required for these lines due to their positioning on major roads (Buntine Highway and Lajamanu Road). This avoids direct impacts to riparian vegetation. Indirect impacts (such as from sedimentation or contamination via spills) can be managed via standard environmental controls.

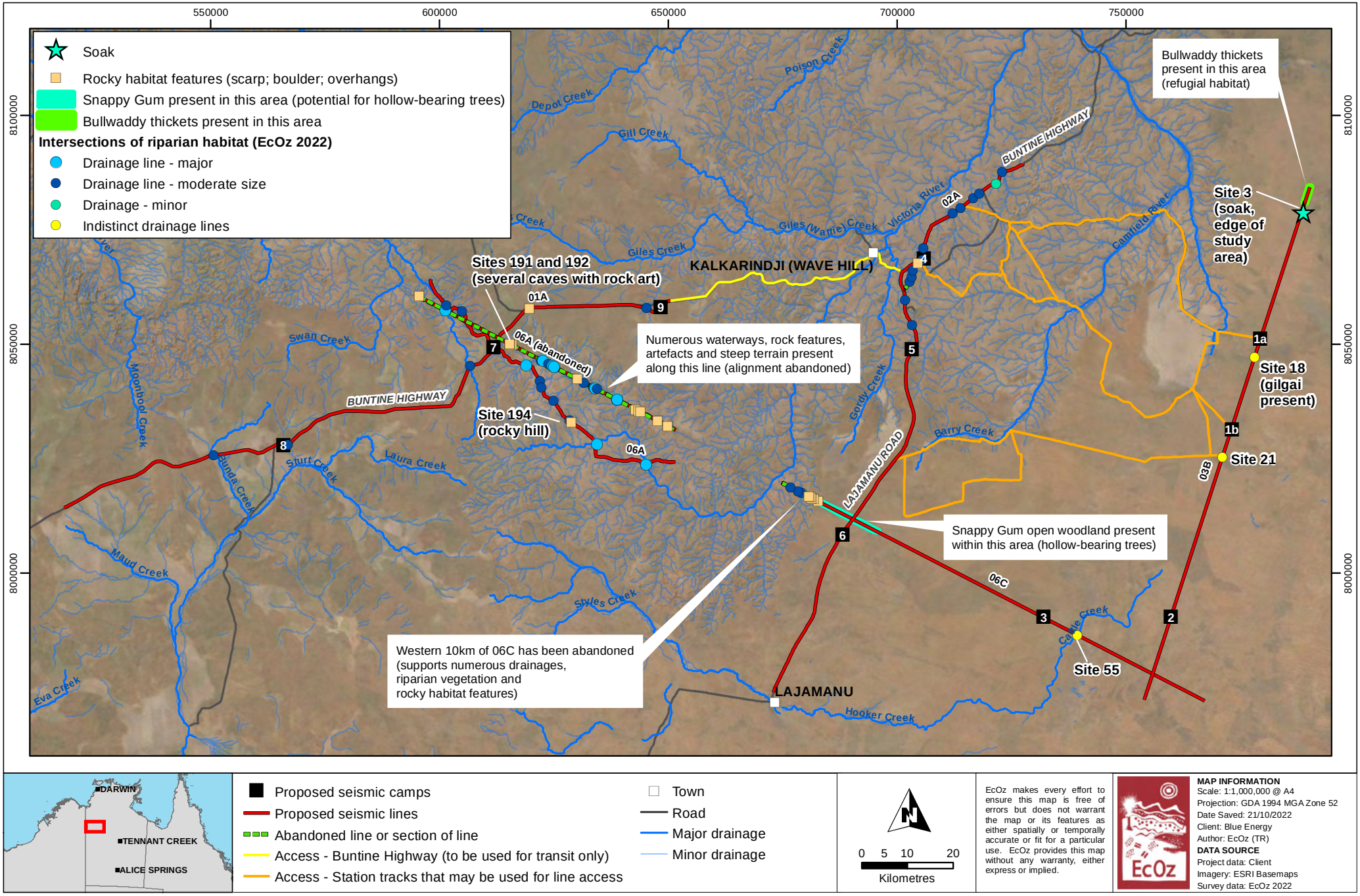

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Figure 4-23. Map showing significant habitat / sensitive vegetation survey outcomes

Table 4-7. Drainage sites that support riparian vegetation within the study area for lines 03B and 06C

Site	Waterway type	Vegetation	Upper stratum	Mid stratum	Ground stratum	Photo
Seismic line 03B						
18	Flood-out drainage associated with Cattle Creek. Narrow shallow ephemeral drainage; no banks. Heavy clay soils; cracking in parts. Gilgai present in the flood-out area to south of drainage.	Low open woodland with patchy to open shrubs over tussock grass	Low open woodland Cover estimate 1 – 5% Height range 5 – 8m Common species: • *Corymbia terminalis* • *Eucalyptus pruinosa* • *Terminalia platyphylla* • *Corymbia flavescens* • *Bauhinia cunninghamii*	Open low-mid shrubs and small trees Cover estimate 1 – 5% Height range 1 – 3m Common species: • *Eucalyptus pruinosa* • *Acacia holosericea* • *Hakea arborescens* • *Carissa lanceolata* • *Ehretia saligna*	Tussock grassland Cover estimate 20-30% Common species: • *Chrysopogon fallax* • *Dichanthium fecundum* • *Eulalia aurea* • *Fimbristylis sp.* • *Eragrostis sp.*	
21	Narrow shallow ephemeral drainage; no banks. Sandy red earth soils (tertiary sediments).	Low sparse woodland with sparse shrubs over tussock grass	Low sparse woodland Cover estimate 1% Height range 6 – 10m Common species: • *Eucalyptus coolabah* • *Corymbia terminalis* • *Ventilago viminalis*	Sparse low-mid shrubs and small trees Cover estimate 1% Height range 1 – 3m Common species: • *Eucalyptus pruinosa* • *Acacia sericophylla* • *Carissa lanceolata* • *Atalaya hemiglauca* • *Vachellia farnesiana*	Open tussock grassland Cover estimate 2 – 5% Common species: • *Chrysopogon fallax* • *Cleome viscosa* • *Eragrostis spp.* • *Enneapogon spp.* • *Aristida hygrometrica* • *Eulalia aurea* • *Triodia pungens* (edge)	
Seismic line 06C						
55	Flood-out drainage associated with Hooker Creek. Broad shallow drainage floor; no banks. Heavy brown loam soils.	Low open woodland with sparse shrubs over hummock grass	Low sparse woodland Cover estimate 1% Height range 6 – 10m Common species: • *Eucalyptus coolabah* • *Corymbia terminalis* • *Corymbia flavescens* • *Bauhinia cunninghamii*	Sparse mid shrubland Cover estimate 1% Height range 1 – 3m Common species: • *Ehretia saligna* • *Owenia reticulata* • *Grevillea refracta (?)* • *Carissa lanceolata* • *Acacia lysiphloia*	Open tussock grassland Cover estimate 2 – 5% Common species: • *Triodia pungens* (dom) • *Chrysopogon fallax* • *Bonamia media*	

Figure 4-24. Photographs of riparian vegetation associated with Sambo Creek located within the abandoned section of line 06C (site 67)

Site 135 (Stirling Creek)

Site 137 (Gum Creek)

Site 139 (Gum Creek)

Site 144 (Gum Creek)

Site 146 (Gum Creek)

Site 147 (tributary of Gum Creek)

Figure 4-25. Photographs (representative selection) of riparian vegetation sites within 06A (this line has been re-aligned to occur on close-by station tracks)

Site 153 (Bunda Creek) (seismic line 01A)

Site 154 (minor creek) (seismic line 01A)

Site 157 (Burtawurta Creek) (seismic line 01A)

Site 158 (minor creek) (seismic line 02A)

Site 160 (minor creek) (seismic line 01A)

Site 75 (creek) (seismic line 02A) (section to be re-aligned to occur on main road)

Site 89 (tributary of Gordy Creek) (seismic line 02A) (section to be re-aligned to occur on main road)

Site 164 (Croker Creek) (seismic line 01A)

Figure 4-26. Photographs of riparian vegetation within line 01A and 02A (located on main roads)

Wetlands (waterholes)

The survey confirmed that no significant wetlands or waterholes are present within the study area.

A soakage (currently holding water) is present 80 m to the west of study area 03B (Site 3; location shown on Figure 4-23; photograph in Figure 4-27). Landforms such as these are considered to be important habitats in semi-arid Australia (Duguid et al. 2005) and need to be avoided (and buffered) by the seismic program if encountered. Field observations and detailed review of aerial imagery indicate that soakages are not present within the study area.

Gilgai formations are present on the southern side of drainage line identified at site 18 associated with land type LT-7 (ground photo in Figure 4-28; aerial photograph in Figure 4-29). Gilgai are small, ephemeral lakes/depressions in expanding clay soils. Gilgai size ranged from a 4 m^2 to 20 m^2 and were scattered within the alluvial zone of the drainage line. Gilgai were dry at the time of survey and contained heavy clay soils with a dense cover of senesced Nardoo (likely Common Nardoo, *Marsilea drummondii*). Gilgai are considered to have local significance in semi-arid Australia (Duguid et al. 2005) and should not be disturbed.

Figure 4-27. Photograph of soakage identified in close proximity to study area for line 03B (site 3)

Figure 4-28. Photograph (ground) of Gilgai identified within the 03B study area (site 17)

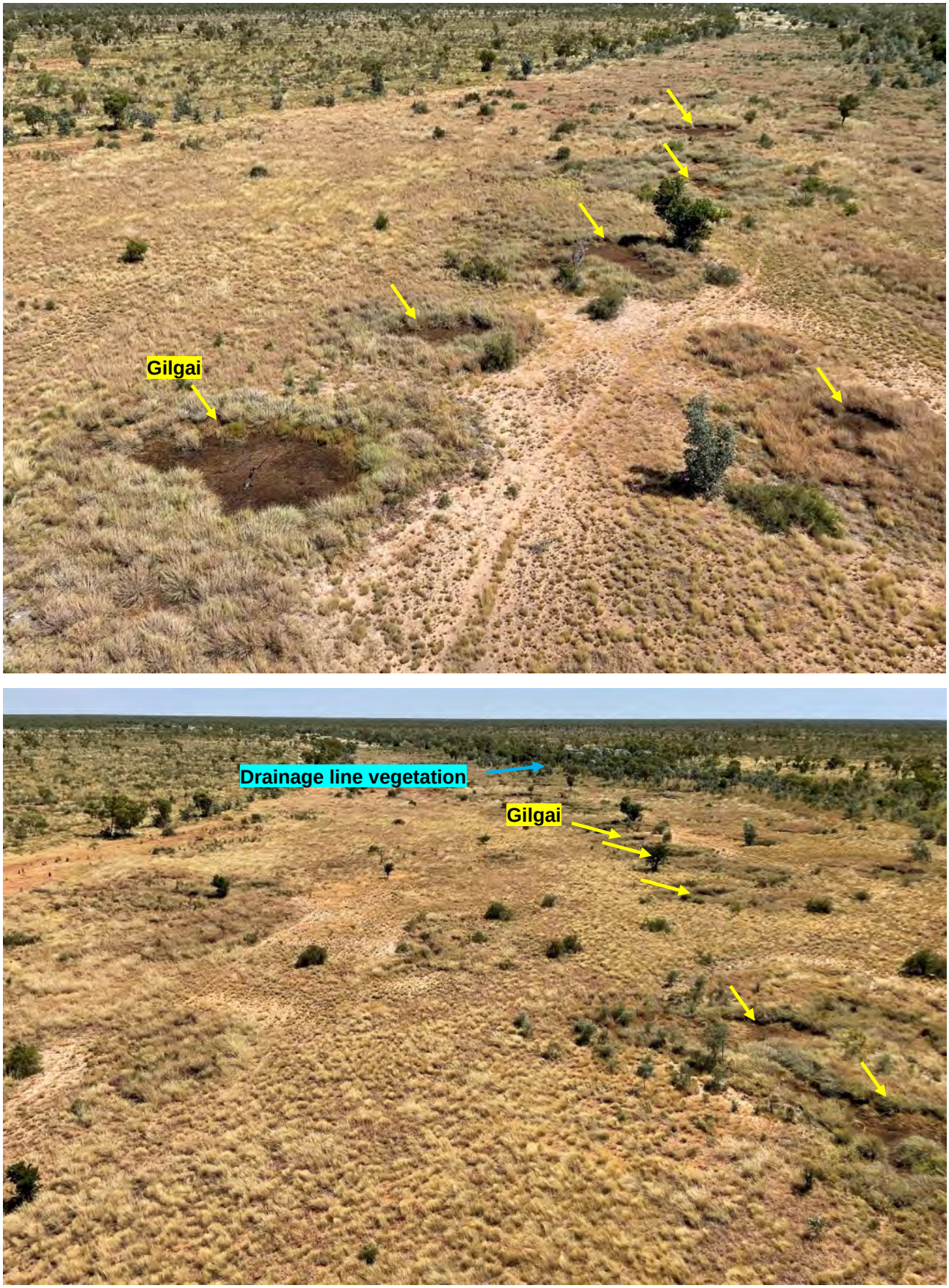

Figure 4-29. Photographs (aerial) of Gilgai identified within the 03B study area (site 17)

Hollow-bearing trees

The presence of hollow-bearing trees was not specifically surveyed as part of the field assessment, because field observations and review of land unit mapping (Napier and Hill 2012) did not indicate the presence of trees species typically known to bear large hollows (such as *Eucalyptus miniata, E. tetrodonta* and *E. coolabah*). Nonetheless, it should be assumed that all large trees (i.e. >10 m in height) have potential to be hollow-bearing to varying degrees, and therefore general avoidance strategies should be implemented to minimise impacts. This should be achievable for this project due to thin nature of clearing area (5 m width), and open to sparse cover of the canopy species.

Mature Snappy Gum (*Eucalyptus brevifolia*) can be hollow-bearing and may have heights less than 10 m. As discussed in Section 1, these trees can be used by Gouldian Finch for nesting purposes. However, the majority of Snappy Gum habitat within the study area is located on existing roads/tracks or the relevant seismic line has been abandoned, and so direct impacts are highly unlikely. An open Snappy Gum community is present within a 10 – 15 km stretch of lateritic plateau (associated with land type LT-9) on the western part of seismic line 06C, and as such tree avoidance strategies are highly recommended in this area to minimise impacts to potential hollow bearing trees (location shown in Figure 4-23).

There are several Bullwaddy (*Macropteranthes kekwickii*) thickets in the northern part of the 03B study area (associated with land type LT-1) (location shown in Figure 4-23; representative photograph in Figure 4-30). They occur in shallow depressions, with heavy red earth soils, and have a scattered occurrence in the local area. When old, these trees can provide relatively large and complex hollows. In addition, the dense tree canopy within thickets can also provide refuge and unique habitat for a range of flora and fauna species including Data Deficient (TPWC Act) grass and forb species (Parks and Wildlife 2005). The Near Threatened (TPWC Act) Spectacled Hare-wallaby (*Lagorchestes conspicillatus leichardtii*) are known to use these stands to shelter in during the day, and feed around the edges at night (Parks and Wildlife 2005). A Spectacled Hare-wallaby was flushed from one Bullwaddy thicket during the current survey (at site 1). As such, Bullwaddy thickets are considered to hold local biodiversity significance and avoidance strategies should be implemented to avoid/minimise impacts.

Figure 4-30. Photograph of Bullwaddy thickets within the northern part of 03B study area

Rocky habitat features

A range of (lateritic) rocky habitat features are present within 06A and 06C study area – including caves, overhangs, scarp/cliffs, crevices and boulders associated with land type LT-10 (representative photographs provided in Figure 4-31; occurrence indicated in Figure 4-23). These features provide unique refugial habitat for a range of species (including the potential for restricted range and threatened species) and can also hold Aboriginal significance (paintings, artefacts and rock engravings were recorded in several caves at sites 191 and 192 – documented in the Aboriginal Cultural Heritage Assessment for the seismic program, Jung 2022).

Seismic works have been abandoned in all areas where significant rocky features are present, and therefore no further assessment or additional mitigations are required.

The revised alignment for 06A occurs on existing tracks, and a review of aerial imagery indicates that there are no rocky scarp or cliffs within 150 m from the road edge (therefore it is unlikely that caves or overhang features are present). One rocky hill (site 194) occurs 40m from the road edge; a review of aerial imagery does not indicate that significant rocky features such as caves or overhangs are present (aerial imagery provided in Figure 4-32). Nonetheless, this rocky hill will not be disturbed by the seismic survey.

Cave site on 06A (site 191) (rock art present)

Cave site on 06A (site 192) (rock art present)

Western end of 06C (site 63)

Western end of 06C (site 63)

Western end of 06C (near site 119)

Figure 4-31. Photographs of important rocky features observed within study area 06A and 06C (it is noted that these lines have been abandoned / re-aligned to avoid potential impacts to these features).

Figure 4-32. Aerial image showing a rocky hill (site 194) adjacent to station track planned to be used for seismic line 06A. This hill requires a ground check so that appropriate protection buffers can be implemented to ensure that potential impacts to significant rocky features do not occur (if present)

4.4 Weed survey

A weed survey was undertaken to determine the current level of weed infestation within the study area, and to inform weed management priorities for the seismic project. Weed species targeted for this project are those listed as Class A or Class B under the Weed Management Act, WONS and priority weed in the regional weed management plan.

Methodology

The weed survey included an aerial inspection of each proposed seismic line, and representative ground-checks within each land type (refer to Figure 4-33). The weed survey targeted priority species as determined in desktop analysis (see Section 3.6.3), which included Parkinsonia (*Parkinsonia aculeata*), Prickly Acacia (*Vachellia nilotica*), Rubber Bush (*Calotropis procera*), Bellyache Bush (*Jatropha gossypiifolia*), Neem (*Azadirachta indica*) and Coffee Senna (*Senna occidentalis*).

When a weed was observed, the following information was recorded – species, seeding status, habitat/landform, photographs (representative only) and infestation level based on the following categories:

- Very low – isolated plant to a few tussocks
- Low – scattered tussocks to small patch (<10 m^2)
- Moderate – medium sized patch (>10 m^2)
- High – large or relatively large infestation (>50 m^2).

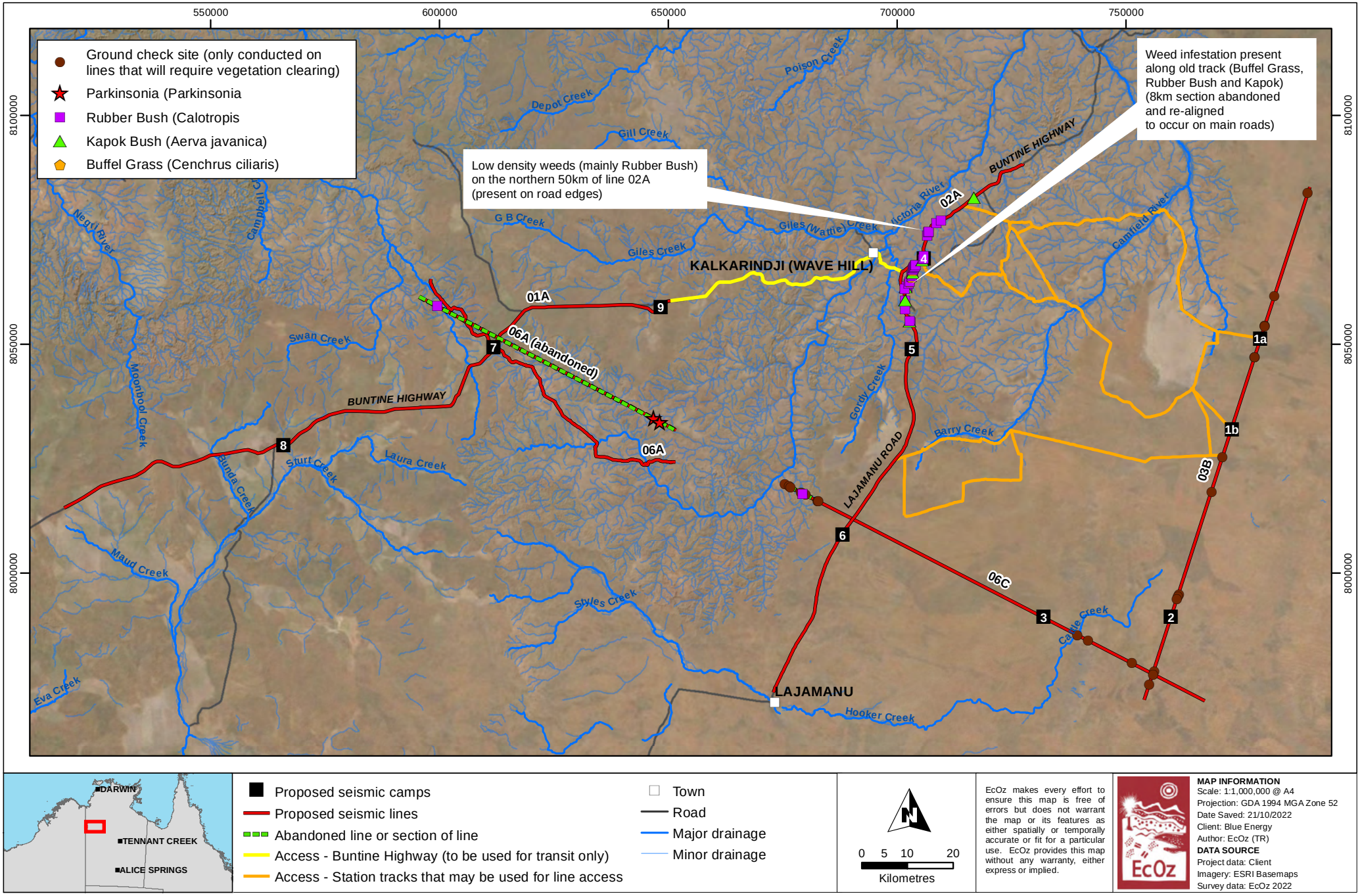

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Figure 4-33. Map of weed survey results

Results

In general, the study area currently has very low weed infestation levels, with only isolated weed records detected – the majority associated with existing disturbances (such as along roadsides).

Weed survey data are summarised below and locations shown on Figure 4-33. Most weed detections were in the northern 50 km of line 02A (on the edges of Buntine Highway and Lajamanu Road). Coordinates and record details are provided in Appendix G.

- Parkinsonia (*Parkinsonia aculeata*) was only observed at two drainage/alluvial zones within line 06A. It was present at very low levels (one or two mature plants, well established and seeded).
- Rubber Bush (*Calotropis procera*) was scattered along roadsides and drainage areas within the northern 40 km of line 02A (recorded at low to very low levels at approximately 30 sites). All plants are assumed to be mature and seeded.
- Kapok Bush (*Aerva javanica*) was observed at low levels at six locations, all associated with existing disturbances within the northern 40 km of line 02A. It is assumed that seed from this species is present in the soil seed bank on roadsides in this area (this species produced high amounts of seed and is easily spread during grading activities). This species generally only occurs in disturbed areas.
- Buffel Grass (*Cenchrus ciliaris/setiger*) and Gallon's Curse (*Cenchrus biflorus*) were observed at relatively high levels at a few drainages on the northern part of line 02A. This section of line has since been abandoned and re-aligned along the main road corridors associated with Lajamanu Road and Buntine Highway. As such, these infestations will not be encountered. However, there is potential that similar infestations could occur in drainage lines on the Buntine Highway and Lajamanu Road – therefore it is important that machinery and personnel to do not enter those areas to minimise chance of weed spread.

No weeds were observed within 03B and the section of 06C where seismic works are proposed (i.e. seismic works have been abandoned in the western 10 km of line 06C due to steep terrain).

No weeds were observed within study area 01A (located on Buntine Highway); however, there is potential for species such as Kapok Bush, Rubber Bush and Buffel Grass due to survey limitations associated with aerial observations and/or species may not have emerged since recent road maintenance works.

It is likely that bores, water-points etc. will contain weeds, so avoidance of these areas is recommended to minimise chance of weed spread along seismic lines via machinery contamination.

It is noted that Mimosa Bush (*Vachellia farnesiana*) commonly occurs within the general study area, mainly associated with drainage areas and alluvial plains (often in areas of higher cattle presence). This species is considered to be a native species (or long-time naturalised in Australia) and is not a declared weed (or weed of concern) within the NT.

Prickly Acacia, Bellyache Bush, Neem and Coffee Senna were not observed during the survey. If present, these species are more likely to occur along drainages and disturbed areas. Pre-clearance checks should be conducted in these areas to check for present and avoid these weeds if observed.

Parkinsonia (*Parkinsonia aculeata*)

Kapok Bush (*Aerva javanica*)

Rubber Bush (*Calotropis procera*)

Buffel Grass (*Cenchrus ciliaris*) infestation within a drainage

Buffel Grass (*Cenchrus ciliaris*) infestation within a drainage

Figure 4-34. Photographs of weed species observed during the survey

4.5 Land condition assessment

A general land condition assessment was conducted for study area 03B and 06C. Land condition for lines 01A, 02A and 06A was not undertaken because they are located on existing roads / tracks.

Each land type survey site has been graded against the criteria outlined within Table 4-8. If a site was considered to align with two or more of the criteria within a row, it was assigned that value.

Table 4-8. Ratings for the land condition assessment

Condition	Vegetation	Erosion	Weeds	Cattle
GOOD	Vegetation structure intact, all expected layers present	No erosion	No weeds	Negligible impact
AVERAGE	Vegetation structure altered, basic vegetation structure present	Some erosion	Few weeds (including Buffel Grass)	Some impact
POOR	Vegetation structure severely impacted, some strata are absent	Significant erosion	Many weeds (including Buffel Grass)	Significant impact

The survey indicates that the majority of sites are currently in good land condition (93 of 108 sites) with intact vegetation, no erosion, no weeds and no (or negligible) impacts from pastoral activities (data provided in Appendix D).

Thirteen sites are in average condition due to presence of station tracks or fence lines (sites 4, 7, 65, 196, 197, 198, 199, 200, 201, 208, 209, 210, 211) or low levels of weed occurrence (site 65 – single Rubber Bush plant observed).

Two sites were in poor condition at the time of survey:

- Site 195 – located at cattle water-point / tank. As expected, vegetation and soils were heavily grazed at this location. No weeds or erosion was observed. Grazing was highly localised around the water point, yard and road – and were not observed in adjacent spinifex plain.
- Site 207 – junction of Lajamanu Road. Cleared vegetation.

No existing erosion issues were observed.

5 RECOMMENDATIONS

If the recommendations presented in Table 5-1 are implemented, it is unlikely that the seismic program will have a significant impact on ecological values identified by this assessment. Recommendations are shown on Figure 5-1 (where applicable).

Table 5-1. Recommendations to avoid potential of significant impact to ecological values

Aspect	Recommendation / consideration
General	
1. Vegetation	**1a** - Implement tree avoidance strategies on lines 03B and 06C, and when constructing camp pads for camps 1a, 1b, 2 and 3 (all other camps are in existing cleared areas). This will involve avoiding mature trees where possible (i.e. trees that are greater than 8m in height)
	1b – Where possible, avoid distinct/dense patches of Acacia-shrubs, particularly in Greater Bilby occurrence area within land type LT-5 because some shrub species are important food sources for bilby (witchetty grubs in the roots). This will minimise potential impacts to bilby (discussed further in recommendation 4) and also be beneficial in terms of achieving rehabilitation objectives (because shrub recruitment takes longer to re-establish than groundcover species).
2. Erosion	**2a** – Implement standard erosion and sediment control planning (ESCP) on lines 03B and 06C to minimise chance of gully erosion along cleared lines.
	2b – Ensure that line preparation minimises intersections of lateritic rises and calcrete rises within land types 4 and 5 because of increased erosion risk on sloped terrain. If crossings are required, erosion controls may need to be installed due to sloped terrain (rises shown on Figure 4-2; spatial files have been provided for planning purposes).
	2c – Minimise grader cuts during line preparation works, and use 'blade-up' techniques where possible. There are no steep slopes present within lines that require preparation works; therefore, major earthworks are not expected to occur.
3. Weeds	**3a** – Conduct a ground-based pre-clearance weed survey of proposed camp sites that are positioned in existing cleared/disturbed areas. If a weed species is present (or suspected) – avoid – or carry out wash-down activities (or equivalent) so that seed is not spread elsewhere. Weed monitoring and subsequent control may also be required.
	3b – Conduct a vehicle-based pre-clearance weed survey along existing road corridors for lines 01A, 02A and 06A prior to commencement of activities. This is required because weed conditions can change between seasons (and the aerial observation method conducted for this survey has survey limitations in terms of detectability of some weed species – especially if they are small size and/or germinating at the time of survey). The current survey recorded several weeds within road corridors, such as Kapok Bush, Rubber Bush and Buffel Grass.
	3c – Avoid movement within areas that have existing weed infestation (to reduce spread / introduction to new areas), or carry out wash-down activities (or equivalent) so that weed seed is not spread elsewhere. Currently, the northern 50 km of line 02A supports low level weed infestation (mainly Rubber Bush); targeted weed management will be required.
	3d – Develop and implement a weed management plan that focuses on weed hygiene and incorporates the above site-specific controls.
Threatened species	
4. Greater Bilby	**4a** – Engage an ecologist with experience in Greater Bilby sign recognition to conduct a pre-clearance survey within the inferred current occupation area at southern end of 03B and 06C (shown on Figure 4-5). The aim of these surveys is to record the location of active bilby burrows so avoidance strategies can be implemented (see below).
	4b – Line preparation and seismic survey should avoid active bilby burrows by at least 50 m, and where possible avoid inactive burrows (no buffer required). Line deviations have been suggested at sites 40 and 47, because active bilby burrows are currently present within 50 m of the current alignment (shown in map inset in Figure 5-1). Burrows observed at sites 30 and 31 are over 50 m from current alignment and so no deviation is required at this stage. However, because bilbys are

Aspect	Recommendation / consideration
	highly active and move between seasons, the burrow data collected by pre-clearance survey will provide the final dataset required for burrows avoidance and buffering.
	4c – Camp locations should avoid active bilby burrows by at least 300 m.
	4d – Avoid night driving in bilby habitat (mainly relevant to lines 01A, 02A, 03B and 06C), or implement speed limits and staff awareness (as bilby are active at night and have been previously observed on Lajamanu Road and Buntine Highway).
	4e - Avoid night-shift seismic survey in areas with confirmed Greater Bilby activity (to be determined by per-clearance survey, but expected to be limited to land type LT-5).
	4f – Site induction should clearly state that Greater Bilby are known to occur in the region and that they are a significant species. Induction material should include pictures of burrows and diggings because an actual sighting of an individual is unlikely (only active at night and are elusive).
5. Gouldian Finch	**5a** – Implement tree avoidance strategies on the lateritic plateau located in the western end of line 06C (shown on Figure 4-13). This area supports Snappy Gum trees that could be used by Gouldian Finch for nesting purposes. Snappy Gum trees have an open structure in this area, and as such, avoidance should be achievable in this area.
	5b – If mature Snappy Gum are required to be cleared / disturbed, a specific assessment may be required to ensure that impacts to Gouldian Finch breeding habitat is avoided.
6. Purple-crowed Fairy-wren	Impacts are inherently low for Purple-crowned Fairy-wren because vegetation clearing is not proposed to occur in riparian areas that support potentially suitable habitat for the species.
	6a – Ensure that staff are aware that this species may occur in riparian areas / waterways.
	6b – Avoid impacts to riparian vegetation and major drainages (as per recommendation 8)
7. Grey Falcon	Impacts are inherently low for Grey Falcon because no vegetation clearing is proposed to occur in areas where potential nesting habitat was identified (i.e. major riparian zones).
	7a – Potential impacts to this species will be suitably mitigated via implementation of tree avoidance strategies (recommendation 1a).
Significant habitat / vegetation	
8. Riparian vegetation	**8a** – The location of minor drainage crossings on lines 03b and 06C (three crossings in total – sites 18, 21 and 55) should be selected to minimise impacts to vegetation and soils (refer to Figure 5-1 for proposed alignments that minimises impacts). These drainages do not have banks and only have gentle slopes; so it is assumed that earthworks (cuts) will not be required.
	8b – Riparian vegetation is present within study area for lines 01A, 02A and 06A; however, because these lines are located on existing roads, they will not involve any clearing of riparian vegetation, so direct impacts will not occur. Potential indirect impacts to riparian vegetation (such as contamination from spills etc.) should be suitably managed by implementing standard controls.
9. Wetlands	**9a** – Implement a 250 m protection buffer around the soakage identified on the northern edge of line 03B (refer to Figure 5-1).
	9b – Avoid direct disturbance of Gilgai formations that are present within a drainage zone on line 03B. No heavy earthworks or deep grader cuts to occur in this area. Avoid/buffer Gilgai by 10 m and implement strict ESCP to ensure that impacts to Gilgai formations are minimised. A proposed alignment has been drafted using high resolution image that aims to avoid Gilgai (refer to Figure 5-1) – this would need to be field verified and flagged prior to clearing/line preparation.
10. Hollow-bearing trees	**10a** – Avoid clearing all large trees (i.e. >10 m in height) as they have potential to be hollow-bearing. This should be achievable for this project due to thin nature of clearing for line preparation (5 m width), and open to sparse cover of the canopy species.
	10b – Avoid clearing Bullwaddy thickets present in the northern 5km of line 03B (example alignment shown on Figure 5-1). Provide photographs of Bullwaddy trees as part of inductions (distinctive tree) so that line preparation crew are familiar with the species.
	10c – Snappy Gum (refer to recommendation 5a)
11. Rocky habitat features	Seismic works have been abandoned in all areas where significant rocky features were identified (06A and western end of 06C). Consequently, no further assessment or mitigations is required as risk of impact is inherently low.

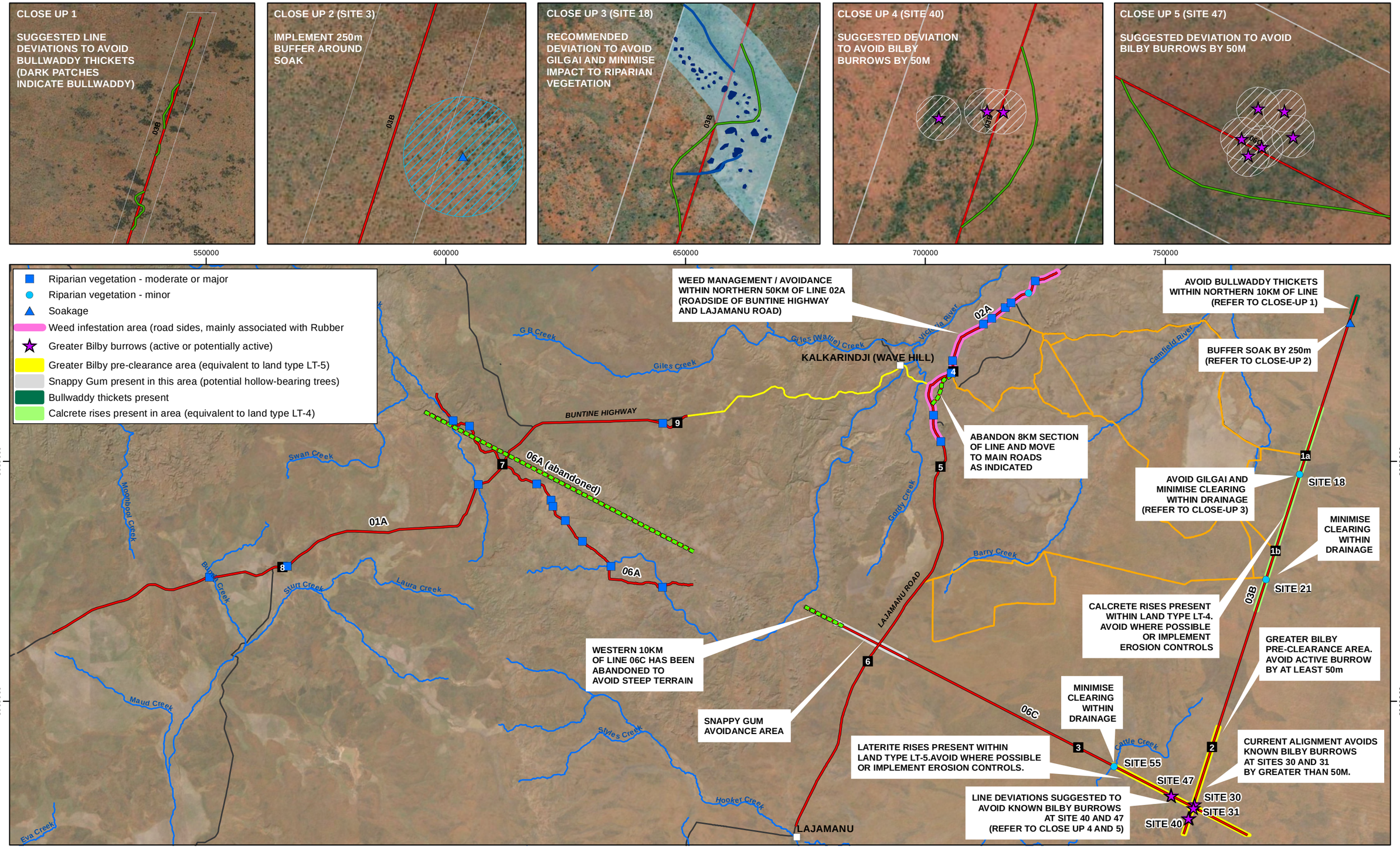

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Figure 5-1. Map of ecological recommendations (A3 pages size)

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APPENDIX A PROTECT MATTERS SEARCH TOOL (PMST) REPORT

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 31-May-2022

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	1
National Heritage Places:	2
Wetlands of International Importance (Ramsar	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	19
Listed Migratory Species:	16

Other Matters Protected by the EPBC Act

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

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

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	7
Commonwealth Heritage Places:	None
Listed Marine Species:	21
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	5
Regional Forest Agreements:	None
Nationally Important Wetlands:	2
EPBC Act Referrals:	3
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties		[Resource Information]
Name	State	Legal Status
Purnululu National Park	WA	Declared property

National Heritage Places		[Resource Information]
Name	State	Legal Status
Indigenous		
Wave Hill Walk Off Route	NT	Listed place
Natural		
Purnululu National Park	WA	Listed place

Wetlands of International Importance (Ramsar Wetlands)	[Resource Information]
Ramsar Site Name	Proximity
Lakes argyle and kununurra	30 - 40km upstream from Ramsar site
Ord river floodplain	150 - 200km upstream from Ramsar site

Listed Threatened Species			[Resource Information]
Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.			
Scientific Name	Threatened Category	Presence Text	
BIRD			
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	
Erythrotriorchis radiatus			
Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area	
Erythrura gouldiae			
Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area	

Scientific Name	Threatened Category	Presence Text
Falco hypoleucos		
Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area
Falcunculus frontatus whitei		
Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat known to occur within area
Geophaps smithii smithii		
Partridge Pigeon (eastern) [64441]	Vulnerable	Species or species habitat may occur within area
Grantiella picta		
Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Malurus coronatus coronatus		
Purple-crowned Fairy-wren (western) [64442]	Endangered	Species or species habitat known to occur within area
Pezoporus occidentalis		
Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Polytelis alexandrae		
Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat known to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Tyto novaehollandiae kimberli		
Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
MAMMAL		
Dasyurus hallucatus		
Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat may occur within area
Macroderma gigas		
Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Macrotis lagotis		
Greater Bilby [282]	Vulnerable	Species or species habitat known to occur within area
Saccolaimus saccolaimus nudicluniatus		
Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat may occur within area
Trichosurus vulpecula arnhemensis		
Northern Brushtail Possum [83091]	Vulnerable	Species or species habitat likely to occur within area
REPTILE		
Liopholis kintorei		
Great Desert Skink, Tjakura, Warrarna, Mulyamiji [83160]	Vulnerable	Species or species habitat may occur within area
SHARK		
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Marine Species		
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Migratory Terrestrial Species		
Cecropis daurica		
Red-rumped Swallow [80610]		Species or species habitat may occur within area
Cuculus optatus		
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Defence	
Defence - KILLARNEY STATION RADAR SITE [70083]	NT
Unknown	
Commonwealth Land - [70451]	NT
Commonwealth Land - [70448]	NT
Commonwealth Land - [70449]	NT
Commonwealth Land - [70997]	NT
Commonwealth Land - [70857]	NT
Commonwealth Land - [70592]	NT

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area overfly marine area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Bubulcus ibis as Ardea ibis		
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Cecropis daurica as Hirundo daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area overfly marine area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area
Pandion haliaetus		
Osprey [952]		Species or species habitat known to occur within area
Rostratula australis as Rostratula benghalensis (sensu lato)		
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area
Reptile		
Crocodylus johnstoni		
Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Judbarra / Gregory	National Park	NT
Northern Tanami	Indigenous Protected Area	NT
Ord River Regeneration Reserve	5(1)(h) Reserve	WA
Purnululu	National Park	WA
Purnululu Conservation Reserve	5(1)(g) Reserve	WA

Nationally Important Wetlands [Resource Information]

Wetland Name	State
Birrindudu Waterhole and Floodplain	NT
Nongra Lake	NT

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Browns Range rare earths mine and processing operation project, WA	2014/7253	Not Controlled Action	Completed
Browns Range Rare Earths Project, 160km SE of Halls Creek, WA	2019/8446	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

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

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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APPENDIX B DESKTOP THREATENED SPECIES 'LIKELIHOOD OF OCCURRENCE' ASSESSMENT

This appendix outlines the procedure and results of the desktop threatened species 'likelihood of occurrence' assessment conducted for this report. The purpose of this assessment is to identify those species that may need to be included within the project's risk assessment, and those that can be reasonably excluded from further consideration because they are unlikely to occur within the study area. The assessment was undertaken using available desktop information, as well as databases of existing records and potential species. *This is not a risk assessment as it does not take into account project activities and potential impacts (this will be covered in the project specific EMP).*

This assessment focuses on species that are listed as Vulnerable, Endangered or Critically Endangered under either the *Territory Parks and Wildlife Conservation Act* (*TPWC Act*) or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*). The *EPBC Act* also protects important habitat for, and significant occurrences of, migratory species.

The following procedure was used to determine which threatened species have the potential to occur in the region of the study area:

- Species records from the latest version of the NT Flora and Fauna Atlases were clipped to within 100 km of the study area. Usually, for these assessments, EcOz would clip those data to include species from a larger area (i.e. bioregion) because of the paucity of records in most parts of the NT. However, the study area is within multiple bioregions so a more localised list is adequate.
- EPBC Protected Matters Search Tool (PMST) was used to generate a report using a 100 km buffer from the study area. This PMST is an online enquiry tool managed by the Commonwealth Department of the Environment and Energy which interrogates a range of existing flora and fauna data, as well as predictive modelling to speculate on the presence of species within a search area. The PMST uses a grid system to determine which protected matters it encapsulates for a particular search. The PMST report (Appendix A) was generated on 31 May 2022.
- For each threatened species, the likelihood of it occurring within the study area was then assessed based on desktop information that relates to habitat requirements, distribution, number and dates of proximate records (obtained from NT Atlas and/or Atlas of Living Australia), and the ecological information described in Section 2. Likelihood ratings are defined in Table 6-1

Table 6-1. Ratings for the desktop threatened species likelihood of occurrence assessment

Likelihood	Definition
HIGH	It is expected that this species occurs within the study area because there is core habitat and recent (post-2000) proximate records or knowledge that the species occurs in the local area.
MEDIUM	Species may occur within the study area because there is suitable habitat; however, there is evidence that lowers its likelihood of occurrence (known range contraction of the species in the region, no recent records within or close to the study area, substantial loss of habitat within the study area since previous records, species is naturally-rare or occurs at a low density etc.).
LOW	Species may occur, as a vagrant, within the study area; only marginally-suitable habitat is expected.
NONE	There is strong evidence that this species will not occur within the study area (i.e. there is no suitable habitat and/or the species is considered to be regionally-extinct).

Note: no threatened flora species are known to occur in the region of the study area.

NAME	STATUS		HABITAT & DISTRIBUTION SUMMARY	LIKELIHOOD OF OCCURRENCE & JUSTIFICATION SUMMARY
	EPBC	TPWC		
BIRDS				
Red Goshawk *Erythrotriorchis radiatus*	VU	VU	**Habitat:** Prefers tall, open Eucalypt forest and riparian areas. Nests in large trees, frequently the tallest and most massive in a tall stand, nest trees are invariably within 1 km of permanent water (Debus & Czechura 1988; Aumann & Baker-Gabb 1991). Rarely breeds in areas with fragmented native vegetation (Aumann & Baker-Gabb 1991; Czechura 2001). Home range of up to 200 km^2 (Czechura & Hobson 2000). **Distribution:** Solitary and secretive hawk that is sparsely distributed across much of northern Australia, from the Kimberley in WA to south-eastern Qld. Within this range, generally confined to taller forests characteristic of higher rainfall coastal and sub-coastal areas (Debus 1998), but there are some isolated records of wandering birds from central Australia (Woinarski 2006).	**LOW** • Preferred nesting habitat (tall Eucalypt forests) not present (based on land unit dataset and aerial imagery review). • Large trees suitable for nesting may be present in riparian vegetation associated with major creeks and rivers; however, no vegetation clearing is proposed in these areas (lines on existing tracks/roads). • Not recorded with 100 km of the study area. Outside known distribution.
	Aumann, T. and Baker-Gabb, D. (1991). *A Management Plan for the Red Goshawk*. RAOU Report 75, Royal Australasian Ornithologists Union, Melbourne. Czechura G.V. and Hobson R.G. (2000). *The Red Goshawk* Erythrotriorchis radiatus *in northern Queensland: status and distribution*. Report to Queensland Parks and Wildlife Service. Czechura G.V. (2001). *The status and distribution of the Red Goshawk* Erythrotriorchis radiatus *on Cape York Peninsula, Queensland*. Unpublished report to Birds Australia. Debus, S. and Czechura, G. (1988). Field identification of the Red Goshawk *Erythrotriorchis radiatus. Australian Bird Watcher*, Vol. 12, pp. 154-159. Debus, S. (1998). *The Birds of Prey of Australia.* Oxford University Press, Melbourne. Department of the Environment (2022). Erythrotriorchis radiatus in Species Profile and Threats Database, Department of the Environment, Canberra. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=942 [Accessed 27 Jan 2022] Woinarski, J. (2006). *Threatened Species of the Northern Territory - Red Goshawk - Erythrotriorchis radiatus*. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0018/206352/red-goshawk.pdf [Accessed 1 May 2018].		
Gouldian Finch *Erythrura gouldiae*	EN	VU	**Habitat:** Prefers areas with an adequate supply of seed from annual and perennial grasses (especially *Sorghum*), a nearby source of surface water and – in the breeding season – unburnt, hollow-bearing Eucalyptus trees (especially *E. tintinnans, E. brevifolia* and *E. leucophloia*) (Tidemann 1996; O'Malley 2006). **Distribution:** Patchily distributed across northern Australia from the Kimberley to north-central Qld (Dostine 1998; Franklin et al. 1999; Barrett et al. 2003; Franklin et al. 2005). In the NT, most known breeding populations occur in the Top End. Non-breeding birds disperse widely (Garnett et al. 2011), greatly increasing the possible range of this species.	**HIGH** • Suitable nesting habitat (Snappy Gum trees, *Eucalyptus brevifolia*) is present within study area associated with lines 01A, 02A, 06A and 06C (as per land unit dataset). • Numerous records within 100 km of the study area, including some in close proximity to lines.
	Barrett, G., Silcocks, A., Barry, S., Cunningham, R. and Poulter, R. (2003). *The New Atlas of Australian Birds*. Royal Australian Ornithologists Union, Melbourne, Victoria. Dostine, P. (1998). *Gouldian Finch Recovery Plan Erythrura gouldiae*. Gouldian Finch Recovery Team and Parks & Wildlife Commission NT, Darwin. Franklin, D.C., Burbidge, A.H. and Dostine, P.L. (1999). The harvest of wild birds for aviculture: an historical perspective on finch trapping in the Kimberley with special emphasis on the Gouldian Finch. *Australian Zoologist,* Vol. 31, pp. 92-109. Franklin, D.C., Whitehead, P.J., Pardon, G., Matthews, J., McMahon, P. and McIntyre, D. (2005). Geographic patterns and correlates of the decline of granivorous birds in northern Australia. *Wildlife Research*, Vol. 32, pp. 399-408. Garnett, S.T., Szabo, J.K. and Dutson, G. (2011). *The Action Plan for Australian Birds 2010*. CSIRO Publishing. Collingwood, Australia. O'Malley, C. (2006). *National Recovery Plan for the Gouldian Finch (Erythrura gouldiae*). WWF-Australia, Sydney and Parks and Wildlife NT, Department of Natural Resources, Environment and the Arts, NT Government, Palmerston. Tidemann, S.C. (1996). Causes of the decline of the Gouldian Finch *Erythrura gouldiae*. *Biological Conservation International*, Vol. 6, pp. 49-61.		

NAME	STATUS		HABITAT & DISTRIBUTION SUMMARY	LIKELIHOOD OF OCCURRENCE & JUSTIFICATION SUMMARY
	EPBC	TPWC		
Grey Falcon *Falco hypoleucos*	VU	VU	**Habitat:** A generally solitary desert falcon that occurs in areas of lightly-timbered lowland plains, typically on inland drainage systems, where the average annual rainfall is less than 500 mm (DEPWS 2021). **Distribution:** Sparsely distributed through much of the arid and semi-arid regions of Australia but has been recorded from all mainland states and territories. In the NT, the majority of records are from the southern half, but there are records all the way up to Darwin (DEPWS 2021). A study of breeding records from 2003 to 2011 documented 38 breeding events – all within the hottest climate classes of Australia – with the northern-most record occurring south of Daly Waters (Schoenjahn 2013).	**MEDIUM** • Proposed seismic lines occurs with species distribution • Nesting habitat (i.e. tall trees in waterways) is potentially present within lines 01A, 02A, 06A and 06C. • Nesting could also occur in telecommunication towers along main roads (01A and 02A). • Several records within 100 km of study area, however the most recent record is from 1994.
	Schoenjahn, J. (2013), A hot environment and one type of prey: investigating why the Grey Falcon (Falco hypoleucos) is Australia's rarest falcon, *Emu*, Vol. 113, pp. 19-25. Department of Environment, Parks and Water Security (2021). *Threatened Species of the Northern Territory - Grey Falcon - Falco hypoleucos*. Northern Territory Government. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0020/206354/grey-falcon.pdf [Accessed 27 Jan 2022].			
Crested Shrike-tit (northern subspecies) *Falcunculus frontatus whitei*	VU	-	**Habitat:** Recorded in eight different woodland types in northern Australia, mainly those dominated by *Eucalyptus miniata, E. tetrodonta* or *C. bleeseri* (DSEWPaC 2013c; Robinson & Woinarski 1992). Nests have been found in the canopy of *E. tectifica, C. grandifolia* and *C. latifolia* at >12 m above the ground in open woodland habitat (Ward et al. 2009). **Distribution:** North-western Australia from the Kimberley in WA, across the Top End of the NT to Borroloola (TSSC 2016). In the NT, recorded in very low densities in many isolated sub-populations (Garnett & Crowley 2000) between north-east Arnhem Land and semi-arid Victoria River District. Scarcity of records suggests that populations are at very low density (Woinarski 2004). Not known to have disappeared from any area where recorded historically (TSSC 2016).	**LOW** • Suitable habitat is only present within lines that are positioned on roads or tracks (01A, 02A and 06A). • Additionally, if present in the area; it is unlikely that the project will disturb wet season breeding as the seismic works are proposed to occur during the dry season only. • Very few records within 100 km of the study area. No recent records.
	Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC). (2013). Falcunculus frontatus whitei in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. [online] Available from: http://www.environment.gov.au/sprat. Garnett, S.T. and Crowley, G.M. (2000). *The Action Plan for Australian Birds 2000*. Environment Australia and Birds Australia, Canberra, ACT. Robinson, D. and Woinarski, J.C.Z. (1992). 'A review of records of the Northern Shrike-tit *Falcunculus frontatus whitei* in north-western Australia'. *South Australian Ornithologist*, Vol. 31, pp. 111-117. Threatened Species Scientific Committee (2016). *Approved Conservation Advice for Falcunculus frontatus whitei - crested shrike-tit (northern)*. Canberra: Department of the Environment. In effect under the EPBC Act from 02-May-2016. Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/26013-conservation-advice-05052016.pdf [Accessed 1 May 2018]. Ward, S.J., Berghout, M. & Baker, B. (2009). Notes on the form and habitat of nests of the Northern Shrike-tit. *Northern Territory Naturalist,* Vol. 21, pp. 54-60. Woinarski, J.C.Z. (2004). *National multi-species Recovery Plan for the Partridge Pigeon [eastern subspecies] Geophaps smithii smithii; crested shrike-tit [northern (sub)-species] Falcunculus (frontatus) whitei; masked owl [north Australian mainland subspecies] Tyto novaehollandiae kimberli; and masked owl [Tiwi Islands subspecies] Tyto novaehollandiae melvillensis, 2004-2008*. NT Department of Infrastructure Planning and Environment, Darwin.		

NAME	STATUS		HABITAT & DISTRIBUTION SUMMARY	LIKELIHOOD OF OCCURRENCE & JUSTIFICATION SUMMARY
	EPBC	TPWC		
Partridge Pigeon (eastern subspecies) *Geophaps smithii smithii*	VU	VU	**Habitat:** Open forests and woodlands with an understorey of grasses (Woinarski 2006). Prefers woodland dominated by *Eucalyptus tetrodonta* and *E. miniata* (Braithwaite 1985; Garnett et al. 2011; Higgins & Davies 1996). According to Fraser (2001), favour a structurally-patchy savanna understorey at a relatively intricate scale. **Distribution:** Historically, across the Top End (from Kununurra in WA to Borroloola in the NT). Since early 20th century a severe range contraction from the western, eastern and southern parts of the former distribution (Higgins & Davies 1996; Woinarski et al. 2007). Currently, distribution is limited to sub-coastal NT from Yinberrie Hill in the south, Litchfield NP in the west and (western) Arnhem Land in the east (Garnett et al. 2011).	**LOW** • Suitable habitat unlikely to be present within study area (based on available land unit dataset – Napier & Hill 2012) • No records within 100 km of the study area.
	Braithwaite, R.W. (1985). *The Kakadu fauna survey: an ecological survey of Kakadu National Park*. Australian National Parks & Wildlife Service, Canberra. Fraser, F., Lawson V., Morrison S., Christophersen P., McGregor S. and Rawlinson M. (2003). Fire management experiment for the declining partridge pigeon, Kakadu National Park. *Ecological Management and Restoration* 4, 94–102. Garnett, S.T., Szabo, J.K. and Dutson, G. (2011). *The Action Plan for Australian Birds 2010*. Birds Australia, CSIRO Publishing, Melbourne. Higgins, P.J. and Davies S.J.J.F. (eds) (1996). *Handbook of Australian, New Zealand and Antarctic Birds. Volume Three: Snipe to Pigeons*. Oxford University Press. Melbourne, Victoria. Woinarski, J., Pavey, C., Kerrigan, R., Cowie, I. and Ward, S. (Eds) (2007). *Lost from Our Landscape: Threatened Species of the Northern Territory*. Northern Territory Government, Darwin.			
Painted Honeyeater *Grantiella picta*	VU	VU	**Habitat:** Acacia and Eucalyptus-dominated woodlands and open forest, preferring habitats with more mature trees that host more mistletoe. Breeding times and seasonal movements (south to north) likely governed by the fruiting of mistletoe (Garnett et al. 2011). **Distribution:** Across eastern and northern parts of the country – but nowhere very numerous (Ward 2012). Many birds move after breeding to semi-arid regions such as north-eastern SA, central and western Qld, and central NT (TSSC 2015). Few NT records – most from the Barkly Tablelands – but no evidence of a breeding population in the NT, and the records are likely irregular visitors from south-eastern Australia (Ward 2012).	**LOW** • Suitable habitat unlikely to be present within study area (based on available land unit dataset – Napier & Hill 2012). • Breeding not known to occur in the NT; therefore impact to species inherently very low. • Not recorded within 100 km of the study area.
	Garnett, S.T., Szabo, J.K. and Dutson, G. (2011). *The Action Plan for Australian Birds 2010*. CSIRO Publishing, Collingwood, Australia. Threatened Species Scientific Committee (TSSC) (2015). *Approved Conservation Advice for Grantiella picta (Painted Honeyeater)*. Canberra: Department of the Environment. Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/470-conservation-advice.pdf [Accessed 1 May 2018]. Ward, S. (2012). *Threatened Species of the Northern Territory – Painted Honeyeater - Grantiella picta.* Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0009/373554/painted-honeyeater.pdf [Accessed 1 May 2018].			
Purple-crowned Fairy Wren (western subspecies) *Malurus coronatus coronatus*	EN	VU	**Habitat:** Riparian areas usually associated with areas of dense river grass – *Chionachne cyathopoda* (Rowley 1993; van Doorn & Low Choy 2009). Also known from *Pandanus aquaticus* habitat (van Doorn & Low Choy 2009). Generally confined to riparian habitats. **Distribution:** Occurs from the central Kimberly in WA to Victoria River in the NT. Within this range, almost entirely restricted to a narrow band around well-defined river channels.	**MEDIUM** • Suitable habitat present in area but unlikely within study area; however, riparian areas will need to be checked, especially those linked or in close proximity to the Victoria River. • Numerus records in the area (around the Victoria River system)
	Rowley, I. (1993). The Purple-crowned Fairy-wren *Malurus coronatus*. I History, distribution and present status. *Emu,* Vol. 93, pp. 220-234. Skroblin, A., Cockburn, A. and Legge, S. (2014). The population genetics of the purple-crowned fairy-wren (*Malurus coronatus coronatus*), a declining riparian passerine. *Australian Journal of Zoology,* Vol. 62, pp. 251-259. van Doorn, A. and Low Choy, J. (2009). A description of the primary habitat of the Purple-crowned Fairy-wren *Malurus coronatus coronatus* in the Victoria River District, N.T. *Northern Territory Naturalist,* Vol. 21, pp. 24-33.			

NAME	STATUS		HABITAT & DISTRIBUTION SUMMARY	LIKELIHOOD OF OCCURRENCE & JUSTIFICATION SUMMARY
	EPBC	TPWC		
Night Parrot *Pezoporus occidentalis*	EN	EN	**Habitat:** Flat spinifex (*Triodia* spp.) grasslands in stony or sandy environments; and samphire and chenopod shrublands – including genera such as *Atriplex, Bassia* and *Maireana* – on floodplains and claypans, and on the margins of salt lakes, creeks or other sources of water (from a variety of sources cited in DoE 2017). **Distribution:** Extremely sparsely distributed through central arid regions. In the NT sightings were made up to 1923 in the Alice Springs region (Whitlock 1924). Presumed extinct until recently rediscovered in western Qld and north-western WA.	**LOW** • Spinifex grassland habitat present within the study area; however, fire history indicates that long unburnt areas of spinifex is unlikely (preferred nesting habitat). • Not recorded within 100 km of the study area.
	Department of the Environment (2017). *Pezoporus occidentalis.* Species Profile and Threats Database. Department of the Environment, Canberra. [online] Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=59350 [Accessed 1 May 2018]. Whitlock, F. (1924). Journey to central Australia in search of the night parrot. *Emu*, Vol. 23, pp. 248-281.			
Princess Parrot *Polytelis alexandrae*	VU	VU	**Habitat:** Swales between desert sand dunes with a shrub layer and scattered trees (Pavey 2006). **Distribution:** Confined to arid regions of WA, the NT and SA (Barrett et al. 2003; Blakers et al. 1984; Higgins 1999). Highly nomadic and, as noted in DoE (2017), 'is an irregular visitor (sometimes at intervals of more than 20 years) to most sites in its range and its movements are largely unknown. For these reasons, it is not possible or practical to provide an estimate of the number of locations at which the species occurs.'	**LOW** • Potential foraging habitat present within the desert sandplain area of 03B and 06C; however, unlikely that suitable nesting trees are present (based on available land unit dataset – Napier & Hill 2012). • No recent records within the study area; however, historic records exist within 100 km of the study area.
	Barrett, G. Silcocks, A. Barry, S. Cunningham, R. and Poulter, R. (2003). *The New Atlas of Australian Birds*, Birds Australia, Melbourne, Victoria. Blakers, M. Davies S.J.J.F. and Reilly P.N. (1984). *The Atlas of Australian Birds*. Melbourne, Victoria: Melbourne University Press. Britton, P.L. (1992). The Queensland Ornithological Society Bird Report, *Sunbird*, 22:51-83. Department of the Environment (2017). *Polytelis alexandrae*. Species Profile and Threats Database. Department of the Environment, Canberra. [online] Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=758 [Accessed 1 May 2018]. Higgins, P.J. (ed.) (1999). *Handbook of Australian, New Zealand and Antarctic* Birds. Volume 4: Parrots to Dollarbird, Oxford University Press, Melbourne, Victoria. Pavey, C. (2006). *Threatened Species of the Northern Territory - Princess Parrot - Polytelis alexandrae*. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0017/206360/princess-parrot.pdf [Accessed 1 May 2018].			
Masked Owl (northern subspecies) *Tyto novaehollandiae kimberli*	VU	VU	**Habitat:** Mainly in *Eucalyptus* tall open forests (especially those dominated by *Eucalyptus miniata* and *E. tetrodonta*), but also roosts in monsoon rainforests and forages in more open vegetation types, including grasslands (Woinarski & Ward 2012). Usually nests in tree hollows, within patches of closed forest (Garnett et al. 2011). Little else known about the subspecies, but the species in general is resident in pairs within a territory up to 3,000 hectares (Debus 2009). Nest in large hollows with an entrance more than 20 cm wide and that is greater than 10 m above the ground (Debus 2009). Breeding poorly known, but thought to occur between March and October (DEWHA 2010). **Distribution:** Poorly known, with few records from across a broad range in northern Australia. In the NT, records from the Top End, Kakadu, Coburg Peninsula (majority of records) and south-west Gulf country (Woinarski & Ward 2012).	**LOW** • Preferred nesting habitat (tall open forest) not present within study area; however, potential foraging woodland and grassland habitat is present within the northern parts of study area (based on available land unit dataset – Napier & Hill 2012). • Only one record within 100 km of the study area. Not proximate to proposed lines.
	Garnett, S.T., Szabo, J.K. and Dutson, G. (2011). The Action Plan for Australian Birds 2010. CSIRO Publishing. Collingwood, Australia. Woinarski, J.C.Z. and Ward, S. (2012). *Threatened Species of the Northern Territory - Masked Owl (north Australian mainland subspecies) - Tyto novaehollandiae kimberli.* Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/word_doc/0008/373553/masked-owl-mainland-top-end.docx [Accessed 1 May 2018].			

NAME	STATUS		HABITAT & DISTRIBUTION SUMMARY	LIKELIHOOD OF OCCURRENCE & JUSTIFICATION SUMMARY
	EPBC	TPWC		
Curlew Sandpiper *Calidris ferruginea*	CR	CR	**Habitat:** Mostly coasts and estuaries, less frequently inland freshwater wetlands (Geering et al. 2007). **Distribution:** A summer migrant from the northern hemisphere; some birds remain in Australia during the winter. Mostly widespread around the northern Australian coast, less common in the south, with few inland records (Garnett et al. 2011). Has declined due to habitat loss at migratory stop-over grounds along the flyway (Ward 2012).	**NONE** • Suitable habitat not present • No records within 100 km of the study area
	Geering, A., Agnew, L. and Harding, S. (2007). *Shorebirds of Australia*. CSIRO Publishing, Collingwood, Australia. Garnett, S.T., Szabo, J.K. and Dutson, G. (2011). *The Action Plan for Australian Birds 2010*. CSIRO Publishing, Collingwood, Australia. Ward, S. (2012). *Threatened Species of the Northern Territory – Curlew Sandpiper - Calidris ferruginea*. Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/__data/assets/word_doc/0009/373545/curlew-sandpiper.docx [Accessed 29 August 2018].			
Australian Painted-snipe *Rostratula australis*	EN	EN	**Habitat:** Edge of wetlands, swamps & inundated grasslands (Taylor et al. 2013). **Distribution:** Nomadic and scattered across Australia with no predictable occurrence (Rogers 2001), but could occur at any wetland or inundated grassland across its distribution, including nearly all of the NT and Qld (Garnett et al. 2011).	**NONE** • Suitable habitat not present • No recent records within 100 km of the study area; however historic records exist (1982).
	Garnett, S.T., Szabo, J.K. and Dutson, G. (2011). *The Action Plan for Australian Birds 2010*. CSIRO Publishing. Collingwood, Australia. Rogers, D. (2001). Painted Snipe. *Wingspan*, Vol. 11 (No. 4), pp. 6-7. Taylor, R., Chatto, R. and Woinarski, J.C.Z. (2013). *Threatened Species of the Northern Territory - Australian painted snipe - Rostratula australis*. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0018/206361/australian-painted-snipe.pdf [Accessed 1 May 2018].			
MAMMALS (TERRESTRIAL)				
Fawn Antechinus *Antechinus bellus*	VU	EN	**Habitat:** Mostly in open forests and woodlands dominated by *Eucalyptus miniata* and/or *E. tetrodonta*, particularly where these forests have a relatively dense shrubby understorey (Friend 1985; Friend & Taylor 1985). Declines in areas with frequent intense fires (Corbett et al. 2003) but not necessarily common in areas where fire has been excluded for long periods (>20 years; Woinarski et al. 2004). **Distribution:** Restricted to the Top End of the NT (Watson & Calaby 2008), one record from Melville Island. Recent surveys have failed to record it across central and eastern Arnhem Land (TSSC 2015).	**LOW** • Suitable woodland habitat unlikely to occur within study area (lines) (based on available land unit dataset – Napier & Hill 2012). • Not recorded within 100 km of the study area.
	Corbett L. K., Andersen, A.N. and Muller, W.J. (2003). Terrestrial vertebrates. In: Andersen, A.N., Cook, G.D. and Williams, R.J. (eds.). *Fire in Tropical Savannas: The Kapalga Experiment*. Springer-Verlag, New York: pp. 126–152. Friend, G.R. and Taylor, J.A. (1985). Habitat preferences of small mammals in tropical open-forest of the Northern Territory. *Australian Journal of Ecology,* Vol. 10, pp. 173-185. Friend, G.R. (1985). Ecological studies of a population of *Antechinus bellus* (Marsupalia: Dasyuridae) in tropical Australia. *Australian Wildlife Research*, Vol. 12 (No. 2), pp. 151-162. Threatened Species Scientific Committee (2015). *Approved Conservation Advice for Antechinus bellus – Fawn Antechinus*. Canberra: Department of the Environment. In effect under the EPBC Act from 03-Dec-2015. Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/344-conservation-advice-2015123.pdf [Accessed 1 May 2018]. Watson, M.L. and Calaby, J.H. (2008). Fawn Antechinus: *Antechinus bellus*. In: Van Dyck, S. and Strahan, R. (eds.). *The Mammals of Australia: 3rd Edition.* Reed New Holland, Sydney. Woinarski, J.C.Z., Risler, J. and Kean, L. (2004). The response of vegetation and vertebrate fauna to 23 years of fire exclusion in a tropical Eucalyptus open forest, Northern Territory, Australia. *Austral Ecology,* Vol. 29, pp. 156–176.		
Western Quoll *Dasyurus geoffroii*	U	VU (EX)	**Habitat:** In central Australia, occurred throughout a range of habitats (Pavey 2006). **Distribution:** Historically occurred throughout the arid interior of Australia including southern NT, now restricted to the south-west of WA (Pavey 2006). Considered extinct in the NT since the 1960's.	**NONE** • Extinct in the NT. • Historic records only.
	Pavey, C. (2006). *Threatened Species of the Northern Territory - Western Quoll, Chuditch - Dasyurus geoffroii*. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0018/205470/western-quoll.pdf [Accessed 1 May 2018].			

NAME	STATUS		HABITAT & DISTRIBUTION SUMMARY	LIKELIHOOD OF OCCURRENCE & JUSTIFICATION SUMMARY
	EPBC	TPWC		
Northern Quoll *Dasyurus hallucatus*	EN	CR	**Habitat:** Wide range of habitats, but since the arrival of Cane Toads generally restricted to the most suitable habitats which are rocky upland areas with numerous crevices and rock piles (Van Dam et al. 2002). Prime habitat in the NT consists of rocky sandstone escarpments and outliers (Braithwaite & Griffiths 1994). Home range varies from 35 to 100 ha (Oakwood 2002). Breeding occurs in May and June, with male die-off occurring shortly afterwards (Oakwood 2000). **Distribution:** Historically occurred in the NT from Borroloola in the south-east as far west as the NT/WA border (Woinarski et al. 2007), extending into the Kimberley and Pilbara regions of WA. Dramatic range contraction and population crash associated with Cane Toad invasion. Now occurs across northern Australia in five regional populations – including the Top End in the NT.	**LOW** • Rocky outcrop habitat present within lines 06A and 06C that may be suitable for species; however, rocky types present (based on available land unit dataset – Napier & Hill 2012) are not generally regarded as favourable habitat for the species. • Not recorded within 100 km of the study area.
	Braithwaite, R.W. and Griffiths, A.D. (1994). Demographic variation and range contraction in the Northern Quoll, *Dasyurus hallucatus* (Marsupialia: Dasyuridae). *Wildlife Research,* Vol. 21, pp. 203-218. Oakwood, M. (2000). Reproduction and demography of the northern quoll, *Dasyurus hallucatus*, in the lowland savanna of northern Australia. *Australian Journal of Zoology*. 48:519-539. Oakwood, M. (2002). Spatial and social organization of a carnivorous marsupial, *Dasyurus hallucatus*. *Journal of Zoology*, London. 257:237-248. Van Dam, R.A., Walden, D.J. and Begg, G.W. (2002). *A preliminary risk assessment of cane toads in Kakadu National Park*. Supervising Scientist Report 164, Darwin, Northern Territory. Woinarski, J.C.Z., Rankmore, B.R., Fisher, A. and Milne, D. (2007). *The natural occurrence of northern quolls Dasyurus hallucatus on islands of the Northern Territory: assessment of refuges from the threat posed by cane toads Bufo marinus.* Report to Natural Heritage Trust.			
Golden Bandicoot *Isoodon auratus (auratus)*	VU	EN	**Habitat:** Mainly in heathland and shrubland on sandstone sheets, avoiding vegetation with greater tree cover (Palmer et al. 2012; Southgate et al. 1996). **Distribution:** Formerly across most of northern, central and western Australia (across a broad range of habitats), but now only recorded population on mainland Australia is within the Kimberley. In the NT, confined to the offshore islands of Arnhem Land. The only records from mainland NT are from the north-east corner of Arnhem Land between 1950 and 1980 (Palmer et al. 2012). Now extinct on the mainland except in a few locations in the north-west Kimberley (TSSC 2015).	**NONE** • Extinct in the NT. • Historic records in area only.
	Palmer, C., Woinarski, J. and Hill, B. (2012). *Threatened Species of the Northern Territory - Golden Bandicoot - Isoodon auratus*. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0017/205505/golden-bandicoot.pdf [Accessed 1 May 2018]. Southgate, R., Palmer, C., Adams, C., Masters, M., Triggs, B. and Woinarski, J. (1996). Population and habitat characteristics of the Golden Bandicoot (*Isoodon auratus*) on Marchinbar Island, Northern Territory. *Wildlife Research*, Vol. 23, pp. 647-664. Threatened Species Scientific Committee (TSSC) (2015). *Approved Conservation Advice for Isoodon auratus auratus (golden bandicoot (mainland))*. Canberra: Department of the Environment. [online] Available at:http://www.environment.gov.au/biodiversity/threatened/species/pubs/66665-conservation-advice-01102015.pdf [Accessed 1 May 2018].			
Greater Bilby *Macrotis lagotis*	VU	VU	**Habitat:** In the NT, occurs in hummock grasslands on sandy soils with a preference for palaeo-drainage lines (Southgate 1990). Has large foraging area and will move home range in search for food (Johnson 2008). **Distribution:** Historically widespread in arid Australia. Currently confined to arid WA, the Tanami Desert in the NT and south-western Qld (Woinarski et al. 2014).	**HIGH** • Suitable habitat and numerous records present within the desert sandplain areas of seismic lines 03B and 06C.
	Johnson, K. (2008). Bilby *Macrotis lagotis*. In: Van Dyck, S. and Strahan, R. (eds.). *Mammals of Australia*. Third Edition. Reed New Holland, Queensland Government, Queensland Museum: pp. 191-193. Southgate, R. (1990). Habitat and diet of the greater bilby *Macrotis lagotis* Reid (Marsupalia: Peramelidae). In: Seebeck et al. (eds.). *Bandicoots and Bilbies*. Surrey Beatty & Sons, Sydney, NSW. Woinarski, J., Burbidge, A. and Harrison, P. (2014). *The Action Plan for Australian Mammals 2012*. CSIRO Publishing: pp. 203-205.			

NAME	STATUS		HABITAT & DISTRIBUTION SUMMARY	LIKELIHOOD OF OCCURRENCE & JUSTIFICATION SUMMARY
	EPBC	TPWC		
Pale Field-rat *Rattus tunneyi*	-	VU	**Habitat:** Historically occurred in a wide range of habitats, but now primarily in dense vegetation along creeks (Aplin et al. 2008). Fire regime seems to have little effect on population numbers; instead, the level of groundwater irrigating the riparian system and, to a lesser extent, current rainfall have a much stronger influence (Braithwaite & Griffiths 1996). **Distribution:** Higher rainfall areas of northern Australia, extending from Kimberley in WA to south-eastern Qld, including the Top End of the NT (Cole & Woinarski 2002, Braithwaite & Griffiths 1996). Previously widespread and patchily abundant, particularly in the north-west of the Top End, the Pale Field-rat appears to have declined in lower rainfall areas (Woinarski 2000).	**LOW** • Riparian habitat present within study area which may be suitable for the species; if present, more likely in the northern lines associated with major drainages – these lines are positioned on existing tracks (so very low likelihood of impact). • Only one historic record within 100 km of the study area.
	Aplin, K., Braithwaite, R. and Baverstock, P. (2008). Pale Field-rat: *Rattus tunneyi*. In: Van Dyck, S. and Strahan, R. (eds.). *The Mammals of Australia (3rd Edition*). Reed New Holland, Sydney, NSW. Braithwaite, R. and Griffiths, A. (1996). The paradox of *Rattus tunneyi*: endangerment of a native pest. *Wildlife Research,* Vol. 23, pp. 1-21. Cole, J. and Woinarksi, J. (2002). *Field Guide to the Rodents and Dasyurids of the Northern Territory.* Surrey Beatty & Sons, Chpping Norton, NSW. Woinarski, J.C.Z. (2000). The conservation status of rodents in the monsoonal tropics of the Northern Territory. *Wildlife Research,* Vol. 27, pp. 421-435.			
Bare-rumped Sheath-tailed Bat *Saccolaimus saccolaimus nudicluniatus*	VU	-	**Habitat:** In the NT, specimens have been collected from Pandanus woodland fringing the sedgelands of the South Alligator River and Eucalypt tall open forests (Friend & Braithwaite 1986; Churchill 1998) with more recent records from Howard Springs (Milne et al 2009). Most records occur within near-coastal habitats with one recent exception (Jasper Gorge) 150km inland (Woinarski et al. 2014). **Distribution:** Widely distributed from India through south-east Asia to the Solomon Islands, with few records across north-eastern Qld and the NT, suggesting a fragmented distribution. The north-eastern Australian population is described as the subspecies *S. s. nudicluniatus*, although it is not clear whether this should be applied to NT populations (Milne & Woinarski 2006).	**NONE** • Suitable roosting habitat not present within study area (based on available land unit dataset – Napier & Hill 2012) • Species distribution does not intersect the lines. • Not recorded within 100 km of the study area.
	Churchill, S. (1998). *Australian Bats*. Reed New Holland, Sydney. Friend, G.R. and Braithwaite, R.W. (1986). Bat fauna of Kakadu National Park, Northern Territory. *Australian Mammalogy*, Vol. 9, pp. 43-52. Milne, D.J., Jackling, F.C., Sidhu, M., and Appleton, B.R. (2009). Shedding new light on old species identifications: morphological and genetic evidence suggest a need for conservation status review of the critically endangered bat, Saccolaimus saccolaimus. Wildlife Research36: 496–508. Milne, D. and Woinarski, J. (2006). *Threatened Species of the Northern Territory - Bare-rumped Sheathtail Bat - Saccolaimus saccolaimus*. Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/__data/assets/pdf_file/0007/376117/bare-rumped-sheathtail-bat.pdf [Accessed 1 May 2018]. Woinarski, J., Burbidge, A. and Harrison, P. (2014). *The Action Plan for Australian Mammals 2012*. CSIRO Publishing: pp. 511-514.			
Northern Brushtail Possum *Trichosurus vulpecula arnhemensis*	VU	NT	**Habitat:** In Northern Australia, mainly tall eucalypt open forests with large, hollow-bearing trees, some mangrove communities, rainforests and semi-urban areas (TSSC 2001). Found in higher abundance when shrub density is high, particularly shrubs that bear large, fleshy fruits (Stobo-Wilson 2019.). **Distribution:** Occurs from the Gulf of Carpentaria, NT to the Kimberley, WA. Also occurs on many NT islands, but not on any WA islands. Within its range, distribution is patchy (TSSC 2021). Recently, there have been broad-scale losses and reduction in extensive areas of NT range (Stobo-Wilson et al. 2019).	**LOW** • Preferred habitat not present within the study area. • Not recorded within 100 km of the study area.
	Stobo-Wilson A, Murphy B, & Cremona T (2019) Contrasting patterns of decline in two arboreal marsupials from Northern Australia. *Biodiversity Conservation 28*, 2951 Threatened Species Scientific Committee (2021). Conservation Advice Trichosurus vulpecula arnhemensis Northern Brushtail Possum. Canberra: Department of Agriculture, Water and the Environment. Available from http://www.environment.gov.au/biodiversity/threatened/species/pubs/83091-conservation-advice-11052021.pdf			

NAME	STATUS		HABITAT & DISTRIBUTION SUMMARY	LIKELIHOOD OF OCCURRENCE & JUSTIFICATION SUMMARY
	EPBC	TPWC		
Common Brushtail Possum (Central Australian subspecies) *Trichosurus vulpecula vulpecula*	-	EN	**Habitat:** In Central Australia, riverine habitat that is close to rocky outcrops and moist gullies within the ranges or rocky slopes (Kerle et al. 1992). Habitat occurs on various geological substrates but is characterised by a diverse association of fire-sensitive plant species (Pavey and Ward 2012). **Distribution:** Occurs in isolated populations in southern NT. Most common in the southern NT within the MacDonald Ranges (Pavey and Ward 2012). Formerly had a much more extensive distribution in the NT, subspecies are known to occur on many Northern islands (TSSC, 2021). Common throughout much of the continent, including SA, Victoria, NSW, southern and south-western Qld, and much of WA (Pavey & Ward 2012).	**NONE** • Riparian and rocky outcrop present in the study area; however, these areas are unlikely to comprise of moist gullies typically required by the species. • Relatively recent records within 100 km of the study area, however, no records close to the study area.
	Threatened Species Scientific Committee (2021). Conservation Advice Trichosurus vulpecula arnhemensis Northern Brushtail Possum. Canberra: Department of Agriculture, Water and the Environment. Available from http://www.environment.gov.au/biodiversity/threatened/species/pubs/83091-conservation-advice-11052021.pdf Kerle, J., Foulkes, J., Kimber, R. and Papenfus, D. (1992). The decline of the brushtail possum, *Trichosurus vulpecula* (Kerr 1798), in arid Australia. *Rangelands Journal,* Vol. 14, pp. 107-127. Pavey, C. and Ward, S. (2012). *Threatened Species of the Northern Territory - Common Brushtail Possum - Trichosurus vulpecula vulpecula*. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0019/205525/common-brushtail-possum.pdf [Accessed 1 May 2018]. Woinarski, J.C.Z. (2004). In a land with few possums, even the common are rare: ecology, conservation and management of possums in the Northern Territory. In: Goldingay, R. and Jackson, S. (eds.). *The biology of Australian possums and gliding possums*. Surrey Beatty & Sons, Sydney: pp.51- 62.			
REPTILES (TERRESTRIAL)				
Plains Death Adder *Acanthophis hawkei*	VU	VU	**Habitat:** Floodplains in the Top End and cracking soil plains inland (Webb et al. 2002). Susceptible to ingesting toxic Cane Toads (Phillips et al. 2009). **Distribution**: Habitat mapping suggests the potential geographic range extends from western Qld, across the sub-coastal north of the NT to the north-eastern Kimberley of WA. Fragmented populations occur in the Mitchell Grass Downs of western Qld, the Barkly Tablelands on the NT/Qld border and east of Darwin (Fogg Dam) in the NT (TSSC 2012; Wuster et al. 2005).	**LOW** • Not known to occur in region. • No suitable habitat (cracking clay soils) present on lines where vegetation clearing is required. • Not recorded within 100 km of the study area.
	Phillips, B.L., Greenlees, M.J., Brown, G.P. and Shine R (2010). Predator behaviour and morphology mediates the impact of an invasive species: cane toads and death adders in Australia. *Animal Conservation*, Vol. 13, pp. 53-59. Webb, J.K., Christian, K.A. and Fisher, P. (2002). Fast growth and early maturation in a viviparous sit-and-wait predator, the northern death adder (*Acanthophis praelongus*) from tropical Australia. *Journal of Herpetology*, Vol. 36, no. 3, pp. 505-509. Wuster, W., Dumbrell, A.J., Hay, C., Pook, C.E., Williams, D.J. and Fry, B.G. (2005). Snakes across the Strait: trans-Torresian phylogeographic relationships in three genera of Australasian snakes (Serpentes: Elapidae: *Acanthophis*, *Oxyuranus*, and *Pseudechis*). *Molecular Phylogenetics and Evolution*, Vol. 34. pp. 1-14. Threatened Species Scientific Committee (2015). *Approved Conservation Advice – Acanthophis hawkei – Plains Death Adder.* Canberra: Department of the Environment. [online] Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/83821-conservation-advice.pdf [Accessed 1 May 2018].			
Great Desert Skink *Liopholis kintorei*	VU	VU	**Habitat:** Generally occurs in tall open shrubland, hummock grasslands and on red sandplains and sand ridges (Cogger et al. 1993). However, in some locations (e.g. the Gibson Desert) found on sandplains with fine gravel. **Distribution:** Originally within a broad range extending from the desert parts of south-western NT, eastern interior of WA and north-western SA (Cogger et al. 1993). Currently known from seven populations (McAlpin 2001), three of which occur in the NT –the Tanami Desert, Uluru-Kata Tjuta National Park and the Yulara lease lands.	**NONE** • Potential habitat within desert sandplains areas of lines 03B and 06C; however, the species range falls outside study area. • Not recorded within 100 km of the study area.
	Cogger, H., Cameron, E., Sadlier, R. and Eggler, P. (1993). *The Action Plan for Australian Reptiles*. Australian Nature Conservancy Agency, Canberra. McAlpin, S. (2001). *The Recovery Plan for the Great Desert Skink (Egernia kintorei) 2001-2011*. Arid Lands Environment Centre. [online] Available at: http://www.environment.gov.au/system/files/resources/2e5e895a-e176-409e-80c3-34d63a80fac5/files/great-desert-skink.pdf [Accessed 1 May 2018].			

NAME	STATUS		HABITAT & DISTRIBUTION SUMMARY	LIKELIHOOD OF OCCURRENCE & JUSTIFICATION SUMMARY
	EPBC	TPWC		
Mertens' Water Monitor *Varanus mertensi*	-	VU	**Habitat:** Semi-aquatic, occupying edges of freshwater watercourses and lagoons, but seldom seen far from water (Christian 2004). **Distribution:** Across far northern Australia from the western Cape York Peninsula in Qld to the Kimberley in WA (Christian 2004). Widespread in the NT, occupying all of the Top End river systems (Ward et al. 2006). The more common water monitor in greater Darwin (outside of Darwin suburbs and coastal area). Susceptible to ingesting toxic Cane Toads resulting in reduced abundance (Griffiths & McKay 2007).	**LOW** • Suitable riparian habitat present within drainages in 01A, 02A, 06A and western end of 06C; however, all ephemeral (no permanent water) so it is only expected during peak of wet season when water is present. Seismic works will not be conducted at this time of year. • No recent records within 100 km
	Christian, K. (2004). Varanus mertensi. In: Pianka et al. (eds.). *Varanoid lizards of the world*. Indiana University Press, Bloomington, Indianapolis. Griffiths, A.D. and McKay (2007). Cane toads reduce the abundance and site occupancy of Merten's water monitor (Varanus mertensi). *Wildlife Research,* Vol. 34, pp. 609-615. Ward, S., Woinarski, J., Griffiths, T. and McKay, L. (2006). *Threatened Species of the Northern Territory - Mertens Water Monitor - Varanus mertensi*. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0018/206460/mertens-water-monitor.pdf [Accessed 1 May 2018].			
Mitchell's Water Monitor *Varanus mitchelli*	-	VU	**Habitat:** Semi-aquatic and often arboreal, inhabiting margins of freshwater watercourses, swamps and lagoons (Shine 1986). **Distribution:** Top End of the NT and Kimberley in WA (Schultz & Doody 2004). In the NT, recorded in most catchments flowing into the Timor Sea, Arafura Sea and the Gulf of Carpentaria (Ward 2012). The more common water monitor in Darwin suburbs and coastal area. Susceptible to ingesting toxic Cane Toads resulting in reduced abundance (Doody et al. 2009).	**LOW** • Suitable riparian habitat present within drainages in 01A, 02A, 06A and western end of 06C; however, all ephemeral (no permanent water) so it is only expected during peak of wet season when water is present. Seismic works will not be conducted at this time of year. • Recent records within 100 km of the study area
	Doody, J.S., Green, B., Rhind, D., Castellano, C., Sims, R. and Robinson, T. (2009). Population-level declines in Australian predators caused by an invasive species. *Animal Conservation*, Vol. 12, pp. 46-53. Schultz, T. and Doody, S. (2004). Varanus mitchelli. In: Pianka et al. (eds.). *Varanoid lizards of the world*. Indiana University Press, Bloomington, Indianapolis. Shine, R. 1986. Food habits, habitats and reproductive biology of four sympatric species of varanid lizards in tropical Australia. *Herpetologica,* Vol. 42, pp. 346-360. Ward, S. (2012). *Threatened Species of the Northern Territory - Mitchell's Water Monitor - Varanus mitchelli*. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0019/206461/mitchells-water-monitor.pdf [Accessed 1 May 2018].			
Floodplain Monitor *Varanus panoptes*	-	VU	**Habitat:** Broad range of habitats from coastal beaches to savannah woodlands (Christian 2004). Also common throughout floodplains grasslands and a variety of native woodlands (Ward et al. 2012). **Distribution:** Across northern Australia from the Kimberley in WA to Cape York Peninsula, and southwards through most of Qld. In the NT, recorded across most of the Top End and the Gulf Region (Christian 2004). Highly susceptible to Cane Toad poisoning (Ujvari & Madsen 2009) and has experienced significant declines (Doody et al. 2009).	**LOW** • Potential habitat present within study area in floodplains in 01A, 02A and 06A; however. low likelihood of impact because lines in areas of suitable habitat are located on existing roads. • Recent records within 100 km of the study area.
	Christian, K. (2004). Varanus panoptes. In: Pianka et al. (eds). *Varanoid lizards of the world*. Indiana University Press, Bloomington, Indianapolis. Doody, J.S., Green, B., Rhind, D., Castellano, C., Sims, R. and Robinson, T. (2009). Population-level declines in Australian predators caused by an invasive species. *Animal Conservation*, Vol. 12, pp. 46-53. Ujvari, B. & Madsen, T. (2009). Increased mortality of naïve varanid lizards after the invasion of non-native cane toads (*Bufo marinus*). *Herpetological Conservation and Biology*, Vol. 4, pp. 248-251. Ward, S., Woinarski, J., Griffiths, T. & McKay, L. (2012). *Threatened Species of the Northern Territory - Yellow Spotted Monitor, Northern Sand Goanna, Floodplain Monitor - Varanus panoptes.* Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0006/206466/floodplain-monitor.pdf [Accessed 1 May 2018].			

NAME	STATUS		HABITAT & DISTRIBUTION SUMMARY	LIKELIHOOD OF OCCURRENCE & JUSTIFICATION SUMMARY
	EPBC	TPWC		
REPTILES (MARINE)				
Gulf Snapping Turtle *Elseya lavarackorum*	EN	-	**Habitat:** Large rivers and their associated overflow lagoons and oxbow lakes (Cogger 2000; Woinarski 2006). Found in deeper permanent pools most often with muddy, sandy or rocky bottoms. Also found in the middle reaches of rivers, upstream of saline regions and downstream of escarpments, including plunge pools. Steep rocky gorges, and river reaches with intact river banks seem to be preferred habitats (Thomson et al. 1997). **Distribution:** Rivers in far eastern NT and far western Qld which discharge into the south of the Gulf of Carpentaria. In the NT this includes the Robinson River (DoE 2017).	**NONE** • Riverine and gorge habitat not present within study area • Not known to occur in region. • Not recorded within 100 km of the study area (species included due to EPBC PMST report)
	Cogger, H.G. (2000). *Reptiles and Amphibians of Australia – 6th edition*. Reed New Holland, Sydney, NSW. Department of the Environment (2017). *Elseya lavarackorum – Gulf Snapping Turtle.* Species Profile and Threats Database, Department of the Environment, Canberra. [online] Available at: https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=67197 [Accessed 1 May 2018]. Thomson, S., White, A. and Georges, A. (1997). Re-evaluation of *Emydura lavarackorum*: identification of a living fossil. *Memoirs of the Queensland Museum*, Vol. 42 (No. 1), pp. 327-336. Woinarski, J. (2006). *Threatened Species of the Northern Territory – Gulf Snapping Turtle - Elseya lavarackorum.* Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0008/376181/gulf-snapping-turtle.pdf [Accessed 1 May 2018].			
Hawksbill Turtle *Eretmochelys imbricata*	VU	VU	**Habitat:** Pelagic (until adulthood) in tropical, subtropical and waters, then tropical tidal and sub-tidal coral and rocky reef habitats (less frequently, within seagrass habitats) (DoE 2017). In the NT, most nesting occurs on islands rather than mainland beaches (Taylor et al. 2012). **Distribution:** Global. In the NT, principal nesting sites are concentrated around north-eastern Arnhem Land and Groote Eylandt (Chatto 1998).	**NONE** • Suitable habitat not present within or adjacent to study area • Not recorded within the study area
	Chatto, R. (1998). A preliminary overview of the locations of marine turtle nesting in the Northern Territory. In: Kennett et al. (eds.). *Marine turtle conservation and management in northern Australia*. Northern Territory University, Darwin: pp. 33-40 Department of the Environment (2017). *Eretmochelys imbricate – Hawksbill Turtle.* Species Profile and Threats Database, Department of the Environment, Canberra. [online] Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1766 [Accessed 1 May 2018]. Taylor, R., Chatto, R., Woinarski, J., Whiting, S. and Ward, S. (2012). *Threatened Species of the Northern Territory – Hawksbill Turtle - Eretmochelys imbricata.* Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0003/206454/hawksbill-turtle.pdf [Accessed 1 May 2018].			
FISH				
Largetooth Sawfish *Pristis pristis*	VU	VU	**Habitat:** Tropical marine and estuarine habitats, entering estuarine or fresh waters to breed during the wet season and moving into marine waters following the wet season (Peverell 2005). Of the four *Pristis* species reported to occur in Australia, is the one most often associated with freshwater, and has been recorded several hundred kilometres upstream (Thorburn et al. 2003). **Distribution:** Circumtropical, with distinct populations in the eastern Atlantic, western Atlantic, eastern Pacific and Indo-West Pacific – including northern Australia (TSSC 2014). In the NT, reported in Adelaide, Victoria, Daly, East and South Alligator, Goomadeer, Roper, McArthur, Wearyan and Robinson Rivers (TSSC 2014). May potentially occur in all large rivers of northern Australia from the Fitzroy River, WA, to the western side of Cape York Peninsula, Qld (DoE 2018).	**LOW** • Suitable riverine habitat unlikely to occur with study area; however, Victoria River is close by and linked by tributaries that may provide temporary suitable habitat during and post-wet season • No permanent waterways within study area • Not recorded within 100 km of the study area
	Department of the Environment (DoE) (2018). *Pristis 94ristis in Species Profile and Threats Database*, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. [Accessed 1 May 2018]. Peverell, S.C. (2005). Distribution of sawfishes (Pristidae) in the Queensland Gulf of Carpentaria, Australia, with notes on their ecology. *Environmental Biology of Fishes,* Vol. 73, pp. 391-402. Threatened Species Scientific Committee (2014). *Approved Conservation Advice – Pristis 94ristis (largetooth sawfish).* Canberra: Department of the Environment. In effect under the EPBC Act from 11-April-2014. [online] Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/60756-conservation-advice.pdf [Accessed 1 May 2018].			

NAME	STATUS		HABITAT & DISTRIBUTION SUMMARY	LIKELIHOOD OF OCCURRENCE & JUSTIFICATION SUMMARY
	EPBC	TPWC		
INVERTEBRATES				
Fitzroy Land Snail *Mesodontrachia fitzroyana*	EN	CR	**Habitat:** Commonly found under rocks in open eucalyptus woodland and small patches of rainforest. These areas often consist of hills with steep slopes, limestone outcrops and terraces (Ward et al. 2012). **Distribution**: Endemic to the NT, known from low limestone hills traversed by the Victoria River east of Timber Creek on the Ngaliwurru Nungali Aboriginal Land Trust (Ward et al. 2012).	**NONE** • Suitable habitat not present within the study area. • Not recorded within 100 km of the study area
	Ward, S., Kessner, V., Braby, M. and Woinarski, J. (2012). *Threatened Species of the Northern Territory - Fitzroy Land Snail - Mesodontrachia fitzroyana.* Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0004/206509/mesodontrachia-fitroyana.pdf [Accessed 1 May 2018].			
Behn River Keeled Snail *Ordtrachia australis*	-	EN	**Habitat:** Found under rocks in areas consisting of limestone in open woodland and patches of scrub (Ward et al. 2006). **Distribution:** In the NT, only known to occur 5.4km south of the Rosewood Station turnoff along the Duncan Highway adjacent to the WA border (Ward et al. 2006).	**LOW** • Suitable habitat unlikely to be present within study area • One historic record within 100 km of the study area
	Ward, S., Kessner, V., Braby, M. and Woinarski, J. (2006). *Threatened Species of the Northern Territory - Land Snail - Ordtrachia australis.* Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0015/206511/ordtrachia-australis.pdf [Accessed 1 May 2018].			
Rosewood Keeled Snail *Ordtrachia septentrionalis*	CR	EN	**Habitat:** Found among exposed limestone boulders in open savannah areas subject to heavy flooding. These rocks range from centimetres to metres in diameter and rarely project more than a few centimetres above ground level (Ward et al. 2006). **Distribution:** Found along 1.4km of road south of Rosewood Station turnoff and in a small located area 8km to the west just over the WA border (Ward et al. 2006).	**NONE** • Suitable habitat not likely present within the study area • Not recorded within 100 km of the study area • Range-restricted species
	Ward, S., Kessner, V., Braby, M. and Woinarski, J. (2006). *Threatened Species of the Northern Territory - Land Snail - Ordtrachia septentrionalis*. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0016/206512/ordtrachia-septentrionalis.pdf [Accessed 1 May 2018].			
Victoria River Squat Snail *Trachiopsis victoriana*	-	VU	**Habitat:** Found in leaf litter at the base of large limestone boulders in a marshy sink. Also recorded buried in soil in open *Eucalyptus* woodlands (Solem 1985). **Distribution:** Reported in and around limestone sinkholes in Katherine region. Possibly naturally extremely restricted in range.	**NONE** • Suitable habitat not present within study area • Not recorded within 100 km of the study area • Restricted-range species with no proximate populations
	Solem, A. (1985). *Camaenid land snails from Western and central Australia (Mollusca: Pulmonata: Camaenidae) - V Remaining Kimberley genera and addenda to the Kimberley*. Records of the Western Australian Museum Supplement 20, pp. 707-981. Wilson, C., Woinarski, J., Kessner, V. and Braby, M. (2006). *Threatened Species of the Northern Territory - Victoria's Land Snail - Setobaudinia victoriana.* Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/__data/assets/pdf_file/0007/206539/setobaudinia-victoriana.pdf [Accessed 1 May 2018].			

APPENDIX C FIELD DATA – LAND TYPES SITE COORDINATES

Site	Easting	Northing	Zone	Line	Observation type	Land Type
1	789720	8083059	52 (GDA94)	03B	Ground	LT-1
2	789221	8081613	52 (GDA94)	03B	Aerial	LT-1
4	787725	8076941	52 (GDA94)	03B	Aerial	LT-3
5	787094	8075043	52 (GDA94)	03B	Aerial	LT-3
6	786840	8073861	52 (GDA94)	03B	Aerial	LT-3
7	785387	8069687	52 (GDA94)	03B	Aerial	LT-2
8	785229	8069160	52 (GDA94)	03B	Aerial	LT-2
9	784417	8067213	52 (GDA94)	03B	Aerial	LT-2
10	783211	8063024	52 (GDA94)	03B	Aerial	LT-2
11	782377	8060496	52 (GDA94)	03B	Ground	LT-4
13	782052	8059493	52 (GDA94)	03B	Aerial	LT-4
14	781911	8059005	52 (GDA94)	03B	Aerial	LT-4
15	780277	8054079	52 (GDA94)	03B	Ground	LT-4
16	780264	8053896	52 (GDA94)	03B	Ground	LT-4
17	778099	8047182	52 (GDA94)	03B	Ground	LT-6
18	778145	8047281	52 (GDA94)	03B	Ground	LT-6
19	775989	8040595	52 (GDA94)	03B	Aerial	LT-4
21	771085	8025419	52 (GDA94)	03B	Ground	LT-6
22	768964	8018850	52 (GDA94)	03B	Aerial	LT-2
23	768752	8017769	52 (GDA94)	03B	Ground	LT-2
24	767953	8015748	52 (GDA94)	03B	Aerial	LT-2
25	763973	8003405	52 (GDA94)	03B	Aerial	LT-2
26	763278	8001172	52 (GDA94)	03B	Aerial	LT-7
27	761571	7995376	52 (GDA94)	03B	Ground	LT-7
28	761277	7994972	52 (GDA94)	03B	Ground	LT-2
29	761102	7994326	52 (GDA94)	03B	Ground	LT-5
30	756156	7978606	52 (GDA94)	03B	Ground	LT-5
31	755953	7977815	52 (GDA94)	03B, 06C	Ground	LT-5
32	757768	7977016	52 (GDA94)	06C	Aerial	LT-5
33	765122	7973163	52 (GDA94)	06C	Aerial	LT-2
34	754495	7974194	52 (GDA94)	03B	Aerial	LT-5
40	755038	7975664	52 (GDA94)	03B	Ground	LT-5
41	752322	7979776	52 (GDA94)	06C	Aerial	LT-5
47	751248	7980340	52 (GDA94)	06C	Ground	LT-5
52	750766	7980597	52 (GDA94)	06C	Aerial	LT-5
53	742339	7984699	52 (GDA94)	06C	Aerial	LT-5
54	741652	7985296	52 (GDA94)	06C	Ground	LT-5
55	739392	7986428	52 (GDA94)	06C	Ground	LT-6
56	732592	7990014	52 (GDA94)	06C	Aerial	LT-2
57	731429	7990622	52 (GDA94)	06C	Aerial	LT-2
58	726550	7993176	52 (GDA94)	06C	Aerial	LT-2
59	725810	7993561	52 (GDA94)	06C	Aerial	LT-2
60	719665	7996686	52 (GDA94)	06C	Aerial	LT-2
62	682662	8015685	52 (GDA94)	06C	Ground	LT-9
63	682756	8015832	52 (GDA94)	06C	Ground	LT-10
64	679949	8017078	52 (GDA94)	06C	Ground	LT-11
65	679325	8017366	52 (GDA94)	06C	Ground	LT-14
66	679284	8017427	52 (GDA94)	06C	Ground	LT-14
67	679028	8017542	52 (GDA94)	06C	Ground	LT-14
68	675489	8019414	52 (GDA94)	06C	Ground	LT-12
69	675747	8019218	52 (GDA94)	06C	Aerial	LT-12
70	676396	8018985	52 (GDA94)	06C	Ground	LT-12

Site	Easting	Northing	Zone	Line	Observation type	Land Type
71	693772	8010066	52 (GDA94)	06C	Aerial	LT-7
72	695481	8009137	52 (GDA94)	06C	Aerial	LT-2
73	701218	8006198	52 (GDA94)	06C	Aerial	LT-7
93	755586	7977339	52 (GDA94)	03B	Aerial	LT-5
96	754080	7972601	52 (GDA94)	03B	Aerial	LT-5
97	767051	7972169	52 (GDA94)	06C	Aerial	LT-2
98	763640	7973938	52 (GDA94)	06C	Aerial	LT-2
99	762010	7974764	52 (GDA94)	06C	Aerial	LT-2
100	760740	7975416	52 (GDA94)	06C	Aerial	LT-5
101	759442	7976117	52 (GDA94)	06C	Aerial	LT-5
102	754513	7978713	52 (GDA94)	06C	Aerial	LT-5
103	750006	7981001	52 (GDA94)	06C	Aerial	LT-5
104	749115	7981481	52 (GDA94)	06C	Aerial	LT-5
105	746287	7982923	52 (GDA94)	06C	Aerial	LT-5
106	745077	7983549	52 (GDA94)	06C	Aerial	LT-5
107	744056	7984125	52 (GDA94)	06C	Aerial	LT-5
110	729383	7991669	52 (GDA94)	06C	Aerial	LT-2
111	717145	7997973	52 (GDA94)	06C	Aerial	LT-2
112	711641	8000793	52 (GDA94)	06C	Aerial	LT-2
113	707437	8003032	52 (GDA94)	06C	Aerial	LT-2
114	702359	8005601	52 (GDA94)	06C	Aerial	LT-2
115	699541	8007036	52 (GDA94)	06C	Aerial	LT-2
116	684092	8015005	52 (GDA94)	06C	Aerial	LT-9
118	682291	8015688	52 (GDA94)	06C	Aerial	LT-11
119	681740	8016094	52 (GDA94)	06C	Aerial	LT-10
120	681434	8016314	52 (GDA94)	06C	Aerial	LT-9
121	681308	8016385	52 (GDA94)	06C	Aerial	LT-10
122	681001	8016544	52 (GDA94)	06C	Aerial	LT-10
123	680624	8016751	52 (GDA94)	06C	Aerial	LT-10
124	680225	8016963	52 (GDA94)	06C	Aerial	LT-11
125	678349	8017924	52 (GDA94)	06C	Aerial	LT-13
126	674945	8019664	52 (GDA94)	06C	Aerial	LT-12
127	676668	8018822	52 (GDA94)	06C	Ground	LT-12
128	677422	8018496	52 (GDA94)	06C	Aerial	LT-13
129	678727	8017675	52 (GDA94)	06C	Aerial	LT-11
130	683249	8015410	52 (GDA94)	06C	Aerial	LT-9
131	686109	8013970	52 (GDA94)	06C	Aerial	LT-9
132	690068	8012164	52 (GDA94)	06C	Aerial	LT-7
133	691365	8011265	52 (GDA94)	06C	Aerial	LT-2
195	780981	8055936	52 (GDA94)	03B	Aerial	LT-4
196	787033	8074738	52 (GDA94)	03B	Aerial	LT-3
197	779429	8051242	52 (GDA94)	03B	Aerial	LT-4
198	776571	8042553	52 (GDA94)	03B	Aerial	LT-4
199	776339	8041682	52 (GDA94)	03B	Aerial	LT-4
200	772992	8031314	52 (GDA94)	03B	Aerial	LT-4
201	771196	8025822	52 (GDA94)	03B	Aerial	LT-4
202	760683	7993139	52 (GDA94)	03B	Aerial	LT-5
203	759817	7990355	52 (GDA94)	03B	Aerial	LT-5
204	758186	7985380	52 (GDA94)	03B	Aerial	LT-5
205	756711	7980832	52 (GDA94)	03B	Aerial	LT-5
206	731833	7990405	52 (GDA94)	06C	Aerial	LT-2
207	690277	8011761	52 (GDA94)	06C	Aerial	LT-2
208	689986	8011946	52 (GDA94)	06C	Aerial	LT-9
209	687421	8013307	52 (GDA94)	06C	Aerial	LT-9
210	683392	8015341	52 (GDA94)	06C	Aerial	LT-9
211	675280	8019488	52 (GDA94)	06C	Aerial	LT-12

APPENDIX D FIELD DATA – LAND TYPES SITE DETAILS

LAND TYPE DATA											
Land type	**Site**	**Landform**	**Slope**	**Soil**	**Vegetation**	**Comment**	**Weeds**	**Vegetation condition**	**Erosion status**	**Cattle impacts**	**Land Condition**
LT-1	1	Shallow depression	Flat	Red earth, loam	Bullwaddy thicket; Spinifex grassland and open Corymbia terminalis and mixed shrubs in surrounding plain	Bullwaddy trees in area (old tree, refugial habitat, difficult to rehabilitate); Spectacled Hare-wallaby	None	Intact	None	Negligible	Good
LT-1	2	Shallow depression	Flat	Red earth, loam	Bullwaddy thicket; Spinifex grassland and open Corymbia terminalis and mixed shrubs in surrounding plain	Bullwaddy trees in area (old tree, refugial habitat, difficult to rehabilitate)	None	Intact	None	Very low	Good
LT-2	7	Sandplain	Flat	Sandy red earth	Open Corymbia; sparse to patchy shrubs.; spinifex grassland	Existing track in good condition and recently used; recently established as not on aerial image	None	Altered	None	Low	Average
LT-2	8	Sandplain	Flat	Sandy red earth	Open Eucalyptus pruinosa; sparse shrubs; spinifex grassland	Australian Bustard	None	Intact	None	Negligible	Good
LT-2	9	Sandplain	Flat	Sandy red earth	Open Corymbia and Eucalyptus pruinosa; scattered Carissa lanceolata shrubs; spinifex grassland		None	Intact	None	Negligible	Good
LT-2	10	Sandplain	Flat	Sandy red earth	Isolated Acacia stipuligera patch amongst extensive open Corymbia/Silver Box woodland over spinifex		None	Intact	None	Negligible	Good
LT-2	22	Sandplain	Gentle	Sandy red earth	Open Bloodwood, spinifex and tussocks		None	Intact	None	Negligible	Good
LT-2	23	Sandplain	Gentle	Sandy red earth	Open Bloodwood, spinifex, Ehretia saligna scattered		None	Intact	None	Negligible	Good
LT-2	24	Sandplain	Flat	Sandy red earth	Open Bloodwood, Acacia sericophylla, Spinifex. Patchy grevillea refracta, Ac stipuligera, Mirbelia viminalis		None	Intact	None	Negligible	Good
LT-2	25	Sandplain	Flat	Sandy red earth	Open Bloodwood, Acacia shrubs, spinifex and tussocks		None	Intact	None	Negligible	Good
LT-2	28	Sandplain	Gentle	Sandy red earth	Open Corymbia opaca, E. pruinosa over Triodia pungens. Scattered Grevillea refracta, Aca lysiphloia, Goodenia, Ac tenuissima, Bonamia media		None	Intact	None	Negligible	Good
LT-2	33	Sandplain	Flat	Sandy red earth; loamy in areas	Open Acacia sericophylla, spinifex grassland		None	Intact	None	Negligible	Good
LT-2	56	Sandplain	Flat	Red earth, loamy patches	Corymbia setosa, E. pruinosa, A. stipuligera; spinifex		None	Intact	None	Negligible	Good
LT-2	57	Sandplain	Flat	Red earth, loamy patches	Corymbia setosa, E. pruinosa, A. stipuligera, spinifex		None	Intact	None	Negligible	Good
LT-2	58	Sandplain	Flat	Sandy red earth	Open shrubs and low trees over spinifex grassland. Grevillea refracta, A. lysiphloia, Corymbia opaca, E. pruinosa	Old fence line (boundary) - overgrown	None	Intact	None	Negligible	Good
LT-2	59	Sandplain	Flat	Sandy red earth	Open shrubs and low trees over spinifex grassland. G. refracta, A. lysiphloia, C. opaca, E. pruinosa, A. sericophylla		None	Intact	None	Negligible	Good
LT-2	60	Sandplain	Flat	Sandy red earth	Open low trees, sparse shrubs over spinifex. C. setosa, C. opaca, A. sericophylla, G. refracta, E. pruinosa (scattered), A. lysiphloia (scat). Occasional C. bella		None	Intact	None	Negligible	Good
LT-2	72	Sandplain	Flat	Sandy pale earth	Open low trees (C. opaca, C. flavescens); very sparse shrubs; spinifex grassland		None	Intact	None	Negligible	Good
LT-2	98	Sandplain	Flat	Sandy red earths	Open Eucalyptus pruinosa, stunted Bloodwood, spinifex grassland		None	Intact	None	Negligible	Good
LT-2	97	Sandplain	Flat	Sandy red earths	Scattered shrubs (Petalostigma nummularia, Hakea arborescens, Carissa lanceolata); spinifex grassland	Old fence line (boundary) - overgrown	None	Intact	None	Negligible	Good

LAND TYPE DATA											
Land type	**Site**	**Landform**	**Slope**	**Soil**	**Vegetation**	**Comment**	**Weeds**	**Vegetation condition**	**Erosion status**	**Cattle impacts**	**Land Condition**
LT-2	99	Sandplain	Flat	Sandy red earths	Open stunted Bloodwood over spinifex; sparse shrubs		None	Intact	None	Negligible	Good
LT-2	110	Sandplain	Flat	Red earth, loamy patches	Corymbia setosa, E. pruinosa, Ac stipuligera, spinifex		None	Intact	None	Negligible	Good
LT-2	111	Sandplain	Flat	Sandy red earth	C. setosa over spinifex; some C. opaca; very sparse shrubs		None	Intact	None	Negligible	Good
LT-2	112	Sandplain	Flat	Sandy red earth	Open low trees (C. setosa, C. opaca) over spinifex; sparse shrubs.		None	Intact	None	Negligible	Good
LT-2	113	Sandplain	Flat	Sandy red earth	Open low trees (C. opaca, C. setosa) over spinifex; patchy A. lysiphloia		None	Intact	None	Negligible	Good
LT-2	114	Sandplain	Flat	Sandy red earth	Open low trees (C. opaca, C. setosa) over spinifex; patchy A. lysiphloia		None	Intact	None	Negligible	Good
LT-2	115	Sandplain	Flat	Sandy red earth	Open to scattered small Bloodwood over spinifex. Isolated A. lysiphloia		None	Intact	None	Negligible	Good
LT-2	133	Sandplain	Flat	Sandy red earth	Open E. pruinosa, C. opaca; spinifex grassland		None	Intact	None	Negligible	Good
LT-2	206	Sandplain	Flat	Lateritic sands, fine gravel	Open Corymbia setosa; scattered shrubs; spinifex	Proposed camp location	None	Intact	None	None	Good
LT-2	207	Sandplain	Flat	Lateritic sands, fine gravel	Disturbed (road corridor)	Lajamanu Road crossing	None	Impacted	None	None	Poor
LT-3	4	Sandplain	Flat	Sandy red earth	Open Corymbia; sparse shrubs; tussock grassland, scattered patches of spinifex (minor)	Existing track in good condition and recently used	None	Altered	None	Low	Average
LT-3	5	Sandplain	Flat	Sandy red earth	Open Corymbia and Eucalyptus pruinosa; tussock grassland		None	Intact	None	Negligible	Good
LT-3	6	Sandplain	Flat	Sandy red earth	Open low trees (Ehretia saligna, Bauhinia, Hakea arborescens, Corymbia dichromophloia); tussock grassland		None	Intact	None	Negligible	Good
LT-3	196	Sandplain	Flat	Sandy red earth	Open E. pruinosa and Corymbia over tussock grassland	Existing station track (good condition)	None	Altered	None	Low	Average
LT-4	11	Calcrete rise	Gentle	Loamy earth, calcareous, cryptogam	Sparse trees over spinifex, tussocks and forbs		None	Intact	None	Negligible	Good
LT-4	13	Calcrete rise	Gentle	Loamy earth, calcareous, cryptogam	Sparse trees over spinifex, tussocks and forbs		None	Intact	None	Negligible	Good
LT-4	14	Calcrete rise	Gentle	Loamy earth, calcareous, cryptogam	Sparse low trees over spinifex, tussocks and forbs		None	Intact	None	Negligible	Good
LT-4	15	Calcrete rise	Gentle	Loamy earth, calcareous, cryptogam	Sparse low trees over spinifex, tussocks and forbs		None	Intact	None	Negligible	Good
LT-4	16	Calcareous plain	Flat	Loamy red earth, cryptogam	Open low Corymbia, Eucalyptus pruinosa over spinifex. Other species Brachychiton multi, Carissa lanceolata, Hakea arb, Ac sericophylla		None	Intact	None	Negligible	Good
LT-4	19	Calcareous plain	Flat	Loamy earth, calcareous	Open Corymbia and Eucalyptus pruinosa over spinifex		None	Intact	None	Negligible	Good
LT-4	195	Calcareous plain	Flat	Calcareous earth	Open Corymbia trees; grazed grasses	Cattle tank and yard and road	None	Impacted	None	High	Poor
LT-4	197	Calcareous plain	Flat	Loamy earth, calcareous	Isolated trees; scattered shrubs; spinifex grassland	Existing station track, good condition; proposed camp	None	Altered	None	Low	Average

LAND TYPE DATA											
Land type	**Site**	**Landform**	**Slope**	**Soil**	**Vegetation**	**Comment**	**Weeds**	**Vegetation condition**	**Erosion status**	**Cattle impacts**	**Land Condition**
LT-4	198	Calcareous plain	Flat	Loamy earth, calcareous	Scattered Corymbia trees; scattered shrubs; tussock grass and patchy spinifex	Fence line; cattle pad along fence line road; old but not overgrown	None	Altered	None	Low	Average
LT-4	199	Calcareous plain	Flat	Loamy earth, calcareous	Scattered Corymbia trees; scattered shrubs; tussock grass and patchy spinifex	Fence line; cattle pad along fence line road; old but not overgrown	None	Altered	None	Low	Average
LT-4	201	Calcareous plain	Flat	Loamy earth, calcareous	Scattered Corymbia trees; scattered shrubs; tussock grass and patchy spinifex	Fence line track; good condition	None	Altered	None	Low	Average
LT-4	200	Calcareous plain	Flat	Loamy earth, calcareous	Scattered Corymbia trees; scattered shrubs; spinifex	Existing station track (good condition); proposed camp	None	Altered	None	Low	Average
LT-5	29	Laterite rise	Gentle	Red earth, fine gravel (laterite) surface; crusting/cryptogam	Open Eucalyptus pruinosa over Triodia (pungens). Daisies, Hakea macro, Petalostigma pubescens/nummularia		None	Intact	None	Negligible	Good
LT-5	30	Laterite rise	Low	Gravel surface; red sandy loam	Open Eucalyptus pruinosa, Acacia lysiphloia, spinifex (T. pungens). Some Acacia adoxa, Ptilotus calostachyus, Aristida holathera.		None	Intact	None	Negligible	Good
LT-5	31	Laterite rise	Low	Gravel surface; red sandy loam	Acacia lysiphloia shrubland; spinifex grass; Eucalyptus pruinosa in area		None	Intact	None	Negligible	Good
LT-5	32	Lateritic plain	Flat	Sandy red earths, low level of gravel (fine)	Acacia stipuligera patch over spinifex. E. pruinosa and Grevilleas wickhamii scattered in area.		None	Intact	None	Negligible	Good
LT-5	34	Laterite sandplain	Flat	Lateritic sands and gravel	Open Corymbia opaca(?); Acacia stipuligera patch; spinifex grassland; some Petalostigma nummularia		None	Intact	None	Negligible	Good
LT-5	40	Laterite sandplain	Gentle	Lateritic sands and gravel	Open Bloodwood (Corymbia), Acacia lysiphloia patch; spinifex grassland (T. pungens); some Grevillea wickhamii, Acacia hemignosta		None	Intact	None	Negligible	Good
LT-5	41	Localised depression within lateritic plain	Flat	Red sandy loam	Open Eucalyptus victrix (Smooth bark Coolabah) over spinifex grassland. Grevillea wickhamii and Hakea arborescens		None	Intact	None	Negligible	Good
LT-5	47	Lateritic rise	Gentle	Lateritic sands and gravel	Mixed open to patch shrubland (Acacia lysiphloia, Grevillea wickhamii, Acacia stipuligera) over spinifex grassland (Triodia pungens).		None	Intact	None	Negligible	Good
LT-5	52	Laterite plain	Flat	Lateritic sands and gravel	Acacia lysiphloia patch; spinifex		None	Intact	None	Negligible	Good
LT-5	53	Laterite rise	Gentle	Gravel; red earth	Sparse Eucalyptus pruinosa and Acacia hilliana over spinifex		None	Intact	None	Negligible	Good
LT-5	54	Laterite plain; localised pan	Flat	Clayey pan	Open Eucalyptus pruinosa, spinifex, Ehretia saligna		None	Intact	None	Negligible	Good
LT-5	93	Lateritic sandplain	Flat	Lateritic sands, fine surface gravel	Open Eucalyptus pruinosa, patchy Acacia lysiphloia, Triodia (pungens)		None	Intact	None	Negligible	Good
LT-5	96	Lateritic sandplain	Flat	Lateritic sands, crusting, low gravel	Open Eucalyptus pruinosa, sparse shrubs (Acacia lysiphloia), spinifex grassland		None	Intact	None	Negligible	Good

LAND TYPE DATA											
Land type	**Site**	**Landform**	**Slope**	**Soil**	**Vegetation**	**Comment**	**Weeds**	**Vegetation condition**	**Erosion status**	**Cattle impacts**	**Land Condition**
LT-5	100	Lateritic sandplain	Flat	Sandy red earths, some surface laterine gravel (fine)	Open Eucalyptus pruinosa, stunted Bloodwood over spinifex. Acacia lysiphloia scattered		None	Intact	None	Negligible	Good
LT-5	101	Lateritic sandplain	Flat	Sandy red earths, some surface laterine gravel (fine)	Open Eucalyptus pruinosa, stunted Bloodwood over spinifex. Acacia lysiphloia patches		None	Intact	None	Negligible	Good
LT-5	102	Lateritic sandplain	Flat	Sandy red earths, surface laterine gravel (fine)	Open small trees (Bloodwood, A. hemignosta, E. pruinosa) over spinifex and tussocks		None	Intact	None	Negligible	Good
LT-5	103	Lateritic plain	Flat	Lateritic sands, fine gravel	Open Eucalyptus pruinosa, scattered Acacia lysiphloia, patchy spinifex and tussocks		None	Intact	None	Negligible	Good
LT-5	104	Lateritic plain	Flat	Lateritic sands, fine gravel	Open Eucalyptus pruinosa, scattered Acacia lysiphloia, Acacia sericophylla, patchy spinifex and tussocks		None	Intact	None	Negligible	Good
LT-5	105	Lateritic plain	Flat	Lateritic sands, fine gravel	Open Eucalyptus pruinosa, scattered Acacia lysiphloia, A stipuligera; patchy spinifex and tussocks		None	Intact	None	Negligible	Good
LT-5	106	Lateritic plain	Flat	Red sandy loam / earth	Acacia lysiphloia patch; Acacia stipuligera; spinifex		None	Intact	None	Negligible	Good
LT-5	107	Lateritic plain	Flat	Red sandy loam / earth	Acacia lysiphloia patch; E. pruinosa; spinifex		None	Intact	None	Negligible	Good
LT-5	202	Lateritic plain	Flat	Lateritic sands, fine gravel	Scattered Corymbia and E. pruinosa; scattered A. lysiphloia; spinifex grassland		None	Intact	None	None	Good
LT-5	203	Lateritic plain	Flat	Lateritic sands, fine gravel	Scattered E. pruinosa; sparse shrubs; open spinifex	Proposed camp location	None	Intact	None	None	Good
LT-5	204	Lateritic plain	Flat	Lateritic sands, fine gravel	Scattered E. pruinosa; sparse shrubs; open spinifex		None	Intact	None	None	Good
LT-5	205	Lateritic plain	Flat	Lateritic sands, fine gravel	Scattered E. pruinosa; sparse shrubs; open spinifex		None	Intact	None	None	Good
LT-6	17	Drainage area	Gentle	Heavy clayey soils; cracking in parts	Tussock grassland (Chrysopogon, Fimbristylis, Eulalia, Eragrostis, Phyllanthus, Nardoo, Heliotropium)	No banks present, Gilgai present on southern side	None	Intact	None	Negligible	Good
LT-6	18	Drainage area	Gentle	Heavy clayey soils; cracking in parts	Silver Box, Cory opaca, Aca holathera, Terminalia, Hakea arb, Cory flavescens, Bauhinia cunninghamii, Atalaya hemiglauca, Carissa lanceolata, Ehretia saligna	No banks present, Gilgai present on southern side; considered as low significance riparian vegetation	None	Intact	None	Negligible	Good
LT-6	21	Drainage area	Gentle	Sandy loam; heavier (clayey) subsurface	Corymbia, Supplejack, Vachellia farnesiana, Carissa lanceolata, Ac sericophylla, Coolabah; over tussocks (Chrysopogon fallax, Aristida hygrometrica)	No banks present; considered as low significance riparian vegetation	None	Intact	None	Negligible	Good
LT-6	55	Drainage area	Gentle	Red earth; loamy; thin surface cracking	Open Corymbia opaca/terminalis, Eucalyptus victrix, Cassytha sp, Owenia reticulata, Wrightia saligna; Grevillea refracta	No banks present; considered as sensitive vegetation (riparian)	None	Intact	None	Negligible	Good
LT-7	26	Alluvial plain	Flat	Brown loam	Melaleuca (fire impacted), Acacia stipuligera, Ac lysiphloia, Cassytha, Spinifex (T. pungens?)	Fire impacted shrubs and trees	None	Intact	None	Negligible	Good

LAND TYPE DATA											
Land type	**Site**	**Landform**	**Slope**	**Soil**	**Vegetation**	**Comment**	**Weeds**	**Vegetation condition**	**Erosion status**	**Cattle impacts**	**Land Condition**
LT-7	27	Alluvial plain	Flat	Grey surface; brown sub-surface; loam; likely clayey at depth	Melaleuca shrubs (nervosum?), Ac elachantha, Triodia sp. (pungens?), Ac hemignosta, Corymbia opaca emergents.		None	Intact	None	Negligible	Good
LT-7	71	Alluvial plain	Flat	Loamy sand	Open Corymbia flavescens, Melaleuca nervosum/viridiflora?, E. pruinosa over spinifex; scattered shrubs		None	Intact	None	Negligible	Good
LT-7	73	Minor depression, low point	Flat	Sandy loam, pale	Open small Melaleuca (small patch); Spinifex (Triodia pungens); Eucalyptus pruinosa (rare); sparse shrubs		None	Intact	None	Negligible	Good
LT-7	132	Drainage area	Flat	Earths; loams	Corymbia flavescens; Corymbia bella; spinifex		None	Intact	None	Negligible	Good
LT-9	62	Gravel plateau	Flat	Gravel surface, shallow sands	Open E. brevifolia, E. odontocarpa, A. acradenia,		None	Intact	None	Negligible	Good
LT-9	116	Laterite plain	Flat	Surface gravel, sandy loam	Open Eucalyptus/Corymbia over spinifex		None	Intact	None	Negligible	Good
LT-9	120	Gravel plateu	Flat	Surface gravel, sandy loam	Open snappy gum; scattered shrubs and Mallee (A. acradenia, E. odontocarpa; spinifex		None	Intact	None	Negligible	Good
LT-9	130	Gravel plateau	Flat, gentle	Laterite gravel; shallow	E. brevifolia, E. chlorophylla, spinifex		None	Intact	None	Negligible	Good
LT-9	131	Lateritic plain	Flat	Gravel surface, shallow sands	E. brevifolia, E. chlorophylla, spinifex		None	Intact	None	Negligible	Good
LT-9	208	Laterite plain / plateau	Flat	Lateritic sands, fine gravel	Open to sparse woodland - burnt	Old fence line - overgrown	None	Altered	None	None	Average
LT-9	209	Laterite plain / plateau	Flat	Lateritic sands, fine gravel	Open E. brevifolia; scattered A. lysiphloia; spinifex	Old road - mostly overgrown with A. lysiphloia	None	Altered	None	None	Average
LT-9	210	Gravel plateau	Flat	Lateritic sands, fine gravel	Open E. brevifolia; scattered A. lysiphloia; spinifex	Fence line track - good condition	None	Altered	None	None	Average
LT-10	63	Scarp	Very steep	Gravel surface, shallow sands	E. brevifolia,; spinifex; Senna glutinosa; A. acradenia		None	Intact	None	Negligible	Good
LT-10	119	Scarp	Steep	Gravel surface, shallow sands	Spinifex grassland; E. brevifolia		None	Intact	None	Negligible	Good
LT-10	121	Scarp	Steep	Surface gravel, sandy loam	Spinifex grassland; E. brevifolia		None	Intact	None	Negligible	Good
LT-10	122	Scarp	Steep	Laterite gravel; shallow	Spinifex grassland; E. brevifolia; Acacia on plateau (likely A. acradenia); E. odontocarpa.		None	Intact	None	Negligible	Good
LT-10	123	Scarp	Steep	Laterite gravel; shallow	Spinifex grassland; E. brevifolia; Acacia on plateau (likely A. acradenia)		None	Intact	None	Negligible	Good
LT-11	64	Undulating rises	Gentle	gravel, rock	Open veg, patches of spinifex, tussocks		None	Intact	None	Negligible	Good

LAND TYPE DATA											
Land type	**Site**	**Landform**	**Slope**	**Soil**	**Vegetation**	**Comment**	**Weeds**	**Vegetation condition**	**Erosion status**	**Cattle impacts**	**Land Condition**
LT-11	118	Undulating gravel rises	Low	Gravel surface; Moderately deep red earths	Scattered trees, tussocks		None	Intact	None	Negligible	Good
LT-11	124	Undulating gravel rises	Low	Gravel surface; Moderately deep red earths	Scattered trees, tussocks		None	Intact	None	Negligible	Good
LT-11	129	Undulating gravel rises	Low	Gravel surface; Moderately deep red earths	Scattered trees, spinifex		None	Intact	None	Negligible	Good
LT-12	68	Undulating laterite gravel plain	Gentle	Gravel surface; Moderately deep red earths	Spinifex grassland, A. lysiphloia; scattered Corymbia terminalis		None	Intact	None	Negligible	Good
LT-12	69	Drainage - minor within laterite plain	Gentle	Gravel surface; Moderately deep red earths	Chrysopogon fallax and Carissa lanceolata		None	Intact	None	Negligible	Good
LT-12	70	Undulating laterite gravel plain	Gentle	Gravel surface; Moderately deep red earths	A. lysiphloia patch; spinifex grassland; scattered Corymbia terminalis		None	Intact	None	Negligible	Good
LT-12	126	Undulating laterite gravel plain	Low	Gravel surface; Moderately deep red earths	Scattered trees, tussocks in drainages, patchy spinifex on rises		None	Intact	None	Negligible	Good
LT-12	127	Drainage - mod	Low	Gravel surface; Moderately deep red earths	Eucalyptus tectifica, C. terminalis; tussock grass (C. fallax); Terminalia arostrata, G. striata, A. sericophylla	Sensitive vegetation (riparian)	None	Intact	None	Negligible	Good
LT-12	211	Undulating laterite gravel plain	Low	Gravel surface; Moderately deep red earths	Scattered trees, tussocks in drainages, patchy spinifex on rises	Old track - overgrown with grass	None	Altered	None	None	Average
LT-13	125	Drainage - mod	Low	Alluvial sands	Open woodland; E. tectifica; E. brevifolia, C. terminalis	Sensitive vegetation (riparian)	None	Intact	None	Negligible	Good
LT-13	128	Black soil plain	Flat, gentle	Cracking black clays	Tussock grassland; isolated trees		None	Intact	None	Negligible	Good
LT-14	65	Drainage - minor	Gentle	Lateritic gravel and soils	Tussock grasses (C. fallax) and shrubs; Carissa lanceolata and Rubber bush. linked to Sambo Creek.		Rubber Bush	Intact	Minor	Negligible	Average
LT-14	66	Drainage - minor	Gentle	Lateritic gravel and soils	Bauhinia cunninghamii, Terminalia platyphylla, Grevillea striata, Hakea arborescens over tussocks (C. fallax); Vachellia farnesiana	Sensitive vegetation (riparian)	None	Intact	None	Negligible	Good
LT-14	67	Drainage - creek	Gentle	Alluvial; coarse river sand; clayey loam on banks	E. camaldulensis, Lophostemon grandiflorus, Terminalis platyphylla, Corymbia bella, Eucalyptus microtheca, Corymbia terminalis, Bauhinia cunninghamii; Excoecaria parviflora; Carissa lanceolata	Sensitive vegetation (riparian)	None	Intact	None	Negligible	Good

APPENDIX E FIELD DATA – GREATER BILBY BURROW DATASET

Site	Line	Burrow ID	Easting	Northing	Site type	Category	Burrow status	Landform	Observations
30	03B	03B-30-1	756156	7978606	Ground check	Likely Bilby	Potentially active	Laterite rise	• Large round burrow present likely from bilby (20cm diameter); • Relatively fresh spoil at burrow entrance; • Burrow positioned amongst spinifex and *Acacia adoxa*; • Diggings in open present, but no RDL diggings or scats observed (as such could not make definite ID); • Burrow may be currently occupied by goanna (claw marks present)
31	03B	03B-31-1	755919	7977819	Ground check	Likely Bilby	Potentially active	Laterite rise	• Large round burrow present likely from bilby (20cm diameter); • Relatively fresh looking spoil at burrow entrance; • Burrow positioned under *Acacia lysiphloia* and spinifex; • No RDL diggings or scats observed (as such could not make definite ID);
31	03B	03B-31-2	755951	7977817	Ground check	Likely Bilby	Not active	Laterite rise	• Large round burrow present likely from bilby (20x30cm); • No fresh spoil at burrow entrance; • Burrow positioned amongst spinifex; • No RDL diggings or scats observed (as such could not make definite ID);
34	03B	03B-34-1	754495	7974194	Aerial check	Potential Bilby	Not active	Lateritic plain / sandplain	• Large burrow, potentially bilby (estimated to be 30x20cm); • Currently inactive due to no fresh spoil at burrow entrance; • Burrow positioned amongst spinifex; • No diggings observed in area (aerial observation only); • Burrow could be Sand Goanna.
40	03B	03B-40-1	755001	7975666	Ground check	Bilby	Active	Lateritic plain / sandplain	• Large round burrow (20x30cm); • Currently active due to fresh spoil, tracks and scats at burrow entrance; • Amongst spinifex and Acacia shrubs; • Numerous RDL diggings present under young *Acacia lysiphloia* in close proximity to burrow; • Numerous scats and tracks observed in close proximity to burrow; • Scat and track sizes indicates at least three individuals currently present, including juvenile and adults.
40	03B	03B-40-2	755038	7975664	Ground check	Bilby	Not active	Lateritic plain / sandplain	• Large burrow (20x30cm) recently backfilled; • Positioned amongst spinifex; • Fresh scats and tracks in spoil at burrow entrance; • RDL diggings in close proximity; • <50m from active burrow (ID 03B-40-1)

Site	Line	Burrow ID	Easting	Northing	Site type	Category	Burrow status	Landform	Observations
40	03B	03B-40-3	754894	7975650	Aerial check	Likely Bilby	Potentially active	Lateritic plain / sandplain	• Large burrow (estimated 20cm diameter) likely to be bilby; • Positioned amongst spinifex and *Acacia lysiphloia*; • Low level of spoil; potentially not active
47	06C	06C-47-1	751201	7980359	Ground check	Bilby	Not active	Laterite rise	• Large old burrow (20x20cm); • No recent activity, presumed inactive; Positioned under *Acacia lysiphloia*; • Numerous diggings and scats in area; • Several other active burrows close-by.
47	06C	06C-47-2	751216	7980321	Ground check	Bilby	Not active	Laterite rise	• Large old burrow (20x20cm); • No recent activity, litter filling entrance, presumed inactive; • Positioned under *Grevillea wickhamii* and spinifex; • Numerous diggings and scats in area; • Several other active burrows close-by.
47	06C	06C-47-3	751239	7980431	Ground check	Bilby	Active	Laterite rise	• Large burrow (20cm diameter) with multiple entrances; • Fresh spoil at entrance, • Potential pop holes; • Positioned under *Acacia stipuligera* and spinifex; • Numerous diggings and scats in area; • Several other active burrows close-by.
47	06C	06C-47-4	751248	7980340	Ground check	Bilby	Active	Laterite rise	• Large burrow (20x20cm); • Established under *Acacia lysiphloia* (Turpentine); • Fresh tracks and scats in spoil at burrow entrance; • Numerous fresh diggings and scats in area; • Other active burrows close-by.
47	06C	06C-47-5	751322	7980365	Ground check	Bilby	Active	Laterite rise	• Large burrow (20x30cm); • Established under spinifex; • Fresh tracks and spoil; • Diggings and scats common in surrounding area; • Other active burrows close-by
47	06C	06C-47-6	751301	7980425	Ground check	Bilby	Active	Laterite rise	• Large burrow (20x30cm), two entrances but only one looks active; • Established under spinifex; • Fresh tracks and spoil; • Diggings and scats common in surrounding area; • Other active burrows in close proximity.

APPENDIX F FIELD DATA – RIPARIAN VEGETATION INTERSECTIONS

Sites in bold italics and with a suffix (*) indicate sites is within an abandoned section of line.

RIPARIAN VEGETATION INTERSECTIONS							
Site	**Easting**	**Northing**	**Survey**	**Line**	**Landform**	**Crossing details**	**Name**
153	550627	8025830	Aerial	01A	Drainage - moderate	Existing road crossing (Buntine Hwy)	Bunda Creek
154	566869	8028141	Aerial	01A	Drainage - moderate	Existing road crossing (Buntine Hwy)	Sturt Creek
155	606730	8045246	Aerial	01A	Drainage - moderate	Existing road crossing (Buntine Hwy)	Stirling creek
157	645250	8057916	Aerial	01A	Drainage - moderate	Existing road crossing (Buntine Hwy)	Burtawurta Creek
75	***702741***	***8063663***	***Ground***	***02A****	***Drainage - moderate***	***Section of line abandoned (moved to main road)***	***Tributary of Gordy Creek***
88	***703119***	***8064669***	***Ground***	***02A****	***Drainage - moderate***	***Section of line abandoned (moved to main road)***	***Tributary of Gordy Creek***
89	***703399***	***8066065***	***Ground***	***02A****	***Drainage - moderate***	***Section of line abandoned (moved to main road)***	***Tributary of Gordy Creek***
158	703258	8054178	Aerial	02A	Drainage - moderate	Existing road crossing (Lajamanu Rd)	Tributary of Gordy Creek
160	701703	8059612	Aerial	02A	Drainage - moderate	Existing road crossing (Lajamanu Rd)	Tributary of Gordy Creek
162	705427	8068376	Aerial	02A	Drainage - moderate	Existing road crossing (Buntine Hwy)	5-mile creek
163	705716	8071019	Aerial	02A	Drainage - moderate	Existing road crossing (Buntine Hwy)	5-mile creek
164	712074	8078596	Aerial	02A	Drainage - moderate	Existing road crossing (Buntine Hwy)	Croker Creek
165	713844	8079810	Aerial	02A	Drainage - moderate	Existing road crossing (Buntine Hwy)	Tributary of Croker Creek
166	716676	8082020	Aerial	02A	Drainage - moderate	Existing road crossing (Buntine Hwy)	Tributary of Victoria River
167	717923	8083017	Aerial	02A	Drainage - moderate	Existing road crossing (Buntine Hwy)	Tributary of Victoria River
213	721569	8085140	Aerial	02A	Drainage - minor	Existing road crossing (Buntine Hwy)	Tributary of Kelly Creek
214	722953	8087625	Aerial	02A	Drainage - moderate	Existing road crossing (Buntine Hwy)	Kelly Creek
18	778145	8047281	Ground	03B	Indistinct drainage	Requires crossing; no banks present, Gilgai present on southern side; avoid Gilgai and minimise disturbance of vegetation and soils via suitable route selection	Flood out drainage area of Cattle creek
21	771085	8025419	Ground	03B	Indistinct drainage	Requires crossing to be established; no banks present, minimise disturbance of vegetation and soils via suitable route selection	NA
135	***601266***	***8057383***	***Aerial***	***06A****	***Drainage - major***	***Line abandoned (moved to tracks)***	***Stirling Creek***
136	***622173***	***8046510***	***Aerial***	***06A****	***Drainage - moderate***	***Line abandoned (moved to tracks)***	***Tributary of Gum Creek***
137	***622613***	***8046341***	***Aerial***	***06A****	***Drainage - major***	***Line abandoned (moved to tracks)***	***Gum Creek***
138	***623790***	***8045701***	***Aerial***	***06A****	***Drainage - moderate***	***Line abandoned (moved to tracks)***	***Tributary of Gum Creek***
139	***624749***	***8045241***	***Aerial***	***06A****	***Drainage - major***	***Line abandoned (moved to tracks)***	***Gum Creek***
140	***625072***	***8045004***	***Aerial***	***06A****	***Drainage - major***	***Line abandoned (moved to tracks)***	***Gum Creek***
142	***631508***	***8041650***	***Aerial***	***06A****	***Drainage - moderate***	***Line abandoned (moved to tracks)***	***Tributary of Gum Creek***
143	***633677***	***8040541***	***Aerial***	***06A****	***Drainage - moderate***	***Line abandoned (moved to tracks)***	***Tributary of Gum Creek***
144	***633976***	***8040370***	***Aerial***	***06A****	***Drainage - major***	***Line abandoned (moved to tracks)***	***Gum Creek***

RIPARIAN VEGETATION INTERSECTIONS							
Site	**Easting**	**Northing**	**Survey**	**Line**	**Landform**	**Crossing details**	**Name**
145	***634398***	***8040238***	***Aerial***	***06A****	***Drainage - moderate***	***Line abandoned (moved to tracks)***	***Tributary of Gum Creek***
146	***638790***	***8037862***	***Aerial***	***06A****	***Drainage - major***	***Line abandoned (moved to tracks)***	***Gum Creek***
147	***638810***	***8038016***	***Aerial***	***06A****	***Drainage - major***	***Line abandoned (moved to tracks)***	***Tributary of Gum Creek***
168	601506	8058514	Imagery	06A	Drainage - moderate	Existing road crossing (station track)	Tributary of Stirling creek
169	604894	8057326	Imagery	06A	Drainage - moderate	Existing road crossing (station track)	Tributary of Stirling creek
172	618965	8045319	Imagery	06A	Drainage - major	Existing road crossing (station track)	Gum Creek
175	621918	8041956	Imagery	06A	Drainage - moderate	Existing road crossing (station track)	Tributary of Gum Creek
176	622299	8040645	Imagery	06A	Drainage - moderate	Existing road crossing (station track)	Tributary of Gum Creek
178	624868	8037635	Imagery	06A	Drainage - moderate	Existing road crossing (station track)	Tributary of Gum Creek
179	628440	8033355	Imagery	06A	Drainage - mod	Existing road crossing (station track)	Tributary of Victoria River
181	634411	8028146	Imagery	06A	Drainage - moderate	Existing road crossing (station track)	Victoria River
186	645151	8023782	Imagery	06A	Drainage - major	Existing road crossing (station track)	Victoria River
55	739392	7986428	Ground	06C	Indistinct drainage	Requires crossing to be established; no banks present, minimise disturbance of vegetation and soils via suitable route selection	Flood out drainage area of Hooker creek
66	***679284***	***8017427***	***Ground***	***06C****	***Drainage - minor***	***Section of line abandoned***	***Tributary of Sambo Creek***
67	***679028***	***8017542***	***Ground***	***06C****	***Drainage - moderate***	***Section of line abandoned***	***Sambo Creek***
125	***678349***	***8017924***	***Aerial***	***06C****	***Drainage - moderate***	***Section of line abandoned***	***Tributary of Sambo Creek***
127	***676668***	***8018822***	***Ground***	***06C****	***Drainage - moderate***	***Section of line abandoned***	***Tributary of Sambo Creek***

APPENDIX G FIELD DATA – WEED RECORDS

Scientific name	Common name	Latitude	Longitude	Site description	Density	Seeding
Cenchrus ciliaris	Buffel Grass	-17.49476944	130.9131167	Creek	Low	Yes
Cenchrus ciliaris	Buffel Grass	-17.50414444	130.9096667	Creek	Moderate	Yes
Cenchrus ciliaris	Buffel Grass	-17.48231667	130.9154972	Creek, and adjacent plain	High	Yes
Senna alata	Candle Bush	-17.93813056	130.7252667	Minor drainage	Very low	Yes
Senna alata	Candle Bush	-17.55919722	129.9373472	Minor drainage	Very low	Yes
Aerva javanica	Kapok Bush	-17.58214094	130.9105092	Minor drainage	Low	Likely
Aerva javanica	Kapok Bush	-17.54070818	130.9008674	Creek	Low	Yes
Aerva javanica	Kapok Bush	-17.51530072	130.9014072	Plain, old track	Low	Yes
Aerva javanica	Kapok Bush	-17.48593611	130.9152833	Plain, old station track, close to drainage	Very low	Yes
Aerva javanica	Kapok Bush	-17.46125557	130.9344486	Creek, Buntine Hwy, road culvert	Low	Yes
Aerva javanica	Kapok Bush	-17.33663441	131.0392607	Creek, roadside, Buntine Hwy	Low	Yes
Parkinsonia aculeata	Parkinsonia	-17.78493600	130.3966340	Minor drainage	Very low	Yes
Parkinsonia aculeata	Parkinsonia	-17.77860575	130.3843556	Minor drainage	Very low	Yes
Calotropis procera	Rubber Bush	-17.92438056	130.6929944	Minor drainage	Very low	Yes
Calotropis procera	Rubber Bush	-17.58506561	130.9125696	Plain	Low	Likely
Calotropis procera	Rubber Bush	-17.58210807	130.9106174	Minor drainage	Low	Likely
Calotropis procera	Rubber Bush	-17.55799000	130.9001300	Creek	Very low	Likely
Calotropis procera	Rubber Bush	-17.54127000	130.9000800	Creek	Very low	Likely
Calotropis procera	Rubber Bush	-17.51346566	130.9050939	Dam	High	Yes
Calotropis procera	Rubber Bush	-17.51324444	130.9031361	Plain, old track	Low	Yes
Calotropis procera	Rubber Bush	-17.51819270	130.8989671	Plain, old track	Very low	Likely
Calotropis procera	Rubber Bush	-17.50836914	130.9071259	Plain, old track	Very low	Likely
Calotropis procera	Rubber Bush	-17.50376800	130.9098740	Creek	Very low	Likely
Calotropis procera	Rubber Bush	-17.55915637	129.9375224	Minor drainage	Very low	Yes
Calotropis procera	Rubber Bush	-17.49495700	130.9130340	Creek	Moderate	Yes
Calotropis procera	Rubber Bush	-17.49342487	130.9136900	Old track, close to drainage	Very low	Likely
Calotropis procera	Rubber Bush	-17.49061057	130.9146507	Plain, old station track	Very low	Likely
Calotropis procera	Rubber Bush	-17.48836389	130.9150389	Plain, old station track	Low	Yes
Calotropis procera	Rubber Bush	-17.47930963	130.9165369	Plain, old station track	Low	Likely
Calotropis procera	Rubber Bush	-17.48092568	130.9158763	Plain, old station track	Low	Likely
Calotropis procera	Rubber Bush	-17.47832889	130.9170839	Plain, old station track	Very low	Likely
Calotropis procera	Rubber Bush	-17.47717923	130.9177950	Plain, old station track	Very low	Likely
Calotropis procera	Rubber Bush	-17.47523205	130.9189402	Plain, old station track	Low	Likely
Calotropis procera	Rubber Bush	-17.47394264	130.9197442	Plain, old station track	Low	Likely
Calotropis procera	Rubber Bush	-17.47147500	130.9206556	Plain, old station track, old ute	Very low	Likely
Calotropis procera	Rubber Bush	-17.47065833	130.9216917	Plain, old station track	Very low	Likely
Calotropis procera	Rubber Bush	-17.46008765	130.9361495	Roadside, Buntine Highway	Low	Likely
Calotropis procera	Rubber Bush	-17.45821111	130.9375306	Roadside, Buntine Highway	Moderate	Likely
Calotropis procera	Rubber Bush	-17.45255833	130.9380028	Roadside, Buntine Highway	Low	Likely
Calotropis procera	Rubber Bush	-17.41241061	130.9444846	Roadside, Buntine Highway	Low	Likely
Calotropis procera	Rubber Bush	-17.40630925	130.9465315	Roadside, Buntine Highway	Low	Likely
Calotropis procera	Rubber Bush	-17.40488879	130.9482460	Roadside, Buntine Highway	Low	Likely
Calotropis procera	Rubber Bush	-17.38755278	130.9636083	Roadside, drainage, Buntine Highway	Low	Likely
Calotropis procera	Rubber Bush	-17.38278947	130.9727736	Roadside, Buntine Highway	Low	Likely

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