

APPENDIX A

Land Condition Assessment (AECOM, 2025)

27.05.2024 12:46

Land Condition Assessment

Shenandoah South Sand Wash Plant Area, Exploration Permit 117

14-Apr-2025
Beetaloo Joint Venture Exploration Project

Land Condition Assessment

Shenandoah South Sand Wash Plant Area, Exploration Permit 117

Client: Tamboran B2 Pty Ltd

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Job No.: 60623736

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Quality Information

Document Land Condition Assessment
Ref 60623736
Date 14-Apr-2025
Originator Cassie Glover
Verifier/s Mez Clunies-Ross

Revision History

Rev	Revision Date	Details	Approved	
			Name/Position	Signature
A	11-Jul-2024	Draft report for client	William Riddell Principal Environmental Scientist	
0	14-Apr-2025	Final report following client review	William Riddell Principal Environmental Scientist	

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Table of Acronyms

Acronym	Meaning
°C	Degrees Celsius
%	Percentage
AEP	Annual Exceedance Probability
BOM	Bureau of Meteorology
CLA	Cambrian Limestone Aquifer
cm	Centimetre
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEPWS	Department of Environment, Parks and Water Security (NT)
E&A	Exploration and Appraisal
EP##	Exploration Permit (e.g., EP76, EP98 and EP117)
EMP	Environmental Management Plan
EPBC Act	Environmental Protection and Biodiversity Conservation Act
GDE	Groundwater dependent ecosystem
GPS	Global Positioning Device
ha	hectare
IBA	Important Bird Area
IBRA	The Interim Biogeographic Regionalisation of Australia
IECA	International Erosion Control Association
km	Kilometre
km ²	Square kilometre
LCA	Land Condition Assessment
L/s	Litres per second
m	metre
m AHD	Metres above Australian Height Datum
Ma	Million years ago
ML/year	Megalitre per year
MNES	Matters of National Environmental Significance
mm	millimetre
NAFI	North Australian Fire Information
Nov	November
NR Maps	Natural Resource Maps
NT	Northern Territory
PMST	Protected Matters Search Tool
PPL	Perpetual Pastoral Lease
SREBA	Strategic Regional Environmental and Baseline Assessment
sp.	unspecified species (e.g <i>Corymbia</i> sp. = unspecified species of the <i>Corymbia</i> genus)

Acronym	Meaning
spp.	Several species (unspecified species of genus)
SWP	Sand wash plant
TPWC Act	Territory Parks and Wildlife Conservation Act
WoNS	Weed of National Significance

1.0 Introduction

1.1 Purpose of this Report

AECOM Australia Pty Ltd (AECOM) completed a Land Condition Assessment (LCA) for Tamboran B2 Pty Ltd (Tamboran) associated with the proposed exploration areas located within Exploration Permit 117 (EP 117) in the Beetaloo Sub-basin, Northern Territory (NT).

Tamboran is proposing to construct a sand wash plant to provide clean proppant for use during the hydraulic fracture stimulation of exploration and appraisal (E&A) wells.

The aim of this LCA is to identify and document site conditions for the proposed Shenandoah South Sand Wash Plant (SWP) within EP 117 that lies within the Beetaloo Sub-basin. The LCA will inform the environmental risk assessment for planned activities at the site.

1.2 Project Boundary

The area assessed under this LCA occurs on the Shenandoah Perpetual Pastoral Lease (PPL) within Tamboran EP 117 (Figure 1). The proposed SWP site is accessed via the existing Kyalla turn-in located off the Stuart Highway and along the existing access track prepared. The location of the SWP area is presented in Figure 2.

1.3 Proposed Activities

Tamboran is proposing to build a sand wash plant (SWP) west of, and adjacent to, the existing Kyalla 117 N2 well site on EP 117. The SWP will process locally sourced sand of a suitable quality for use in the completion of Tamboran's petroleum E&A wells.

1.4 Scope of Works

This report describes the physical and biological environment of the proposed SWP area. The scope of work for the LCA involved:

- A review of historical data and reports prepared during the previous Beetaloo onshore oil and gas exploration programs, particularly from recent LCA surveys undertaken in the Kyalla 117 N2 area in March 2023 and May 2024. Noting that the Kyalla 117 N2 area is immediately adjacent to the proposed SWP site.
- Database searches of the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters database at 10 km and 50 km buffer (December 2024).
- A review of NT Department of Environment, Parks and Water Security (DEPWS) Natural Resource Maps Database (flora and fauna Atlas database).
- A review of the more recently published Strategic Regional Environmental and Baseline Assessment for the Beetaloo Sub-basin (SREBA) data set (Northern Territory Government).
- The preparation of this LCA report.

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GEOCENTRIC DATUM OF AUSTRALIA 94

0 12.5 25 50
Kilometres

- Sand wash plant indicative location
- Highway
- Permit Areas

LOCATION



Data sources:
Permit Area, Cadastre - NT Gov 2019.
Places, Vegetation - Aust Gov 2019
Highways, Roads, Drainage - StreetPro 2019

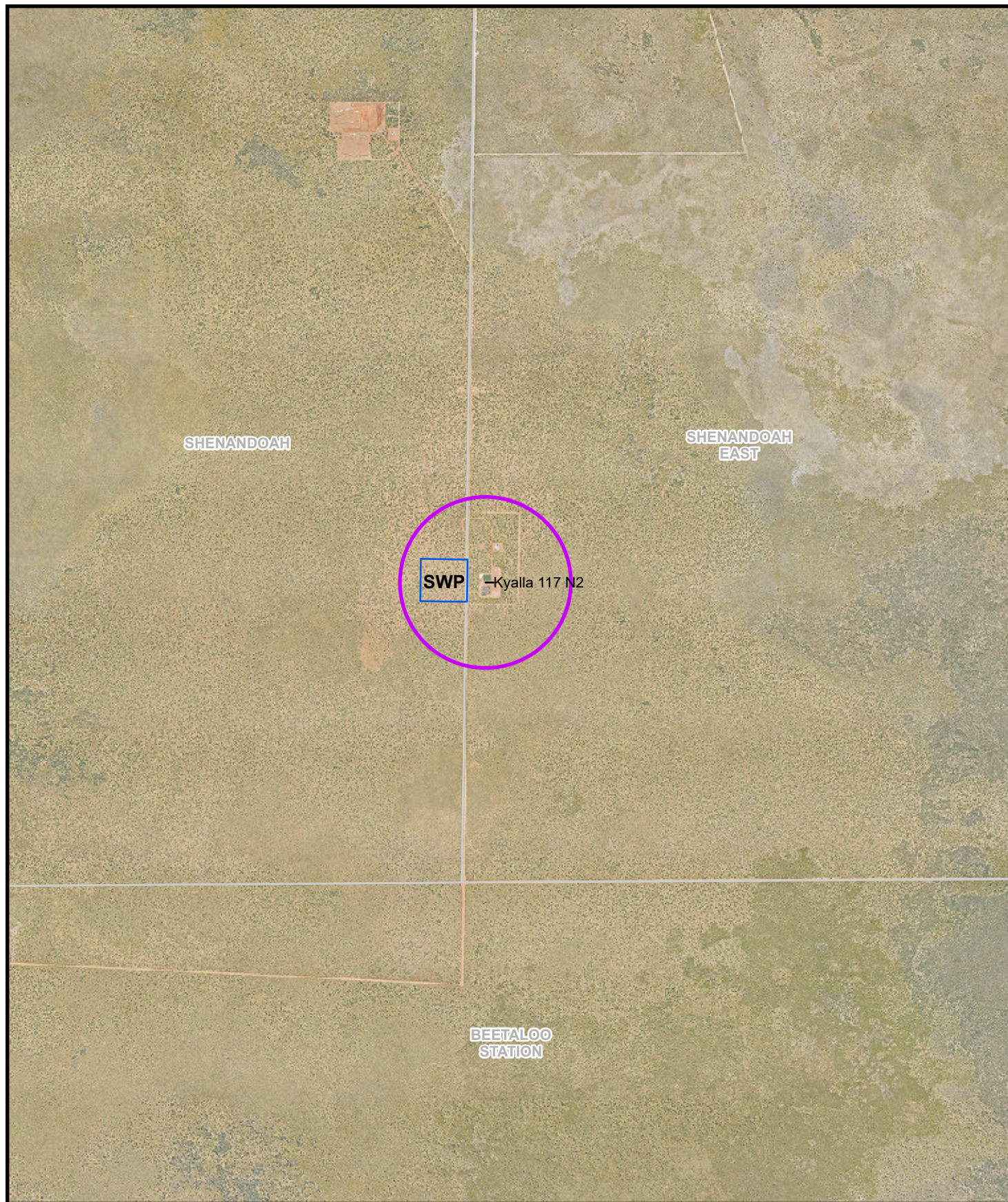
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**Project Location
Wash Plant Area**

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Figure
1

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GEOCENTRIC DATUM OF AUSTRALIA 94

0 250 500 1,000

Metres

-  Scouting Area
-  Sand Wash Plant Area
-  Pastoral Lease Boundary

LOCATION



Data sources:
Permit Area, Cadastre - NT Gov 2019.
Places, Vegetation - Aust Gov 2019
Highways, Roads, Drainage - StreetPro 2019

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Project Area Wash Plant Area

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Figure
2

2.0 Assessment Method

2.1 Desktop Review

The following information was reviewed to for this report:

- Vegetation types and flora and fauna species within the region that potentially occur within the SWP site, using previous reports and aerial/satellite imagery.
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Territory Parks and Wildlife Conservation Act 1976* (TPWC Act) listed threatened species or communities that potentially occur within the vicinity of the SWP site.
- Matters of National Environmental Significance (MNES) or other matters protected by the EPBC Act that potentially occur in the vicinity of the SWP site.
- Weeds or feral animals listed under the EPBC Act or *Weeds Management Act 2001* that potentially occur within the vicinity of the SWP site.

Table 1 provides a chronological list of reports (2004 - 2024), in relation to environmental approvals and management support for petroleum exploration activities in the Beetaloo Sub-basin, NT. The extent of work undertaken since 2004 has provided a baseline of the natural environment, which has been fundamental in assessing the land condition within the vicinity of the SWP site.

Table 1 Summary of Existing Environmental Assessment and Reports for the Beetaloo Sub-basin (2004-2024)

Date	Report
Company: Sweetpea Petroleum	
Jul- Aug 2004	Baseline land condition assessment (LCA)
	Site database established
Jul 2005	Exploration EMP finalised and approved
November 2019 to February 2020	LCA for EP136 (Seismic and Drilling Exploration Program)
Petrohunter Australia (Partner to Sweetpea)	
Dec 2006	Baseline vegetation assessment
Apr 2007	Drill site assessments
Apr 2007	Annual report
Jun 2007	Update of the existing EMP to include the new Exploration Permit areas
Jul 2007	Drill Site maps
Jul 2007	Supplemental Environmental Management Plan, Drilling Program 2007, Beetaloo Basin, NT
Jul 2007	Soil erosion assessment
Jul 2007	Groundwater quality
July 2007	Emergency Maps
Jul 2007	Environment & Heritage Induction Materials
Falcon Oil and Gas	
Dec 2010	Drill site condition assessments
Jan 2011	Archaeological survey
March 2011	Site-specific drilling EMP
2011	Falcon Shenandoah 1 Stimulation and Testing Groundwater Monitoring

Date	Report
2011/2012	Shenandoah 1 Re-Entry Environment Plan (EP)
July 2012	EP99 Archaeological Survey, Beetaloo Basin
2013	EP99 Seismic Exploration Environmental Management Plan
Tamboran B2 Pty Ltd	
2015 and 2016	Beetaloo Basin Environmental and Heritage Assessment and preparation of Approval documentation
October 2018	LCA and Heritage Assessment of proposed lease area (Velkerri 76 S1-1, Velkerri 76 S2-1, Velkerri 117 E1-1, Velkerri 98 N1-2, Kyalla 117 N2-1 and Kyalla 117 W1-2, Kyalla 98 W1-1)
July 2019	Weed Survey of Kyalla 117 N2-1 and access tracks, including Kalala S1 and Amungee NW-1H
November 2019 – September 2022	Wildlife Monitoring Program for Kyalla 117 N2 Lease Pad
December 2019	LCA and Heritage Assessment of EP76, EP117 and EP98
June 2020	Beetaloo Exploration Program Annual Weed Survey Report 2020
September 2021	Land Condition Assessment and weed surveys for Velkerri 76 N1, Amungee NW and Beetaloo W
May 2022	Additional Land Condition Assessment field survey of this specific proposed exploration program
December 2022	Land Condition Assessment field survey in Tamboran B2 Pty Ltd permit area
March - April 2023	Land Condition Assessment specific to the revised Amungee NW-3, Amungee NW-4, Shenandoah South and Shenandoah North well site and seismic areas.
July 2024	Land Condition Assessment – Shenandoah South E&A Program

2.2 SREBA Data Set

AECOM have undertaken a review of the recently published SREBA data and reports which were prepared by the Northern Territory Government specifically for the Beetaloo Sub-basin. The aim of this data set is to inform decisions on the development of any onshore shale gas industry in the region.

The terrestrial, ecosystem baseline data reviewed includes:

- regional vegetation mapping,
- description of regional biogeographic patterns for terrestrial biodiversity,
- spatial distribution models for significant species and communities,
- identification and mapping of areas of high conservation value, and the
- evaluation of the sensitivity of significant species to development.

3.0 Physical Environment

3.1 Climate

The climate of the SWP area can be described as arid to semi-arid, with rainfall decreasing in frequency and quantity from north to south. The climate is monsoon influenced and has a distinctive wet and dry season. The wet season occurs in summer, between October and April and is characterised by hot and wet conditions. The dry season occurs during the winter months between May and September and is characterised by mild days and cool nights. September and April are transitional months, with

occasional rainfall. Approximately 90% of the rainfall occurs during the wet season, and annual totals show moderate variability from year to year.

There is a pronounced north-south rainfall gradient through the region, with mean annual rainfall of ~1200 mm in the north and ~500 mm in the south (DEPWS 2022b). The maximum rainfall for the permit areas occurs in January and February, coinciding with the northern Australian annual monsoon event and average monthly rainfall is very low in the dry season (between May and October) (BOM 2024; DEPWS 2022b). Daly Waters airstrip is on a similar latitude with the northern end of the permit areas and recorded the highest average rainfall in the region at this time, with 167 mm falling in January and 188 mm in February. The May to September period is generally very dry, with average monthly rainfall ranging from 0.3 – 6.2 mm (BOM, 2024). The annual rainfall pattern within the area is highly variable. Drought conditions are known to occur in the region once every 10 years (Holt & Bertram, 1981).

Average maximum and minimum temperatures are higher in the wet season than the dry season, with slightly greater extremes of temperature in the southern part of the region. At Daly Waters, annual monthly maximum temperatures range between 29.0 °C (June) and 38.2 °C (Nov), and minimums between 11.9 °C (Jul) and 24.2 °C (Dec) (DEPWS 2022b).

The average annual rainfall experienced in the region (which includes the BOM data from Daly Waters Airstrip) is shown in Table 2.

Table 2 Annual rainfall 2016 – 2024

Year	Annual rainfall (mm)	Months during which rain was recorded
2016	608	12
2017	866	7
2018	752	7
2019	277	8
2020	951	9
2021	679	7
2022	561	10
2023	762	8
2024*	1302	8

*Rainfall statistics as of December 2024

3.2 Topography, Surface Water and Drainage

The SWP area occurs within a topographic zone classified as laterite plains that predominantly slope in a south and south westerly direction (Tickell, 2003).

The SREBA Beetaloo Wiso Basin Water Management Area mapping reveal that the SWP area is situated in the Wiso River Basin (Figure 3). The Wiso River Basin covers the southern half of EP98 (south of the Carpentaria Highway) and a large proportion of EP117. The Wiso Basin is internally drained by Newcastle Creek and several small ephemeral creeks. Newcastle Creek flows into Lake Woods, which is located south of Newcastle Waters Station, approximately 101 km south of the SWP area.

Lake Woods covers an area of inundation of approximately 50,000 ha in normal rainfall years, extending to 80,000 ha in exceptionally wet years, after which it can retain water for several years (AECOM, 2015). Lake Woods is described as a major quasi-permanent surface water body in the region, although some semi-permanent and many ephemeral waterholes are located across the permit area (HLA, 2006). Lake Woods fills during major flood events of Newcastle Creek and is listed as a wetland of national significance in the Directory of Important Wetlands in Australia (DIWA: NT013 Lake Woods) (NRETAS, 2009). The location of Lake woods and Newcastle Creek is displayed in Figure 4.

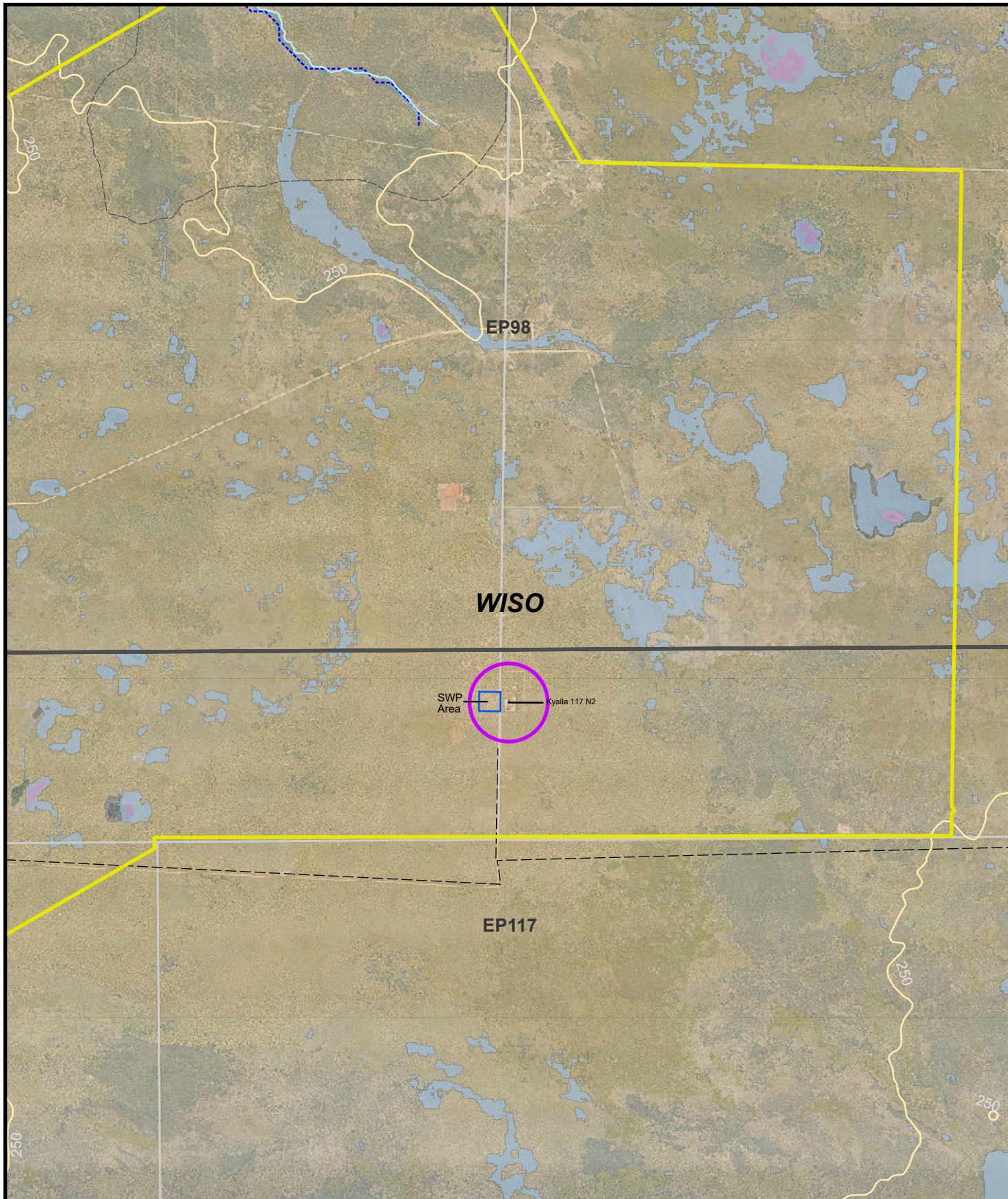
Although Lake Woods is located approximately 100 km south, outside of the exploration permit area, it is principally fed by surface inflow of Newcastle Creek, originating more than 160 km north-east on Amungee Mungie Station. During the period of inundation, Lake Woods supports over 100,000 waterbirds including internationally significant numbers of Plumed Whistling-Duck (*Dendrocygna eytoni*). Numerous bird species nest and feed in the diverse wetland habitat, and the conservation group 'Birdlife International' nominated Lake Woods as an 'Important Bird Area' (IBA). The lake also includes the largest area of lignum swamp in the Northern Territory and in tropical Australia (NRETAS, 2009).

3.2.1 Surface water quality

Water and surface water quality across the Beetaloo study area varies widely due to climate conditions associated with significant rainfall during the wetter months of the year and lower rainfall during drier periods which has the potential to influence surface water quality across the study area. The historical water summary data on Newcastle Creek and Daly Waters from show neutral surface water pH, while spring water shows higher alkaline pH. Salinity varies from fresh to brackish conditions, however, it is greatly reduced during the wet season due to rainfall (Myer, 2023).

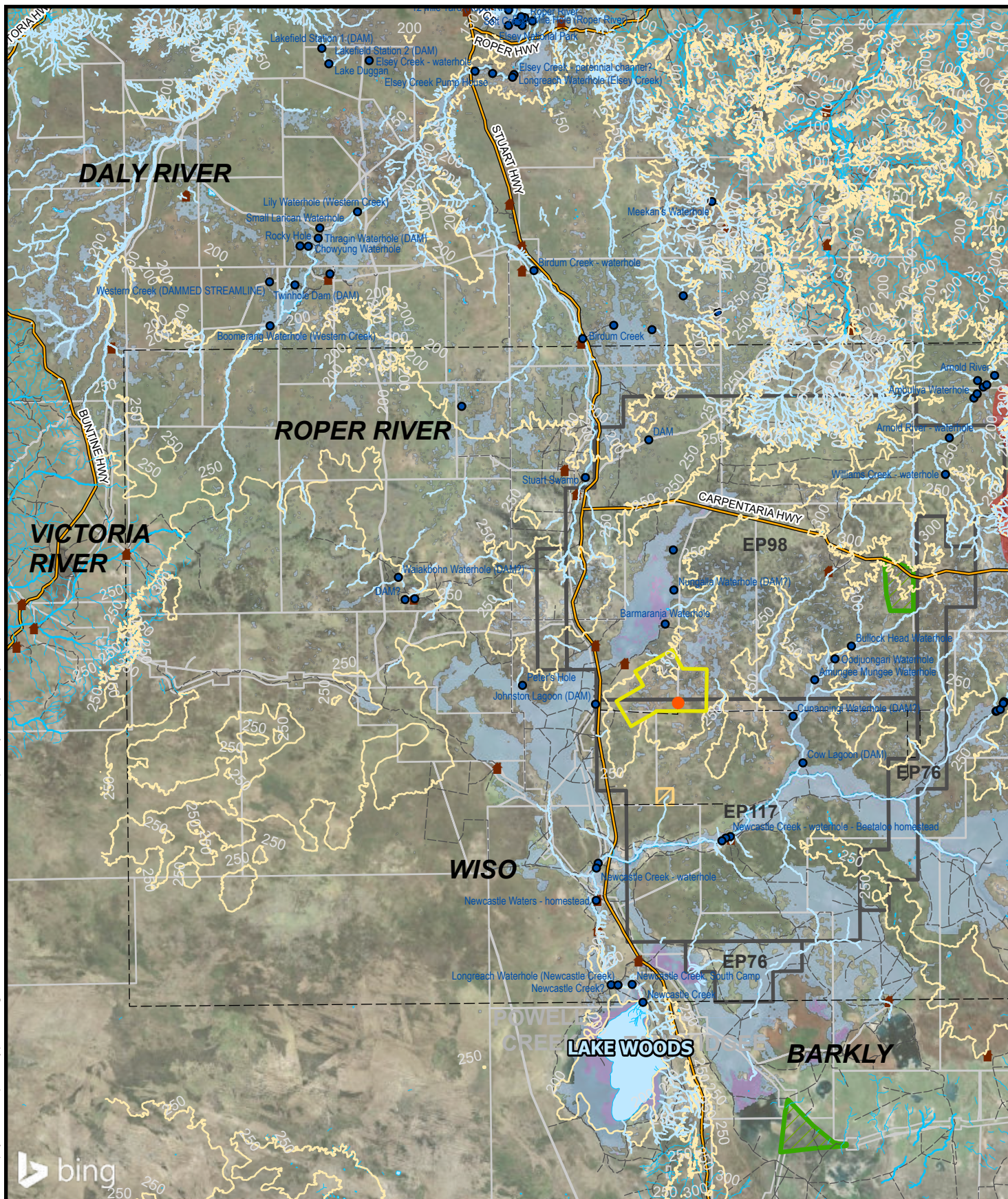
No creeks intersect the proposed SWP site.

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LOCATION  AECOM www.aecom.com  N GEOCENTRIC DATUM OF AUSTRALIA 94 0 0.5 1 2 Kilometres	 Scouting Area  Sand Wash Plant Area  Shenandoah South E&A area  Contours Stream Order  Intermittent Streams 1  Tracks  Permit Areas  Pastoral Lease Boundary  AHGHF Mapped Stream - SREBA Aquatic ecosystem  Palustrine System  Floodplain System Data sources: Permit Area, Cadastre - NT Gov 2019, Places, Vegetation - Aust Gov 2019 Highways, Roads, Drainage - StreetPro 2019	 Surface Water and Drainage Sand Wash Plant Area <table border="1"><tr><td>PROJECT ID</td><td>60623736</td></tr><tr><td>CREATED BY</td><td>sam.schroder</td></tr><tr><td>LAST MODIFIED</td><td>07-Jan-2025</td></tr><tr><td>VERSION</td><td>1</td></tr></table> Figure 3	PROJECT ID	60623736	CREATED BY	sam.schroder	LAST MODIFIED	07-Jan-2025	VERSION	1
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VERSION	1									

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GEOCENTRIC DATUM OF AUSTRALIA 94

0 5 10 20
Kilometres

- SWP indicative location
- Shenandoah South E&A area
- Contours
- Tracks
- Highway
- Permit Areas
- ▨ Aboriginal Land
- ▨ Pastoral Lease Boundary
- Water Bodies

- Bullwaddy Conservation Reserve
- SREBA Beetaloo Aquatic Ecosystems - Refugia points
- AHGHF Mapped Stream - SREBA

Aquatic ecosystem
■ Riverine System
■ Lacustrine System
■ Palustrine System
■ Floodplain System

Data sources: Permit Area, Cadastre - NT Gov 2019, Places, Vegetation - Aust Gov 2019 Highways, Roads, Drainage - StreetPro 2019

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New Castle Waters and Lake Woods Surface Water and Drainage

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Figure
4

3.3 Hydrogeology

The Beetaloo Sub-basin consists of a series of stacked sedimentary basins ranging in age from Mesoproterozoic to Cretaceous with a thin Cenozoic cover (DEPWS 2022c). Beetaloo Sub-basin is characterised by lateritic plains and rises, clay plains, alluvial flood plains, sandstone plains and rises, lateritic plateau and basalt plains and rises. SWP area consists of a thick sequence of sandstone formations and rises that were deposited between 1,500 and 1,430 million years ago (Ma) (Table 3). The sandstone formation is estimated to reach 5,000 m in thickness in the centre of the basin, while the northern and eastern margins have an average depth of approximately 500 m (CloudGMS, 2015).

The sandstone formations are overlain by the Georgina Basin (630 – 497 Ma), which includes widespread basalts and a thick limestone sequence that forms the Cambrian Limestone Aquifer (CLA), which is a significant water supply aquifer in the region. The Georgina Basin is capped by Cretaceous mudstone and sandstone (145 – 66 Ma) and recent alluvial and laterite deposits.

The generalised Hydrostratigraphy of the Beetaloo Sub-basin is presented in Table 3.

Table 3 Summary of Beetaloo Sub-basin Hydrostratigraphy (DEPWS 2022b; CloudGMS 2015)

Province	Period/Age	Formation		Aquifer Status	Thickness (m)	Yield (L/s)	Ave EC (µs/cm)
CARPENTARIA BASIN	CRETACEOUS 145 – 66 Ma	Undifferentiated		Local Aquifer	0 - 130	0.3 - 4	1,800
GEORGINA BASIN	CAMBRIAN 497-630 Ma	Cambrian Limestone Aquifer (CLA)	Anthony Lagoon Beds	REGIONAL AQUIFER	0 – 200	1 - 10	1,600
			Gum Ridge Formation	REGIONAL AQUIFER	0 – 300	0.3 - >20	1,400
		Antrim Plateau Volcanics		REGIONAL AQUITARD	0 – 440	0.3 - 5	900
		Bukalara Sandstone		Local Aquifer (not regionally connected)	0 – 75	0.3 - 5	1,000
BEETALOO BASIN (ROPER GROUP)	NOT KNOWN	Hayfield Mudstone		REGIONAL AQUITARD	0 – 450	-	32,000
		Jamison Sandstone		Local Aquifer (not regionally connected)	0 – 150	-	138,000
	MESO-PROTEROZOIC 1,430-1,500 Ma	Kyalla Formation		REGIONAL AQUITARD	0 – 800	-	-
		Moroak Sandstone		Local Aquifer (not regionally connected)	0 – 500	0.5 - 5	131,000
		Velkerri Formation		REGIONAL AQUITARD	700 – 900	-	-
		Bessie Ck Sandstone		Local Aquifer (not regionally connected)	450	0.5 - 5	-

Across parts of the Beetaloo Sub-basin, undifferentiated Cretaceous deposits form the uppermost aquifer which is utilised for stock use. Notably, a basal sandstone unit immediately overlying the CLA

produces yields of up to 5 L/s. Shallow groundwaters have also been recorded within the permit area between 1 and 2 metres below ground level.

The CLA, comprising the Gum Ridge Formation and the Anthony Lagoon Beds, is an extensive regional aquifer system that forms the principal water resource in the Beetaloo Sub-basin. Limestone in the CLA is commonly fractured and cavernous and regionally bore yields of up to 100 L/s have been recorded from this aquifer. Approximately 80% of groundwater bores drilled in the basin screen the CLA and the aquifer supplies water for the pastoral industry and local communities including Elliott, Daly Waters, Larrimah and Newcastle Waters.

The CLA contains a significant but largely undeveloped groundwater resource with the sustainable yield from the Georgina Basin estimated to be in the order of 100,000 ML/year. Existing groundwater use in the Beetaloo Sub-basin is estimated at 6,000 ML/year.

The regional groundwater flow direction in the CLA is north-west toward Mataranka, where the aquifer discharges into the Roper River and supports significant groundwater dependent ecosystems including the Roper River at Elsey National Park and Red Lily/57 Mile Waterhole. These discharge features occur around 100 km north-west of the Beetaloo Sub-basin. Dry season flow in the Roper River has been gauged at 95,000 – 126,000 ML/year and provides an estimate of the magnitude groundwater discharge from the CLA. Large decadal changes in the discharge to the Roper River suggest that most recharge input occurs close to the discharge zone (i.e. beyond the Beetaloo Sub-basin region). Groundwater recharge mechanisms to the CLA are poorly characterised but are likely to be dominated by infiltration through sinkholes and preferential recharge through soil cavities.

Limited information exists on the hydrogeological characteristics of the Roper Group sequence as it occurs at depth within the Beetaloo Sub-basin. Sandstone dominated formations may behave as aquifers, however, drilling results suggest these formations have limited permeability and will only form marginal, very local scale aquifers. Groundwater in the Roper Group is highly saline and contrasts with the shallower, utilised aquifers in which groundwater is generally of drinking water quality.

The Velkerri Formation represents the primary unconventional gas target in the Beetaloo Sub-basin, although small hydrocarbons intersections have been encountered in other formations within the Roper Group. Vertical pressure gradients between the Roper Group and the CLA are not well characterised, however, previous exploration well formation tests indicate there is an upward pressure gradient from the Roper Group to the CLA. Over much of the basin the CLA is separated from these formations by multiple aquitards including the Antrim Plateau Volcanics and Hayfield Mudstone.

The Tamboran permit area currently falls within the Daly Roper Beetaloo Water Control District, that encompasses 175,580 km² and includes the Roper River and its tributaries as well as the Beetaloo Sub-basin (DENR, 2018). Legislation in Water Control Districts covers all aspects of sustainable water management. Through the NT *Water Act 1992*, water control districts and water allocation plans, allocation of water to various declared beneficial uses, including agriculture, aquaculture, public water supply, riparian and industry while ensuring that adequate provisions are made to maintain cultural and environmental requirements. Water control districts are geographical areas declared under the *Water Act* by the minister to allow for intensive management of water resources. Tamboran have an existing water extraction licence from DEPWS Water Resource Division in accordance with the *Water Act* (Cloud GMS, 2015).

There are 12 groundwater bores located within 12 km of the SWP area. Six of the bores are associated with Tamboran activities at Kyalla 117 NE and the remaining are Stuart Highway Roadside bores or pastoral bores.

3.4 Aquatic systems

There were no surface aquatic ecosystems recorded within the SWP area. The nearest aquatic ecosystem is Johnston Lagoon, located approximately 25 km to the west (SREBA Beetaloo Aquatic Ecosystems – Refugia points meta data set).

3.5 Land systems and units

The SWP lies within the Beetaloo Land System, which is classified as lateritic plains and rises. This land system is characterised by plains and rises associated with deeply weathered profiles (laterite) including sand sheets and other depositional products, sandy and earth soils (DLRM, 2013).

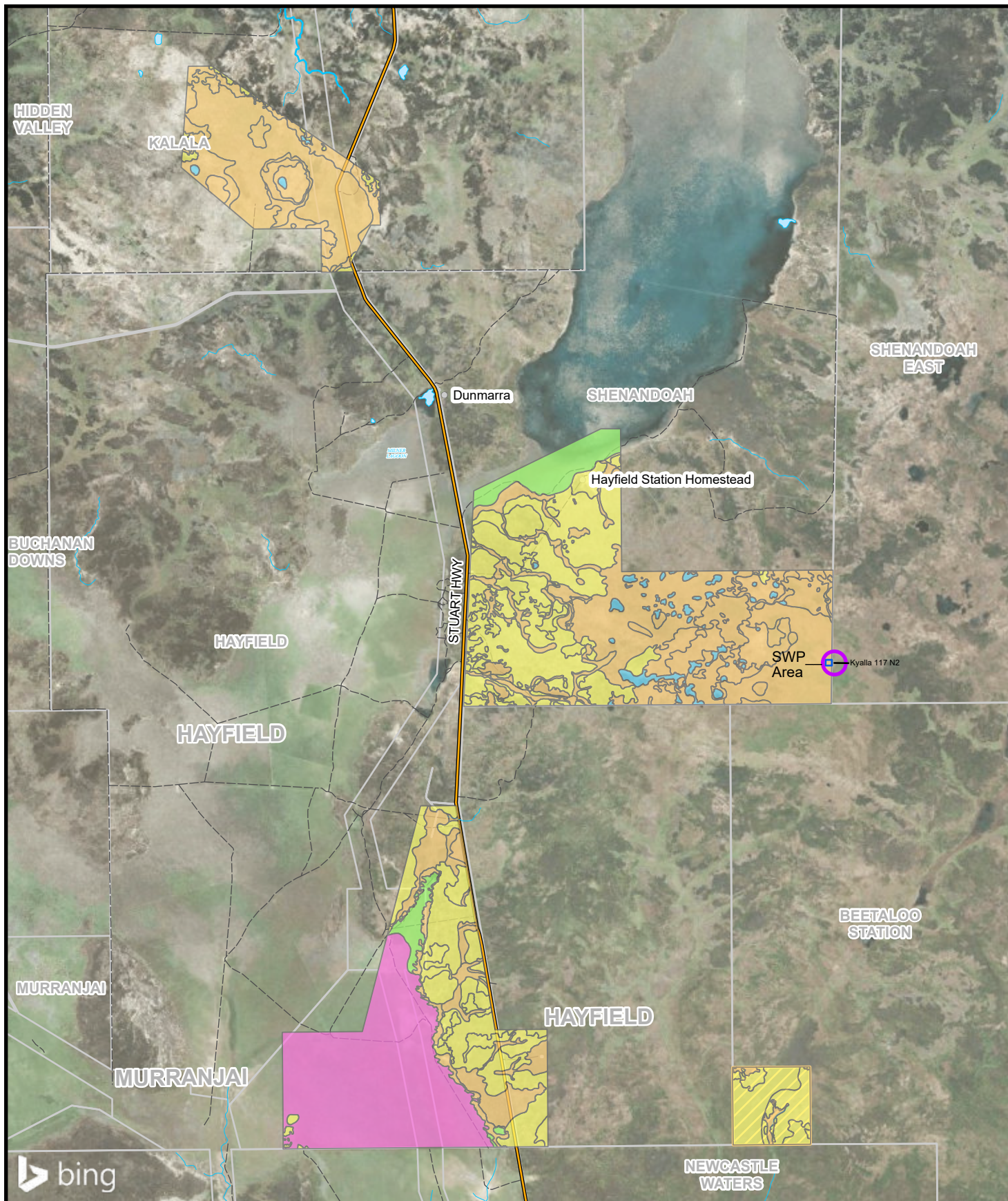
Land units are defined based on a combination of geology, topography, soils and vegetation. Land unit mapping has been undertaken at a scale of 1:50,000 in an area that covers the SWP area, and is derived from *Soil and Land Suitability Assessment for Irrigated Agriculture in the Dunmarra Area* (Burley *et al.*, 2019).

The SWP area is covered by the 8a1 Plains Land Unit, with details summarised below in Table 4, and displayed in Figure 5.

Table 4 Land Unit details (Burley *et al.*, 2019)

Land Unit	Landform Class	Landform Description	Soil Description	Vegetation Description
8a1	Plains	Level plains of residual plateau surface	Very deep (>1.5 m), red massive earths (Red Kandosols)	<i>Corymbia dichromophloia</i> , <i>Erythrophleum chlorostachys</i> , <i>Corymbia ferruginea</i> mid open woodland

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GEOCENTRIC DATUM OF AUSTRALIA 94

0 2.5 5 10

Kilometres

- Sand Wash Plant Area
- Scouting Area
- Populated Place
- Tracks
- Highway
- Water Bodies
- Aboriginal Land
- Pastoral Lease Boundary
- Landform Class**
- Downs Plains
- Inland Wetlands
- Low Rises
- Plains
- Swamps

LOCATION



Data sources:
Permit Area, Cadastre - NT Gov 2019.
Places, Vegetation - Aust Gov 2019
Highways, Roads, Drainage - StreetPro 2019

tamboran
RESOURCES

Wash Plant Area Landforms

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Figure
5

3.6 Soils

Soils within the Sturt Plateau have been derived from ancient rock formations and ancestral soils that were formed during earlier weathering cycles. The soils have been deeply weathered, leached and are relatively infertile because they have not been enriched by any recent geological events (Orr & Holmes, 1984). The soil types located within the plateau range from the very strongly leached lateritic soils of the Tertiary land surface to the calcareous desert soils and desert loams in the southern drier areas.

The lateritic plains and rises, which encompass the SWP area, are classed as very strongly leached soils of the Tertiary land surface (Richards *et al* 2023).

The 8a1 Land Unit that covers SWP comprises very deep (>1.5 m), Red Kandosols (Burley *et al.*, 2019).

3.6.1 Erosion Susceptibility

Soil erosion susceptibility varies throughout the permit area, dependent upon soil types, slope and extent of ground disturbance. Apart from the erosive impact of climatic conditions, soil erosion is influenced mainly by the inherent properties of the soils and the processes which occurred during the formation of the landscapes (Aldrick & Wilson, 1990).

Erosion will occur in the SWP site if the land is used beyond its capacity, as is seen if land is overstocked or vehicle movements not controlled. Factors considered to determine the risk of erosion occurring include the following:

- Soil type – soils with higher clay content are prone to generation of bulldust and are easily eroded by wind and water. The surface soils at sites where a full soil assessment was undertaken had low clay content in the upper 0.2m, usually comprising loamy sands (5-10% clay). Gravelly soils tend to be more robust to disturbance on the scale expected during construction within the SWP area. The sites assessed mostly lacked surface gravels and were generally non-dispersive soils (AECOM, 2024)
- Slope – the slope of the site will determine the risk of erosion during rainfall events, with steeply inclined areas a higher risk than small undulations in the landform. The SWP area comprises plains that are generally flat with slopes of ≤1%. As such the project area has a low erosion risk regarding slope.
- Aspect - the position of the access tracks, well pads, gravel pits and seismic lines in relation to the direction of the contour should be considered and creation of tracks across (as opposed to parallel with) the contour should be avoided.
- Rainfall – Table 5 and Table 6 presents the erosion risk rating based on average monthly rainfall using the rating system provided in the IECA (2008) for Daly Waters Airstrip (located north of the SWP area). Construction activities are planned for completion prior to the wet season, November – March for Daly Waters and December – March for Newcastle Waters, to minimise the risk of erosion resulting from rainfall impacts.

Table 5 Erosion Risk Rating based on average monthly rainfall at Daly Waters Airstrip

Item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	167.3	188.1	110.0	21.0	6.1	2.8	2.7	0.3	2.3	21.3	53.9	116.8
Erosion Risk	H	H	H	VL	VL	VL	VL	VL	VL	VL	M	H

■ = Extreme (>225 mm), ■ = High (100+ to 225 mm); ■ = Moderate (45+ to 100 mm); ■ = Low (30+ to 45 mm); ■ = Very Low (0 to 30 mm) Data sourced from Bureau of Meteorology, Climate Averages for Station 014626 Daly Waters Aerodrome recorded from 1939-2024.

Table 6 Erosion Risk Rating based on average monthly rainfall at Newcastle Waters

Item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	125.0	130.4	82.3	19.0	7.3	4.8	2.7	1.2	4.8	18.2	39.1	75.0
Erosion Risk	H	H	M	VL	VL	VL	VL	VL	VL	VL	L	M

■ = Extreme (>225 mm), ■ = High (100+ to 225 mm); ■ = Moderate (45+ to 100 mm); ■ = Low (30+ to 45 mm); ■ = Very Low (0 to 30 mm) Data sourced from Bureau of Meteorology, Climate Averages for Station 015086 Newcastle Waters recorded from 1889-2024.

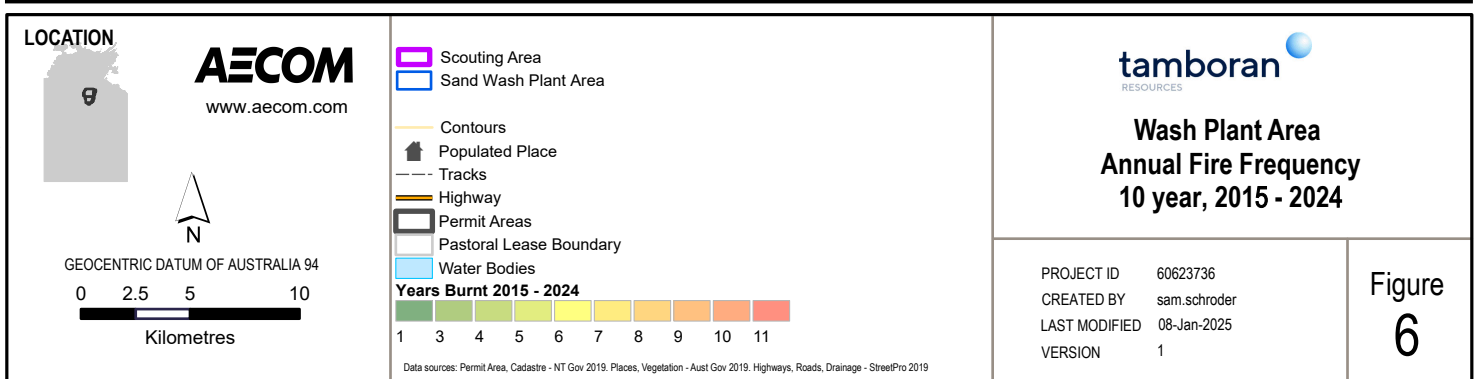
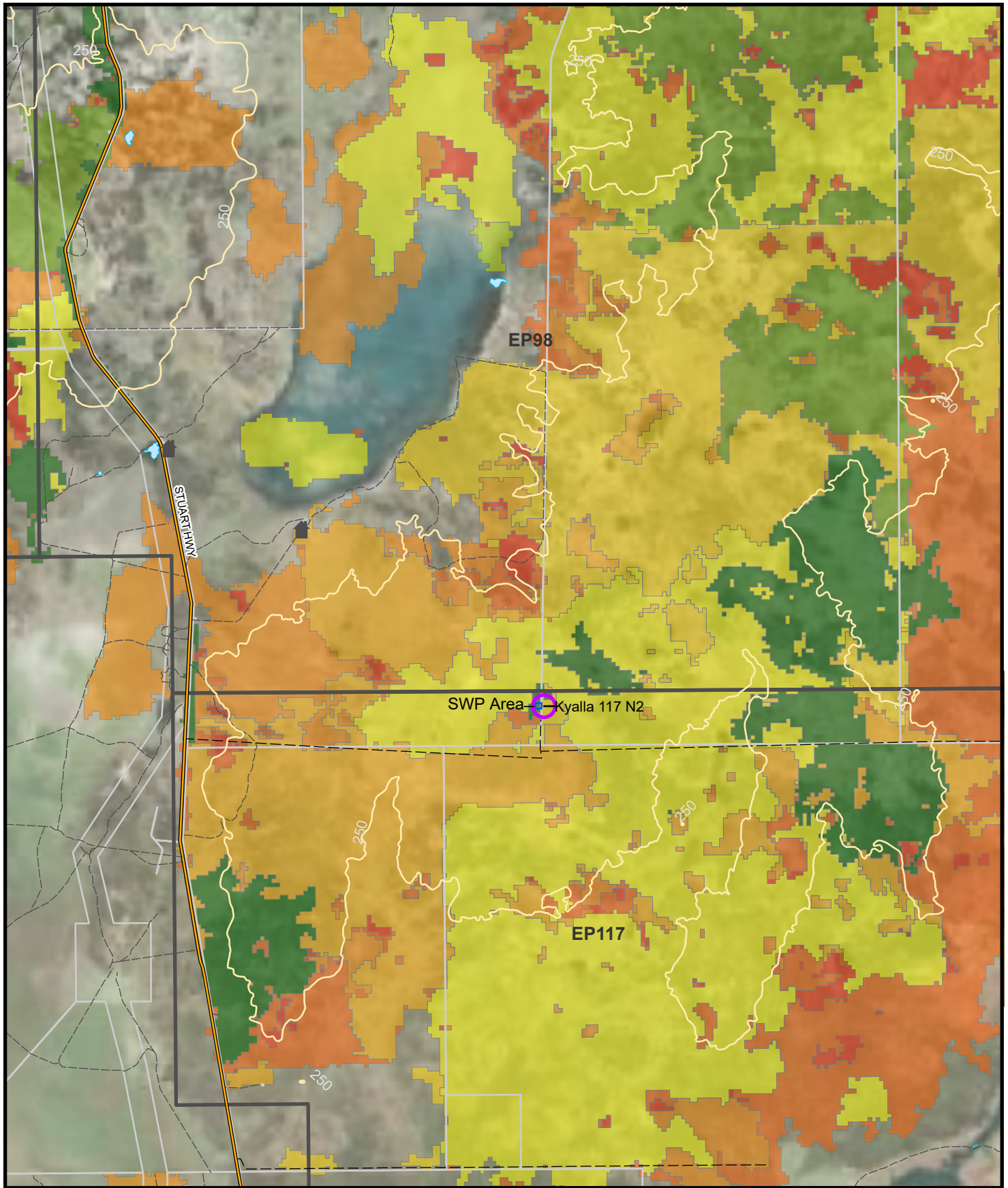
3.7 Bushfire

Fire is a natural occurrence in most Australian ecosystems and plays an important ecological role. Historically, most high intensity fires within the Beetaloo Sub-basin occur during the dry season (June to September) (HLA, 2005). Wet season fires (October to May) occasionally occur and are likely to be patchy and of lower intensity, depending on the fuel load.

Fire data was acquired from the North Australian Fire Information (NAFI) site and queried for the SWP site. NAFI fire data shows that most of the area has been burnt two to three times in the past 10 years, and nine times since 2000.

Figure 6 shows the fire frequency within the exploration areas over the past 10 years (201 to 202).

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3.8 Air quality

The SREBA Beetaloo air quality report (GHD, 2022) reveals that dust at the Bullwaddy, Daly Waters and Elliott monitoring stations is within the adopted objective level (4 g/me/month). Concentrations of nitrous oxide (NO₂), sulfur dioxide (SO₂) and hydrogen sulfide (H₂S) are also below the annual criterion at three monitoring stations, as displayed in Table 7.

Table 7 Summary of air quality data in the Beetaloo Sub-basin (GHD, 2022)

Gas type	Annual criterion	Bullwaddy (80 km NE)*	Daly Waters (70 km NW)*	Elliott (80 km SW)*
NO ₂ (October to November 2022)	31 (µg/m3)	2	2	3.4
SO ₂ (October to November 2022)	57(µg/m3)	0.6-1	0.3-2	1
H ₂ S (October to November 2022)	0.5 µg/sample	Below the detectable limit		
Volatile Organic Compounds (VOC) (October to November 2022)	Below the detectable limit for various organic compounds			
Dust (October 2022)	4 g/m ² /month	1.0 0	0.40	0.70

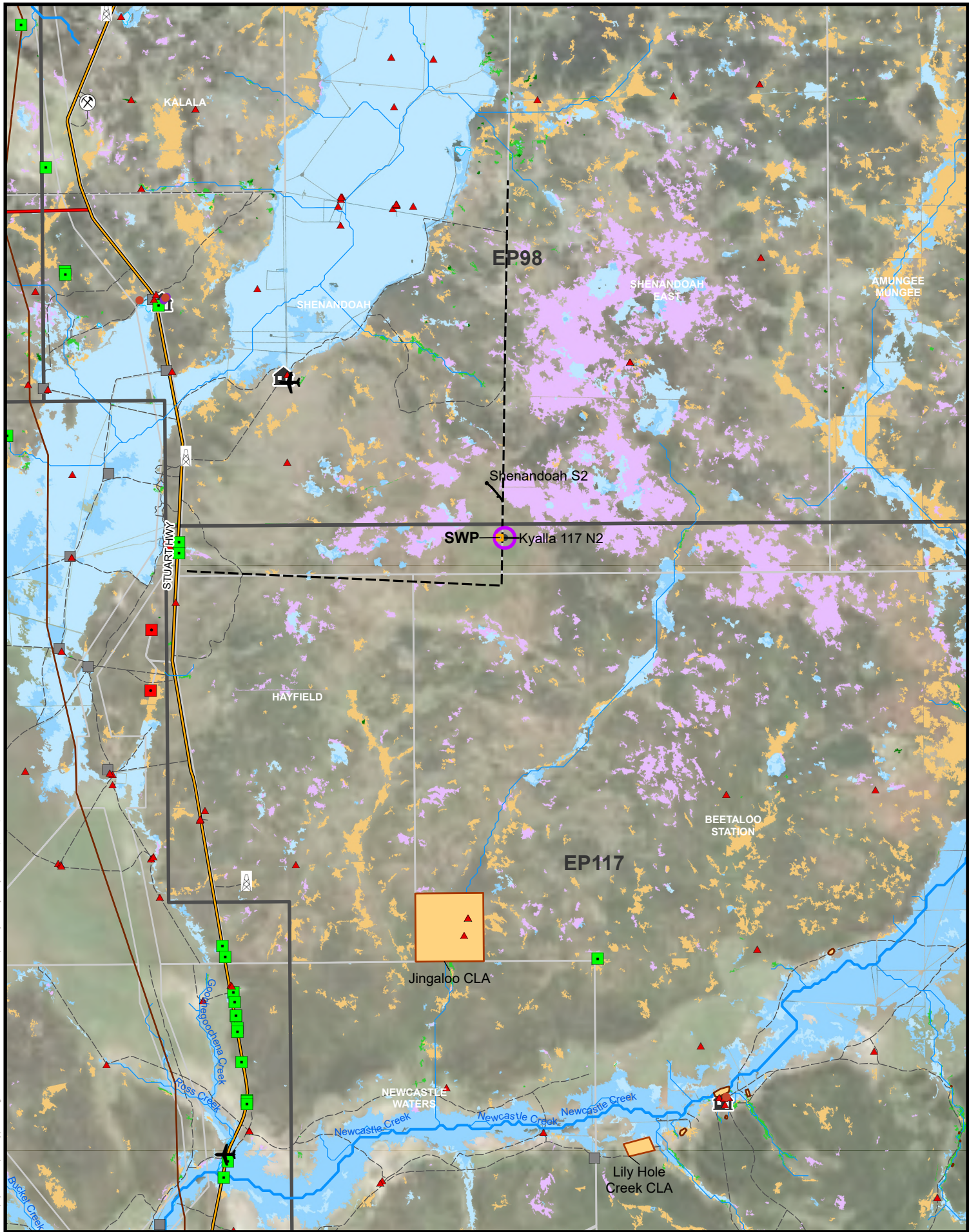
*Approximate distance from SWP area

3.9 Land use and sensitive receptors

Approximate distances from the SWP to the nearest environmental and community receptors are summarised in Table 8, and displayed in Figure 7.

Table 8 SWP environmental and community receptors

Receptor	Distance from SWP area
Closest pastoralist bore - Hayfield	~20 km north-west
Nearest homestead - Hayfield	~20 km north-west
Nearest town - Daly Waters	~70 km north-west
Nearest Service Station – Dunmarra Roadhouse	~30 km north-west
Jingaloo community living area	~30 km south
Lily Hole community living area	~46 km south
Stuart Highway	~24 km west
Carpentaria Highway	~61 km north
Bullwaddy Conservation Reserve	~76 km north-east
Frew Ponds Reserve	~27 km south-west
Lake Woods	~101 km south
Nearest mapped major watercourse	~19 km



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GEOCENTRIC DATUM OF AUSTRALIA 94
1:358,450 (when printed at A3)
0 3.25 6.5 13
Kilometres

Sand Wash Plant

Scouting Area

Well Pad

Permit Areas

Access Tracks

Populated Place

Aircraft Facility

Tower

Mine

Yard

Tracks

Highway

Gas Pipeline

Aboriginal Communities

Pastoral Lease Boundary

Pastoralist Bores

Creek

River

Water Bodies

Threatened Flora and Fauna
CR - Critically Endangered

VU - Vulnerable

Heritage
Historic Heritage Sites

Archaeological Sites

Significant vegetation
Floodplain

Floodplain/depression

Riparian

Riparian/wetland

Run-on

Wetland

Wetland/floodplain

LOCATION

Permit Area – sensitive receptors and features of interest

PROJECT ID60623736

CREATED BYsam.schroder

LAST MODIFIED14-Apr-2025

VERSION1

Data sources: Permit Area, Cadastre - NT Gov 2019, Places, Vegetation - Aust Gov 2019, Highways, Roads, Drainage - StreetPro 2019, SREBA, 2023.

Figure 7

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A3 size

4.0 Natural Environment

4.1 Bioregions

The Interim Biogeographic Regionalisation of Australia (IBRA) classifies the SWP area as occurring within the Sturt Plateau Bioregion. The Sturt Plateau Bioregion comprises undulating plains on sandstone, with predominantly neutral sandy red and yellow earth soils. Dominant vegetation is eucalypt woodland (dominated by variable-barked bloodwood *Eucalyptus dichromophloia*) with spinifex understorey, as well as extensive areas of the Lancewood (*Acacia shirleyi*) - Bullwaddy (*Macropteranthes kekwickii*) vegetation association.

Fauna associated with this bioregion, includes the Spectacled Hare-Wallaby (*Lagorchestes conspicillatus*).

Land condition in the bioregion is moderate to good but threatened by impacts from weeds, feral animals, pastoralism and changed fire regimes (Baker *et al*, 2005).

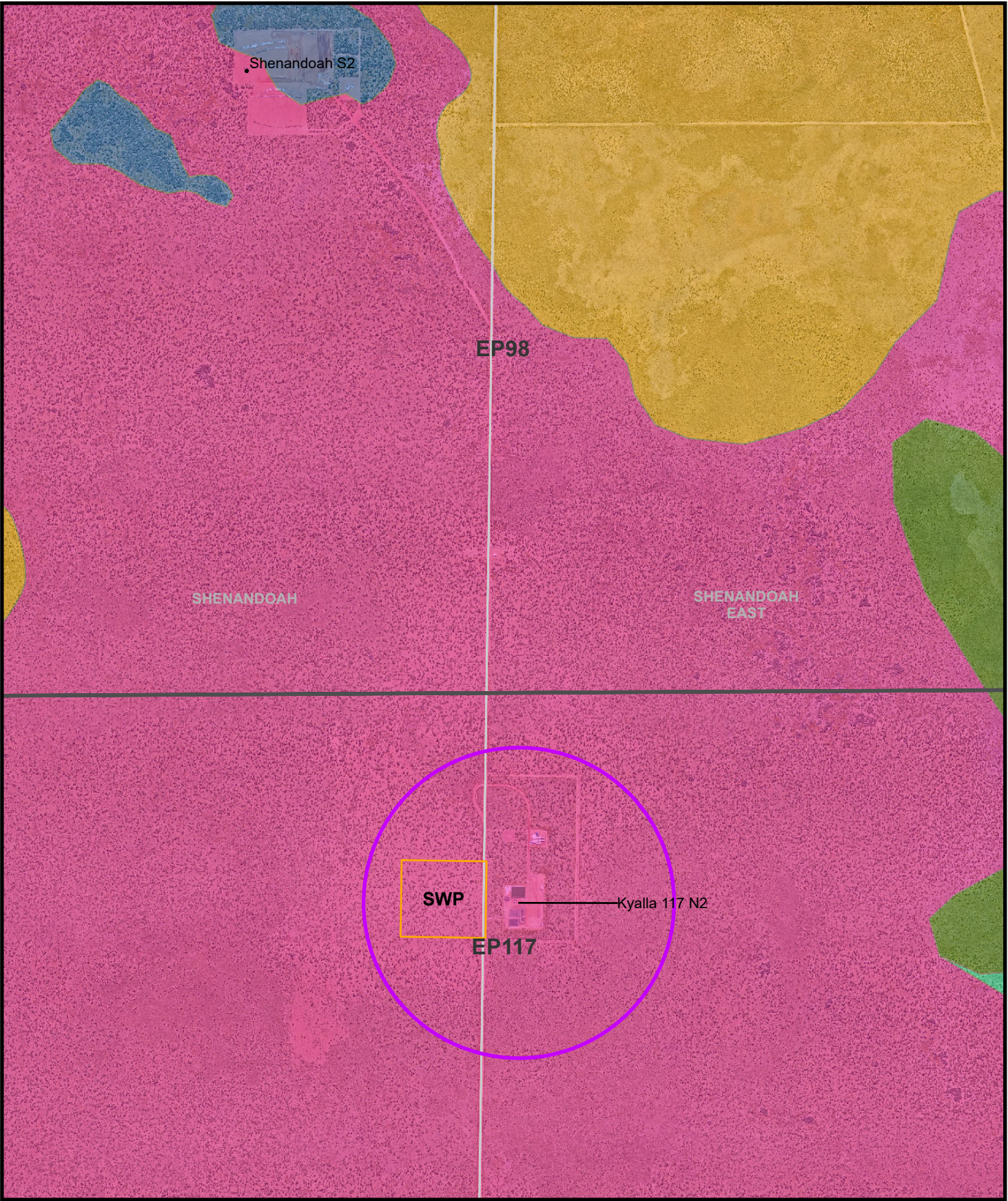
4.2 Vegetation Community

Vegetation community mapping of the SWP area has been undertaken across three different investigations, and are as follows:

- Land Condition Assessment – Shenandoah South Program (AECOM, 2024), mapped as
 - *Corymbia dichromophloia* ± *Erythrophleum chlorostachys* mid high open woodland, over *Acacia difficilis*, *Terminalia canescens*, *Dodonaea hispidula* mid high open shrubland, over *Triodia bitextura* ± *Chrysopogon fallax*, *Schizachyrium fragile* mid high hummock grassland
- SREBA vegetation mapping (Young *et al*, 2022)
 - *Corymbia*/ *Eucalyptus* open woodland on sandy loam
- NT Government Land suitability survey (Burley *et al.*, 2019)
 - *Corymbia dichromophloia*, *Erythrophleum chlorostachys* and *Corymbia ferruginea* mid open woodland

Vegetation communities within the project area mapped by AECOM are displayed in Figure 8.

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 www.aecom.com GEOCENTRIC DATUM OF AUSTRALIA 94 	- Sand Wash Plant - Scouting Area - Permit Areas - Pastoral Lease Boundary - Existing Well Pad Vegetation Community - Comm 1 - <i>A. shirleyi</i> mid high woodland - Comm 2a - <i>C. dichromophloia</i> ± <i>Erythrophleum chlorostachys</i> mid high open woodland - Comm 3a - <i>C. polycarpa</i>, ± <i>Erythrophleum chlorostachys</i> mid high open woodland - Comm 4a - 47g-1 <i>Acacia</i> sp. 2 ± <i>M. viridiflora</i> tall shrubland - Comm 4b - <i>M. viridiflora</i>, <i>Terminalia canescens</i> low sparse shrubland Data sources: SREDA 2023, Permit Area, Cadastre - NT Gov 2019, Places, Highways, Roads, Drainage - StreetPro 2019.	 Shenandoah South Sand Wash Plant Vegetation Communities								
	<table><tr><td>PROJECT ID</td><td>60623736</td></tr><tr><td>CREATED BY</td><td>sam.schroder</td></tr><tr><td>LAST MODIFIED</td><td>14-Apr-2025</td></tr><tr><td>VERSION</td><td>1</td></tr></table>	PROJECT ID	60623736	CREATED BY	sam.schroder	LAST MODIFIED	14-Apr-2025	VERSION	1	Figure 8
PROJECT ID	60623736									
CREATED BY	sam.schroder									
LAST MODIFIED	14-Apr-2025									
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4.3 Flora

The SREBA Terrestrial Ecosystem Report (Young *et al.*, 2022) indicated that the flora surveys completed over 2021-2022 contributed to 15,419 new plant records within the Beetaloo sub-basin.

A search of the NT Government flora atlas database was undertaken for the SWP area, with a 5 km buffer applied. This search generated records of 117 flora species, none of which are listed as threatened. These species are listed in Appendix A.

4.3.1 Threatened Flora

Analysis of flora records on the NR maps database indicates that one threatened flora species, *Carex fascicularis* (Tassel Sedge), potentially occurs within 20 km of the SWP area. This species is an erect, densely tufted, perennial sedge that can grow to 1m that occurs in swampy areas (DEPWS, 2021a). In 2022, *Carex fascicularis* was recorded in a *Fimbristylis* herbland within an *Astrebla* spp. mixed tussock grassland on cracking clay soils, near a flowing creek, (Young *et al.*, 2022). This species is listed as Vulnerable under the TPWC Act but not listed under the EPBC Act. The species is unlikely to occur in the vicinity of the proposed SWP, due to a lack of suitable wet habitat.

4.4 Weeds

Previous surveys within the Tamboran exploration permit areas have recorded a low number and density of weed species, indicating that land condition is generally good. Three declared weed species, *Calotropis procera* (Rubber Bush), *Parkinsonia aculeata* (Parkinsonia) and *Mesosphaerum suaveolens* (Hyptis), have been recorded during previous surveys.

Table 9 provides a list of weed species that are known to occur or likely to occur around the SWP area based on a desktop review of the following sources:

- Tennant Creek Regional Weeds Strategy (DEPWS, 2021b),
- Katherine Regional Weeds Strategy (DEPWS, 2021c).
- Mapping data provided by the Weed Management Branch, DEPWS.
- Guidelines for the Management of the Weeds of Beetaloo 2018 (DLRM & CDU, 2018).
- Department of Climate Change, Energy, the Environment and Water (DCCEEW) EPBC Act Protected Matters Report database.
- Previous data collected by AECOM in the permit area.

There are four classes of weeds under the NT *Weeds Management Act 2001*, which was amended in May 2022. The classes are described as:

A - it is necessary to eradicate the plant.

B - it is necessary to prevent the growing and spreading of the plant.

C - it is necessary to prevent the introduction of the plant into the Territory or a part of the Territory.

D - it is necessary to prevent the plant being spread by the actions of persons.

Based on the available data none of the weeds in Table 19 have Class D status.

Table 9 NT listed weeds known or likely to occur within the SWP area

Scientific Name	Common Name	Status
<i>Alternanthera pungens</i>	Khaki Weed	Class B and C
<i>Andropogon gayanus</i>	Gamba Grass	Class A and C, WoNS
<i>Azadirachta indica</i>	Neem	Class B and C
<i>Calotropis procera</i>	Rubber Bush	Class B and C (south of 16°30' S latitude)

Scientific Name	Common Name	Status
<i>Cenchrus ciliaris</i>	Buffel Grass	Class B and C
<i>Cenchrus echinatus</i>	Mossman River Grass	Class B and C
<i>Datura ferox</i>	Fierce Thornapple	Class A and C
<i>Mesosphaerum suaveolens</i>	Hyptis	Class B and C
<i>Jatropha gossypifolia</i>	Bellyache Bush	Class B and C, WoNS
<i>Parkinsonia aculeata</i>	Parkinsonia	Class B and C, WoNS
<i>Sida acuta</i>	Spinyhead Sida	Class B and C
<i>Sida cordifolia</i>	Flannel Weed	Class B and C
<i>Sida rhombifolia</i>	Paddy's Lucerne	Class B and C
<i>Tamarix aphylla</i>	Athel Pine	Class B and C, WoNS
<i>Themeda quadrivalvis</i>	Grader Grass	Class https://yt3.ggpht.com/proxy/JPI5SIYqlmKm8ikmogW6XXXecfdisiTFrVdoh-YnXBY2lgh6L2M22yotSZWfdFrrUIG0KyWMPFkxog1gzwlEro4slh25FqFK-L75ndFLVSElaQZw0qYHJAKFXfHlwZ_gnVY=w1152-h603-nd B and C, WoNS
<i>Tribulus terrestris</i>	Caltrop	Class B and C
<i>Vachellia nilotica</i>	Prickly Acacia	Class A and C, WoNS

In addition to the species listed in Table 9, a range of grassy weeds are known to occur along road corridors throughout the region. This includes Buffel Grass which was originally introduced for livestock feed and soil stabilisation but has subsequently shown to alter fire regimes and impact biodiversity.

The *Katherine Regional Weeds Strategy 2021-2026* (DEPWS, 2021c) provides a strategic approach to reducing the adverse impact of weeds in the Katherine Region. The plan includes a list of weed species that require priority management attention. Nine priority weed species that may be a potential risk to SWP site are listed in Table 10.

Table 10 Priority weed species identified for the Katherine Region (DEPWS, 2021c)

Scientific Name	Common Name	Declaration
<i>Vachellia nilotica</i>	Prickly Acacia	Class A
<i>Prosopis</i> spp.	Mesquite	Class A
<i>Parthenium hysterophorus</i>	Parthenium	Class A, WoNS
<i>Mimosa pigra</i>	Mimosa	Class A
<i>Cryptostegia grandiflora</i>	Rubber vine	Class A, WoNS
<i>Salvinia molesta</i>	Salvinia	Class B
<i>Cylindropuntia</i> spp.	Rope cactus	Class A
<i>Hyparrhenia rufa</i>	Thatch grass	Class A
<i>Sporobolus</i> spp.	Giant rats tail grass	Not Declared

The *Tennant Creek Regional Weeds Strategy* and *Katherine Regional Weeds Strategy* also identifies three alert weed species that potentially occur within the Tamboran permit areas (Table 11). Alert weeds have been identified as the principal threatening weeds to specific regions of the NT.

Table 11 Alert weed species in the Katherine and Tennant Creek regions (DEPWS, 2021b; DEPWS, 2021c).

Scientific name	Common name	Declaration
<i>Themeda quadrivalvis</i>	Grader Grass Class B	Class B and C
<i>Parthenium hysterophorus</i>	Parthenium	Class A and C, WoNS
<i>Chromolaena odorata</i>	Siam weed	Class C

In the last 24 months Kapok bush (*Aerva javanica*) (Plate 1) has been observed along the Stuart Highway between Katherine and Mataranka. Kapok bush is an erect woody shrub that is not declared in the NT but has potential to become a weed and should be treated as such by Tamboran to prevent the weed from spreading.



Plate 1 Kapok bush (*Aerva javanica*) near Katherine, NT

4.5 Fauna and Habitat

Recent SREBA surveys identified 354 vertebrate species within the Beetaloo sub-basin region consisting of 202 bird species, 99 reptile species and 39 mammal species and 14 amphibians (Young et al, 2022).

A fauna monitoring program undertaken from November 2019 to September 2022 at the Kyalla 117 N2 well site provides significant data on the fauna species that occur in the area. Six motion-activated cameras were installed around the perimeter of the drill pads, with some cameras also aimed on the drill pads and sumps. Thirty-eight species were detected comprising 30 birds, five mammals, two reptiles and one amphibian. These species are listed in Table 12.

Table 12 Fauna recorded at Kyalla 117 N2 well site November 2019 to September 2022

Scientific Name	Common Name
Birds	
<i>Accipiter fasciatus</i>	Brown Goshawk
<i>Ardea intermedia</i>	Intermediate Egret
<i>Ardeotis australis</i>	Australian Bustard
<i>Artamus cinereus</i>	Black-faced Woodswallow
<i>Artamus leucorhynchus</i>	White-breasted Woodswallow
<i>Artamus minor</i>	Little Woodswallow
<i>Burhinus grallarius</i>	Bush Stone-Curlew
<i>Calyptorhynchus banksii</i>	Red-tailed Black Cockatoo
<i>Chlamydera nuchalis</i>	Great Bowerbird
<i>Chlidonias hybrida</i>	Whiskered Tern
<i>Corvus orru</i>	Torresian Crow
<i>Cracticus nigrogularis</i>	Pied Butcherbird
<i>Egretta novaehollandiae</i>	White-faced Heron
<i>Eolophus roseicapilla</i>	Galah
<i>Eurystomus orientalis</i>	Dollarbird
<i>Geopelia cuneata</i>	Diamond Dove
<i>Geopelia humeralis</i>	Bar-shouldered Dove
<i>Grallina cyanoleuca</i>	Magpie Lark
<i>Haliastur sphenurus</i>	Whistling Kite
<i>Melopsittacus undulatus</i>	Budgerigar
<i>Merops ornatus</i>	Rainbow Bee-eater
<i>Milvus migrans</i>	Black Kite
<i>Nymphicus hollandicus</i>	Cockatiels
<i>Ocyphaps lophotes</i>	Crested Pigeon
<i>Philemon citreogularis</i>	Little Friarbird
<i>Podargus strigoides</i>	Tawny Frogmouth
<i>Rhipidura leucophrys</i>	Willie Wagtail
<i>Struthidea cinerea</i>	Apostlebird
<i>Todiramphus sanctus</i>	Sacred Kingfisher
<i>Vanellus miles</i>	Masked Lapwing
Mammals	
<i>Canis lupus dingo</i>	Dingo

Scientific Name	Common Name
<i>Felis catus</i>	Feral Cat
<i>Macropus agilis</i>	Agile Wallaby
<i>Macropus robustus</i>	Common Wallaroo
<i>Onychogalea unguifera</i>	Northern Nailtail Wallaby
Reptiles	
<i>Varanus gouldiae</i>	Sand Monitor
<i>Varanus panoptes</i>	Yellow-spotted Monitor
Amphibians	
<i>Rhinella marina</i>	Cane Toad

The SWP area comprises of *Corymbia dichromophloia* and *Erythrophleum chlorostachys* mid open woodland with a hummock and tussock grass understorey. *Corymbia dichromophloia* trees provide hollow habitat for a variety of fauna species, including Owlet Nightjar (*Aegotheles cristatus*) and Southern Boobook owl (*Ninox boobook*), whilst savanna grasslands and open woodlands that occur in the surrounding area provide suitable habitat for Near Threatened (TPWC Act) species such as Emu (*Dromaius novaehollandiae*) and Australian Bustard (*Ardeotis australis*).

4.5.1 Threatened Fauna

A search of the Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters database of nationally significant fauna (PMST) and records from the NT Government Fauna Atlas database (NR Maps) was undertaken using a 10km buffer of the project area. The search results indicate the potential presence of 14 fauna species listed as threatened under the EPBC Act and/or the TPWC Act. These included eight birds, two mammals, three reptiles and one shark. Of these species, four may occur within the SWP area.

A likelihood of occurrence assessment was undertaken based on the availability of suitable habitat within the permit area, records in the vicinity and distributional data (Table 13). Many of the threatened and migratory fauna species encountered in databases as 'occurring' or 'likely to occur' have been assessed as unlikely to occur within the SWP area due to the lack of ephemeral wetland habitat. Because the SWP area have not been subject to intensive survey and some species are cryptic, a conservative approach has been taken to assess species presence. A full description of each species, their distribution and habitat associations are outlined in Table 13 below.

Table 13 EPBC and TPWC listed threatened species and likelihood of occurrence within the SWP area

Species	Conservation Status		Distribution	Habitat	Likelihood
	EPBC Act	TPWC Act			
Birds					
Sharp-tailed Sandpiper <i>Calidris acuminata</i>	VU	-	Most of the Sharp-tailed Sandpiper population migrates to Australia in the non-breeding season, with widespread records occurring both inland and in coastal locations. In the NT the species mostly occurs in the north coastal regions. Widely scattered inland records occur south to northern Tanami Desert, and in southern NT (Higgins & Davies 1996).	In Australia the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation (Higgins & Davies 1996).	Unlikely Suitable habitat does not occur within the SWP area.
Curllew Sandpiper <i>Calidris ferruginea</i>	CE	VU	In the NT this species occurs around Darwin, north to Melville Island and Cobourg Peninsula, and east and south-east to Gove. It has been recorded inland from Victoria River Downs and around Alice Springs (Higgins & Davies, 1996).	Coastal habitats, inland it has been found around lakes, dams and ephemeral/permanent waterholes.	Unlikely Suitable habitat does not occur within the SWP area.
Red Goshawk <i>Erythrotriorchis radiatus</i>	EN	VU	Found across most of Northern Australia, in the NT most records are from the Top End but there are records from central Australia (Pizzey & Knight, 2012).	Red Goshawks occupy a range of habitats, often at ecotones, including coastal and sub-coastal tall open forest, tropical savannahs crossed by wooded or forested watercourses. In the NT, it inhabits tall open forest/woodland as well as tall riparian woodland (Aumann & Baker-Gabb, 1991).	Unlikely No records or suitable breeding habitat occur within the SWP area.
Gouldian Finch <i>Chloebia gouldiae</i>	EN	VU	Formerly widespread across northern Australia. In the NT they are found in the Top End south past Daly Waters (Palmer <i>et al.</i> , 2012).	Gouldian Finches occupy different habitat types in the breeding and non-breeding season. Breeding habitat consists of hillsides with suitable nesting trees. Outside of the breeding season they are found in lowland drainages to	Possible Recent records occur within the Beetaloo Sub-basin and suitable foraging habitat is present within the SWP area.

Species	Conservation Status		Distribution	Habitat	Likelihood
	EPBC Act	TPWC Act			
				feed on suitable perennial grasses (Dostine & Franklin, 2002).	
Grey Falcon <i>Falco hypoleucos</i>	VU	VU	This species has a widespread distribution, and records occur throughout the NT. However, most records are from arid and semi-arid regions (Pizzey & Knight, 2012).	Grey Falcon is typically found on inland drainage systems in lightly treed lowland plains, pastoral lands, timbered watercourses and, occasionally, the driest deserts (DEPWS, 2021d).	Possible Recent records occur within the Beetaloo Sub-basin, however suitable breeding habitat does not occur within the SWP area.
Northern Shrike-tit <i>Falcunculus whitei</i>	VU	NT	This species has been recorded from widely scattered localities from near Timber Creek to the east Gulf Country, north to Kakadu National Park and in north-eastern Arnhem Land (DEPWS, 2021e).	Occupies wet and semi-arid melaleuca and eucalypt open woodlands. May be associated with bloodwoods with flaky bark and ironwood (Ward, 2008).	Possible No recent records occur in the vicinity of the SWP area, though suitable habitat is present.
Painted Honeyeater <i>Grantiella picta</i>	VU	VU	This species is migratory based on seasonal variation in occurrence. They breed on the inland slopes of the Great Dividing Range. After the breeding season they sometimes occur in the north-eastern NT, south of the Roper River (Garnett & Baker, 2021).	Painted Honeyeater inhabits woodlands dominated by Acacia and/or Eucalyptus species and open forests but prefers habitats with abundant mature trees that host mistletoes. The species specialises on the fruit of mistletoes and also forages on nectar and insects (Garnett <i>et al.</i> , 2011).	Unlikely No recent records occur close to the SWP area.
Night Parrot <i>Pezoporus occidentalis</i>	EN	EN	Night Parrot was once widespread across arid and semi-arid regions. Recent confirmed records of the species come from widely separated locations in western Queensland and Western Australia (DEPWS, 2021f).	This species occupies spinifex grasslands in stony or sandy areas, in ephemeral herblands, samphire and chenopod shrublands on floodplains (DEPWS, 2021f).	Unlikely No recent records occur within the area Suitable habitat does not occur within the SWP area.
Princess Parrot, Alexandra's Parrot	VU	VU	This species irregularly occurs across the arid zone from near Oodnadatta in South Australia, west to near Coolgardie and the	Princess Parrot is usually recorded from shrubland in swales between sand dunes, with occupied sites typically having a variety of	Unlikely

Species	Conservation Status		Distribution	Habitat	Likelihood
	EPBC Act	TPWC Act			
<i>Polytelis alexandrae</i>			east Murchison River in Western Australia, and north to near the Fitzroy River in Western Australia and to Howell Ponds in the Northern Territory (Higgins 1999; Baxter & Henderson 2000)	shrubs (including Grevillea, Hakea, Cassia and Eremophila species) among scattered emergent trees, with a ground-cover of spinifex Triodia species. The species occurs less often in woodland. The princess parrot forages on the ground and in flowering shrubs and trees (Higgins 1999; Pavey <i>et al.</i> 2014)	No recent records occur close to the SWP area.
Australian Painted Snipe <i>Rostratula australis</i>	EN	VU	Records of the species occur across the NT. More recent records come from McMinns Lagoon near Darwin, Yellow Waters in Kakadu, the Sturt Plateau, the Barkly and the Tanami (DEPWS, 2021g).	Australian Painted Snipe prefers a habitat of recently flooded temporary vegetated wetlands during the non-breeding period and brackish temporary freshwater wetlands with minimum vegetation during breeding periods. Birds usually forage in thick, low vegetated areas during the day (Curtis <i>et al.</i> 2012).	Unlikely Suitable habitat does not occur within the SWP area.
Masked Owl (northern) <i>Tyto novaehollandiae kimberli</i>	VU	VU	The subspecies occurs in northern Australia, although its distribution is not well known. In the NT, occurs from Cobourg south to Katherine and the VRD and east to the McArthur River (DoE, 2014).	This species inhabits tall open eucalypt forest in the NT, especially those associated with <i>Eucalyptus miniata</i> and <i>E. tetradonta</i> . Also found in riparian and monsoonal forest and rainforest (DoE, 2014).	Unlikely No recent records occur close to the SWP area and suitable habitat is not present.
Mammals					
Northern Quoll <i>Dasyurus hallucatus</i>	CE	EN	The species once occurred throughout most of Northern Australia although it is has declined across much of its range (Woinarski & Hill, 2012). In the NT it is found in the Top End as far southeast as Borroloola.	Northern Quolls do not have highly specific habitat requirements although the most suitable appear to be rocky habitats. They occur in a variety of habitats across their range, including open forest and woodland. Daytime den sites provide important shelter. Shelter sites include rocky outcrops, tree hollows, hollow logs, termite mounds, goanna burrows and human dwellings (Woinarski & Hill, 2012).	Unlikely No recent records, occur in the vicinity of the SWP area and habitat is sub-optimal.

Species	Conservation Status		Distribution	Habitat	Likelihood
	EPBC Act	TPWC Act			
Ghost Bat <i>Macroderma gigas</i>	VU	NT	The species' range in northern Australia is from relatively arid conditions in the Pilbara region of Western Australia to humid rainforests of northern Queensland. A large colony occurs in a series of gold mine workings at Pine Creek, NT. This species has also been recorded throughout the mainland Top End north of approximately 17° latitude (DEPWS, 2021h).	The distribution of Ghost Bats is influenced by the availability of suitable caves and mines for roost sites. The species often roosts in a deep crack or cave during the day (DEPWS, 2021h).	Unlikely No recent records occur close to the SWP area.
Greater Bilby <i>Macrotis lagotis</i>	VU	VU	This species occurs in south-western Queensland and in arid north-western Australia (Western Australia and Northern Territory). This species was previously widespread in arid and semi-arid Australia (Pavey, 2006). The most northern records are from Newcastle Waters and Wave Hill (Southgate & Paltridge, 1998).	In the NT, this species is found on sandy soils dominated by spinifex. It also occurs in hummock grassland associated with low lying drainage systems and alluvial areas (Pavey, 2006). Recent surveys in the Beetaloo region have recorded Greater Bilby in Eucalyptus and Corymbia woodlands mixed tussock and hummock grasses in sandy/loam soils (Davis <i>et al.</i> , 2021).	Unlikely No recent records, occur in the vicinity of the SWP area and suitable habitat is not present.
Bare-rumped Sheath-tailed Bat <i>Saccolaimus saccolaimus nudicluniatus</i>	VU	DD	Wide distribution from India through south-eastern Asia to the Solomon Islands, including north-eastern Queensland and the NT. Records of the species in the NT are sparsely scattered across the Top End (DEPWS, 2021i).	Previous specimens have been collected from Open <i>Pandanus</i> woodland fringing the sedgeland of the South Alligator River in Kakadu National Park, and from eucalypt woodlands and forests from coastal and adjacent inland areas (DEPWS, 2021i).	Unlikely No recent records, occur in the vicinity of the SWP area and habitat is not suitable.
Common Brushtail Possum <i>Trichosurus vulpecula arnhemensis</i>	VU	NT	The Common Brushtail Possum (northern subspecies) occurs discontinuously from the Gulf of Carpentaria hinterland near Borroloola, NT westward to the Kimberley, WA (TSSC, 2020b).	The species occurs mainly in tall eucalypt open forests with large hollow-bearing trees, particularly where the understorey includes some shrubs that bear fleshy fruits (TSSC, 2020b).	Possible Recent records of the species occur at nearby Kalala Station and suitable habitat occurs within the SWP area.

Species	Conservation Status		Distribution	Habitat	Likelihood
	EPBC Act	TPWC Act			
Pale Field-rat <i>Rattus tunneyi</i>	-	VU	Pale Field-rat inhabits higher rainfall areas of northern and eastern Australia, including the Top End of the NT (Menkhorst & Knight, 2011).	This species favours dense vegetation found along rivers where it occupies burrows in loose colonies (Cole & Woinarski, 2002). Pale Field-rat occurs within a variety of habitats including woodlands if a dense understorey of grasses is present (Menkhorst & Knight, 2011)	Unlikely No recent records occur close to the SWP area and suitable habitat is absent.
Reptiles					
Plains Death Adder <i>Acanthophis hawkei</i>	VU	VU	Fragmented populations of the Plains Death Adder are known to occur in the Mitchell Grass Downs of western Queensland, the Barkly Tableland on the Northern Territory / Queensland border and east of Darwin in the Northern Territory (Cogger, 2000).	Suitable habitat for the Plains Death Adder consists of flat, treeless, cracking-soil riverine floodplains (Cogger, 2000).	Possible No recent record within the vicinity of the SWP area. Suitable habitat occurs in the region.
Gulf Snapping Turtle <i>Elseya lavarackorum</i>	-	EN	Gulf Snapping Turtle is restricted to rivers draining into the Gulf of Carpentaria, including the Calvert and Nicholson River systems (DEPWS, 2021j)	The species occurs in deep pools in the upper catchments of permanently flowing spring-fed river systems, particularly in areas with intact riparian vegetation (DEPWS, 2021j).	Unlikely Suitable habitat does not occur within the SWP area.
Northern Blue-tongue Skink <i>Tiliqua scincoides intermedia</i>	CE	-	The Northern Blue-tongue Skink occurs across northern Australia from Eighty Mile Beach in Western Australia (WA), across the southern Kimberley and Top End of the Northern Territory (NT), to approximately the Gregory Downs / Cloncurry area in western Queensland (DCCEEW, 2023a).	The Northern Blue-tongue Skink occurs in a wide variety of ecosystems, including riparian forest, vine scrub, monsoon rainforest, pandanus-lined gorges, melaleuca forest, eucalypt woodland and savanna, sparse and dense shrubland, and spinifex and tussock grassland. GPS tracking has shown that northern blue-tongue skinks move widely across savanna landscapes in the wet-season, but they spend most (~ 95 %) of their time in small, fragmented patches of relatively dense vegetation that	Possible Recent records occur nearby, and suitable habitat occurs within the SWP area.

Species	Conservation Status		Distribution	Habitat	Likelihood
	EPBC Act	TPWC Act			
				provide cool, shaded, and damp conditions (DCCEEW, 2023a).	
Mertens' Water Monitor <i>Varanus mertensi</i>	EN	VU	Mertens' Water Monitor has a broad distribution that encompasses coastal and inland waters across the far north of Australia. In the NT, the species has been recorded across most of the Top End and the Gulf region (DEPWS, 2021k).	Mertens' Water Monitor is highly aquatic and rarely ventures more than 5-10 m from the edge of water. The species has been recorded in the following habitat: - Perennial and semi-permanent pools, including springs, seeps, swamps, creeks and gorges, - The margins of permanent streams, rivers and lakes, - Floodplain billabongs, lagoons, swamps and soaks, - Perennial waterholes in woodlands, Man-made irrigation channels and the margins of dams (DCCEEW, 2023b).	Unlikely Suitable habitat does not occur within the SWP area.
Mitchell's Water Monitor <i>Varanus mitchelli</i>	CE	VU	Mitchell's water monitor occurs across the wet-dry tropics of northern Australia from the far west Kimberley of WA across the Top End of the NT to far northwest Queensland (DCCEEW, 2023).	Mitchell's water monitor inhabits freshwater and saline wetlands that range from seasonal gorges in upper catchments to large rivers and coastal floodplains. It is recorded from rivers, creeks, gorges, springs, lagoons, swamps, mangroves, and foreshores (DCCEEW, 2023c).	Unlikely No recent records occur at similar latitudes and the SWP area appears to be south of the species current distribution.
Yellow-spotted Monitor <i>Varanus panoptes</i>	-	VU	Occurs across a broad geographic range across northern Australia. In the NT most records are from the Top End but occurs as far south as Renner Springs (Ward <i>et al.</i> , 2012).	Occupies a variety of habitats including coastal beaches, floodplains, grasslands and woodlands (Ward <i>et al.</i> , 2012).	Likely The species was recorded during the wildlife monitoring program at Kyalla 117 N2 during 2020. Suitable habitat is present.

Species	Conservation Status		Distribution	Habitat	Likelihood
	EPBC Act	TPWC Act			
Shark					
Largetooth Sawfish <i>Pristis pristis</i>	VU	VU	Largetooth Sawfish have been recorded in numerous drainage systems in northern Australia in fresh and saline water including the Fitzroy, Durack, Robinson and Ord rivers (Western Australia), the Adelaide, Victoria, Daly, East and South Alligator, Roper, McArthur, Wearyan and Robinson rivers (Northern Territory), and the Gilbert, Mitchell, Normanby, Wenlock, Mission, Embley and Leichhardt rivers (Queensland) (DoE, 2015).	This species in northern Australia appears to be confined to freshwater drainages and the upper reaches of estuaries, occasionally being found as far as 400 km from the sea (DoE, 2015).	Unlikely Suitable habitat does not occur within the SWP area.

VU = Vulnerable, EN = Endangered, CE = Critically Endangered, NT = Near Threatened, DD = Data Deficient

No critical fauna habitat was identified within the SWP area. However, some species are known to or may occur within the SWP area, including:

- Gouldian Finch *Chloebia gouldiae* (Endangered EPBC Act, Vulnerable TPWC Act)
- Grey Falcon *Falco hypoleucos* (Vulnerable EPBC Act and TPWC Act)
- Northern Shrike-tit *Falcunculus whitei* (Vulnerable EPBC Act)
- Common Brushtail Possum (northern) *Trichosurus vulpecula arnhemensis* (Vulnerable EPBC Act)
- Plains Death Adder *Acanthopsis hawkei* (Vulnerable EPBC ACT and TPWC Act)
- Northern Blue-tongue Skink *Tiliqua scincoides intermedia* (Critically Endangered EPBC Act)
- Yellow-spotted Monitor *Varanus panoptes* (Vulnerable TPWC Act).

As records of species may be limited in remote areas the precautionary principle has been applied. There are some species that have been assessed as possibly occurring even though their primary habitat is not found within the proposed sites or access tracks. These include species that are associated with ephemeral wetlands, low lying areas that may be seasonally inundated and creeks. During the wet and early dry season these areas may sustain threatened species such as wetland birds (including migratory species).

The following provides a summary of each of the threatened species that may potentially occur within the SWP area.

Gouldian Finch *Chloebia gouldiae* (Endangered EPBC Act, Vulnerable TPWC Act)

Research has shown that critical habitat for the Gouldian Finch include suitable nesting trees during the breeding season (particularly *Eucalyptus tintinnans*, *E. brevifolia* or *E. leucophloia*), a water source and a diverse range of favoured annual and perennial grasses (Dostine & Franklin, 2002).

During the wet season, Gouldian Finches move from breeding habitat on hillsides with suitable trees down to lower lying areas where they forage on perennial grasses such as *Triodia* sp., *Alloteropsis semialata*, and *Chrysopogon fallax* (Palmer *et al.* 2012). Some of these perennial grasses were recorded during recent surveys so potential foraging habitat is present; however, there are limited records in the vicinity.

Potentially suitable nesting trees, specifically *Corymbia dichromophloia* and *Eucalyptus leucophloia* as well as suitable perennial, foraging grasses have been observed within the SWP area. Although no Gouldian Finches were observed during the bird surveys habitat in the SWP area was moderately suitable for this species.

The SREBA species distribution model for Gouldian Finch indicates a low probability of the species occurring within the SWP area, as displayed in Figure 9.

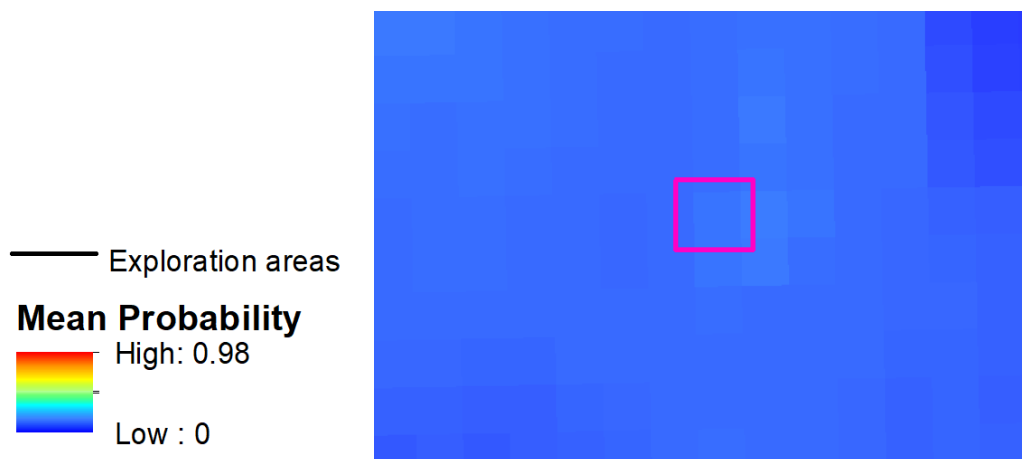


Figure 9 Mean probability of presence of Gouldian Finch within the SWP area (Young *et al.*, 2022)

Grey Falcon

The Grey Falcon (*Falco hypoleucos*) is a widespread species listed as Vulnerable in the NT and possibly occurs in the SWP area. The species occurs in low densities throughout arid and semi-arid areas of Australia (DEPWS, 2021d).

Grey Falcon is known to nest on repeater towers in the region, including one site located approximately 100 km south-west of SWP area where the species bred in 2014 (Jonny Schoenjahn, personal communication, 2022). The species also nests in the tallest trees along watercourses, such as Red River Gums (*Eucalyptus camaldulensis*) (TSSC, 2020a). The Grey Falcon may intermittently forage within the SWP area but is unlikely to breed.

Northern Shrike-tit

The Northern Shrike-tit lives in dry Eucalypt forests and woodlands where it feeds on insects from the canopy and under bark. It has been recorded in wet Melaleuca open woodlands and woodlands dominated by Nutwood (*Terminalia arostrata*) and Bloodwoods with flaky bark and ironwood (Ward, 2008). In the NT, nesting has been recorded from September through to January and nests are built in terminal branches at the top of trees (Ward *et al.*, 2009). The stronghold of this species is north of the SWP area, with NR Maps showing only four records south of -16.25° latitude. Targeted surveys by the NT Government in the Beetaloo Sub-basin failed to detect the species south of -16.0° latitude despite significant survey effort (>30 call playback surveys). Additionally, the SREBA distribution model suggests that the entire project has a low likelihood of the species occurring (Young *et al.*, 2022). Although it is possible the Northern Shrike-tit may be present in the area, it is unlikely to represent an important area for this species.

Common Brushtail Possum

Recent surveys have detected the Common Brushtail Possum (*Trichosurus vulpecula arnhemensis*) on Kalala Station (Young, *et al.*, 2022). Suitable woodland habitat is contiguous through the landscape; therefore, the species potentially occurs within the SWP area. Given the large amount of suitable habitat within the region comparative to the project footprint the risk of impacts to regional populations of this species is small.

Plains Death Adder

Suitable habitat for the Plains Death Adder consists of flat, treeless, cracking-soil riverine floodplains (Cogger, 2000). A population of this species occurs in the Barkly Tableland from the Northern Territory to central-western Queensland. In the Beetaloo Sub-basin records of the species occurs close to Lake Woods, Lake Sylvester and Lake Tarrabool. The species may occur within the SWP area, particularly following heavy wet season rainfall.

Northern Blue-tongue Skink

The Northern Blue-tongue Skink occurs in a wide variety of vegetation communities including, eucalyptus woodlands and savanna grasslands, sparse and dense shrublands, and spinifex and tussock grasslands. Areas of dense vegetation that provides cool and moist conditions within hot, dry, and flammable landscapes are critical habitat for the survival of the species. Examples of such habitat includes rainforest and vine thicket, riparian forests, well-vegetated creeks and drainage lines, well-vegetated swamps and springs, and dense thickets within floodplains, grasslands, shrublands, savannas and woodlands (DCCEEW, 2023a).

Several recent (2020-2022) records of the species occur within 100 km, and suitable habitat occurs within the SWP area. The species was recently listed as Critically Endangered under the EPBC Act in December 2023.

Yellow-spotted Monitor

The Yellow-spotted Monitor (*Varanus panoptes*) occurs across northern Australia where it occupies a variety of habitats, including grasslands and woodlands (Ward *et al.*, 2012). Most records of this species are from the Top End, though it has been recorded in the Barkly Tablelands. The species was recorded along the perimeter of the Kyalla 117 N2 well pad in 2020 (Plate 2).



Plate 2 Yellow-spotted Monitor (*Varanus panoptes*) recorded at Kyalla 117 N2 well site in 2020

4.5.2 Migratory and Marine Species

The EPBC Protected Matters database (Appendix B) indicated the potential presence of 13 migratory and 17 marine listed species within the SWP area (Table 14). Of these species, one is considered likely to occur, six possibly occurring and 11 are unlikely to occur. The SWP area does not contain critical habitat for any migratory or marine listed species.

Table 14 Migratory listed species potentially occurring within the SWP area

Scientific Name	Common Name	EPBC Act	Likelihood of Occurrence
<i>Actitis hypoleucos</i>	Common Sandpiper	Migratory, Marine	Unlikely
<i>Anseranas semipalmata</i>	Magpie Goose	Marine	Unlikely
<i>Apus pacificus</i>	Fork-tailed Swift	Migratory, Marine	Possible/Overfly area
<i>Bubulcus ibis</i> (<i>Ardea ibis</i>)	Cattle Egret	Marine	Possible
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Migratory, Marine	Unlikely
<i>Calidris ferruginea</i>	Curlew Sandpiper	Migratory, Marine	Unlikely
<i>Calidris melanotos</i>	Pectoral Sandpiper	Migratory, Marine	Unlikely
<i>Cecropis daurica</i>	Red-rumped Swallow	Migratory, Marine	Unlikely
<i>Charadrius veredus</i>	Oriental Plover	Migratory, Marine	Possible
<i>Chalcites osculans</i> (<i>Chrysococcyx osculans</i>)	Black-eared Cuckoo	Marine	Possible
<i>Cuculus optatus</i>	Oriental Cuckoo	Migratory	Possible
<i>Glareola maldivarum</i>	Oriental Pratincole	Migratory, Marine	Possible
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	Marine	Unlikely
<i>Hirundo rustica</i>	Barn Swallow	Migratory, Marine	Unlikely

Scientific Name	Common Name	EPBC Act	Likelihood of Occurrence
<i>Merops ornatus</i>	Rainbow Bee-eater	Marine	Likely
<i>Motacilla cinerea</i>	Grey Wagtail	Migratory, Marine	Unlikely
<i>Motacilla flava</i>	Yellow Wagtail	Migratory, Marine	Unlikely
<i>Pristis pristis</i>	Freshwater Sawfish	Migratory	Unlikely

4.5.3 Feral Animals

Feral animals known to occur within the region include:

- Pig (*Sus scrofa*)
- Wild dog (*Canis lupus familiaris*)
- Feral cat (*Felis catus*)
- Cane toad (*Rhinella marina*)
- Horse (*Equus caballus*)
- Donkey (*Equus asinus*)
- Water buffalo (*Bubalus bubalis*)
- Camel (*Camelus dromedarius*)
- Black rat (*Rattus rattus*)
- Domestic cattle (*Bos Taurus*)

The cane toad is known to be present in the SWP area and the Commonwealth DCCEEW recognises this species as a 'key threatening process' related to their impacts on biodiversity through predation, competition, land degradation and poisoning. In the NT, the cane toad has been implicated in the decline of several reptile species such as the Plains Death Adder (*Acanthophis hawkei*), King Brown Snake (*Pseudechis australis*) and Varanus monitors (Smith & Phillips, 2006).

Pest predators such as cats are likely to occur within the SWP area, though their abundance is difficult to assess due to their cryptic nature. Introduced predators such as cats impact many vertebrates (Dickman, 1996 & 2009). One of the primary concerns of these introduced predators are the impacts on reptiles and ground-dwelling birds. Feral cats are also believed to be one of the factors that have led to the decline of the threatened ground-dwelling Partridge Pigeon (Woinarski *et al.* 2007).

There is potential for pest species to be attracted to the SWP area due to increased site activities. Inappropriate dumping of rubbish on site can also attract food for feral animals. Care should be taken during project activities to ensure that rubbish is securely contained (i.e. with suitable lids) and removed from the site as soon as possible to discourage feral animals.

4.6 Conservation Areas

There are no national or world heritage places, Commonwealth land or heritage places or reserves or critical habitat areas listed under the EPBC Act are located within or adjacent to the SWP area.

The Bullwaddy Conservation Reserve occurs approximately 76 km north-east of the SWP area. The Reserve was declared in 2000 and is approximately 11,500 ha in area. It represents the only declared conservation area within the Sturt Plateau region to protect the Lancewood/Bullwaddy vegetation community. Less than 3% of this vegetation community is reserved nationally (PWCNT, 2005). The most significant values of the reserve are the flora and the associated fauna for which it provides habitat. This includes the Spectacled Hare-Wallaby, the Northern Nailtail Wallaby and the Giant Frog (*Cyclorana australis*). It is also a valuable area for research on the ecology of Bullwaddy, particularly the effects of fire (PWCNT, 2005).

Lake Woods is located approximately 101 km south-west of the SWP area on Newcastle Waters Station. This wetland is listed as a Site of Conservation Significance by the Department of Land Resource Management and is listed in the Directory of Important Wetlands in Australia. Although Lake Woods is located outside of the SWP area, it is fed principally by surface inflow of Newcastle Creek, itself originating more than 160 km north-east on Amungee Mungee Station. During the period of inundation, Lake Woods supports over 100,000 waterbirds including internationally significant numbers of Plumed Whistling-Duck (*Dendrocygna eytoni*). Numerous bird species nest and feed in the diverse wetland habitat, and the conservation group 'Birdlife International' nominated Lake Woods as an 'Important Bird Area' (IBA). The lake also includes the largest area of lignum swamp in the Northern Territory and in tropical Australia (NRETAS, 2009).

4.7 Aquatic Ecosystems

Mapping of aquatic ecosystems undertaken by the NT Government indicates these ecosystems are sparsely scattered throughout the Tamboran exploration permit. Most of these are classified as floodplain systems, which are seasonally or intermittently flooded areas that have hydric soils and contain vegetation that has adapted to the intermittent presence of water. A smaller portion of the area is classified as a lacustrine system, which are characterised by deep standing or slow-moving water, and have less than 30% of their extent covered by vegetation such as trees, shrubs or persistent emergent vegetation (DEPWS, 2022d). The SWP area is a well-drained plain not associated with an aquatic ecosystem.

4.8 Groundwater Dependent Ecosystems

A search of the National Groundwater Dependent Ecosystems (GDE) Atlas was undertaken in December 2024. The dataset expresses the potential for groundwater interaction/use for river/spring/wetland ecosystems across Australia. It shows ecosystems that rely on groundwater that has been discharged to the surface, as baseflow or spring flow. GDEs occur in the wider landscape, including Newcastle Creek to the south and Milner Lagoon to the west of the SWP area. No aquatic GDEs occur within the SWP area. Activities at the SWP area are unlikely to impact these GDEs.

4.9 Stygofauna

Stygofauna comprise of aquatic taxa occurring in groundwater aquifers and subterranean water bodies. Stygofauna inhabit and form a component of groundwater dependent ecosystems. Stygofauna are likely to be present in the karstic systems such as the Gum Ridge Formation aquifer, located within the Georgina Basin that underlies the SWP area, where water levels are less than 100 m below ground level (GISERA, 2020). Stygofauna inhabit the interstitial spaces of the cavities of alluvial, sedimentary and karstic aquifers. Recent studies by the Gas Industry Social and Environmental Research Alliance (GISERA) program have identified and characterised stygofauna assemblages in the Cambrian Limestone Aquifer units of the Beetaloo Sub-basin (GISERA, 2020). Data is available that can provide an indication of the likelihood of stygofauna presence, with the following factors determining the distribution of stygofauna:

- Formation type: Stygofauna are predominantly found in aquifers with large (mm or greater) pore spaces, which are more common for alluvial, karstic and some fractured rock aquifers.

- Depth below ground level: The abundance and diversity of stygofauna typically decreases with depth below ground, with fauna being rarely found more than 100 m below ground level.
- Proximity of exchange and recharge: Stygofauna are more abundant in areas of surface water-groundwater exchange, compared to deeper areas or those further along the groundwater flow path remote from areas of exchange or recharge (Hose *et al.*, 2015).

4.9.1 Stygofauna surveys

Stygofauna surveys through the use of eDNA have been undertaken in the Beetaloo Sub-basin in August and October of 2019 (Rees *et al.*, 2020), and during May 2021 and October 2022 (Humphreys *et al.*, 2022). These surveys involved sampling across several bores in the region, including four bores within 50 km of the SWP area. The results of stygofauna surveys at these bores are summarised in Table 15. A full list of Stygofauna identified at the bores is provided in Appendix C.

Table 15 Stygofauna survey results (Rees *et al.*, 2020; Humphreys *et al.*, 2022)

Bore	Distance from SWP area	Summary of results
RN041444	40 km north-west	No stygofauna detected
Hayfield Shenandoah Homestead Bore	20 km north-west	25 stygofauna identified by DNA: • 6 to family level • 7 to order level • 8 to class level • 4 to phylum level
Sturt Plains Homestead Bore	30 km south-west	11 stygofauna identified by DNA: • 1 to family level • 4 to order level • 5 to class level • 1 to phylum level
RN038816	35 km south-west	18 <i>Enchytraeidae</i> sp. (pot worms) detected

Stygofauna baseline sampling results recorded no Stygofauna taxa recorded within the SWP area. The nearest records are from the Hayfield Shenandoah Homestead bore, located approximately 3 km north-west to the SWP area.

Stygofauna surveys found that diversity was greater within the Tindall aquifer of the Daly Basin, located north of the SWP area. Stygofauna diversity is lower in the Georgina Basin despite the presence of limestone strata. This is possibly due to the prevalence of mudstone and siltstone, which are less suitable habitat for stygofauna due to the lack of cavities and pore space (Humphreys *et al.*, 2022).

4.10 Matters of National Environmental Significance

4.10.1 Potential EPBC Act Controlling Provisions

Actions such as the proposed wash bay at Kyal 117 N2 may require approval by the Commonwealth Minister for the Environment, under the *EPBC Act*. Approval is only required if the action is likely to result in significant impacts on Matters of National Environmental Significance (MNES) or if the action will have or is likely to have a significant impact on the environment.

Potential triggers under the EPBC Act include a significant impact on:

- The world heritage values of a declared World Heritage Property
- The national heritage values of a listed National Heritage Place
- The ecological character of a declared Ramsar wetland
- A listed Threatened Ecological Community, or its habitat
- The members of a listed threatened species
- The members of a listed migratory species or their habitat
- A water resource, in relation to coal seam gas development and large coal mining development.

4.10.2 Matters of National Environmental Significance

An EPBC Protected Matters Search was generated on the 13 December 2024 (refer Appendix B) to identify whether MNES or other matters protected by the EPBC Act are likely to occur on or in the near vicinity of the SWP area. Results of the search are provided below in Table 16.

Table 16 Summary of EPBC Aspects for SWP area

Aspect	Located within the SWP area
Matters of National Environmental Significance	
World Heritage Properties	None
National Heritage Places	None
Wetlands of International Significance	None
Great Barrier Marine Park	None
Commonwealth Marine Area	None
Listed Threatened Ecological communities	None
Listed Threatened Species	14
Listed Migratory Species	13
Other Matters Protected by the EPBC Act	
Commonwealth Land	None
Commonwealth Heritage Places	None
Listed Marine Species	17
Whales and other Cetaceans	None
Critical Habitat	None
Commonwealth Reserves Terrestrial	None
Australian Marine Parks	None
Habitat Critical to the Survival of Marine Turtles	None

Aspect	Located within the SWP area
Extra Information (Information that may also be relevant to the Exploration sites)	
State and Territory Reserves	None
Regional Forest Agreement	None
Nationally Important Wetlands	None
EPBC Act Referrals	None
Key Ecological Features (Marine)	None
Biologically Important Areas	None
Bioregional Assessments	None
Geological and Bioregional Assessments	1 - Beetaloo GBA region

Section 4.5 provides details on threatened, migratory and marine fauna species that potentially occur within the SWP area. The threatened and migratory species that potentially occur within the SWP area are unlikely to be impacted by construction of a wash plant.

5.0 References

- AECOM Australia Pty Ltd. 2024. *Land Condition Assessment – Shenandoah South E&A Program*. Report prepared for Tamboran B2 Pty Ltd, Darwin, NT.
- AECOM Australia Pty Ltd. 2015. *Exploration Environmental Plan, Beetaloo Basin, NT*. Unpublished report for Origin Energy Resources Limited, Darwin, NT.
- Aldrick JM and Wilson PL. 1990. Land systems of the Southern Gulf Region, Northern Territory, Technical Report No. 42, Conservation Commission of the Northern Territory, Palmerston, NT.
- Aumann, T. and Baker-Gabb D. 1991. RAOU Report 75. *A Management Plan for the Red Goshawk*. RAOU. Royal Australasian Ornithologists Union, Melbourne.
- Baker, B., Price, O., Woinarski, J, Gold, S., Connors., G, Fisher, A. and Hempel, C. 2005. *Northern Territory Bioregions: assessment of key biodiversity values and threats*. Department of Natural Resources, Environment and the Arts, Northern Territory Government.
- Baxter, C. and Henderson, R. 2000. A literature summary of the Princess Parrot *Polytelis alexandrae* and a suspected recent breeding event in South Australia. *South Australian Ornithologist*. Vol. 33, pp. 93-108.
- Burley, P., Carnavas, M. and Hem. pel, J. 2019. *Soils and Land Suitability Assessment for Irrigated Agriculture in the Dunmarra Area*. Department of Environment and Natural Resources. Northern Territory Government, Palmerston.
- Bureau of Meteorology (BOM). 2024. Northern Territory Weather Observations. Available from <http://www.bom.gov.au/nt/observations/index.shtml>. Site accessed 10 December 2024.
- CloudGMS, 2015. *Beetaloo Basin Hydrogeological Assessment*. Prepared by S. Fulton and A. Knapton, February 2015.
- Cogger, H. 2000. *Reptiles and Amphibians of Australia* (6th edition). Ralph Curtis Publishing.
- Cole, J. and Woinarski, J. 2002. *Field Guide to the Rodents and Dasyurids of the Northern Territory*. Surrey Beatty and Sons, Chipping Norton, NSW.
- Curtis, Lee K., A. J. Dennis, K. R. McDonald, P. M. Kyne, and Debus S.J.S., Eds. 2012. *Queensland's Threatened Animals*. CSIRO Publishing, Collingswood.
- Davis, J, Gillespie, G, Cuff, N, Garcia, E, Andersen, A, Young, L, Leiper, I, Ribot, R, Kennard, M, Pintor, A, Bonney, S, and Wedd, D. 2021. *Beetaloo GBA Region Baseline Survey Program*. Research Institute for Environment & Livelihoods, Charles Darwin University, Darwin, Australia.
- Department of Climate Change, Energy, the Environment and Water (DCCEEW). 2023a. *Conservation Advice for Tiliqua scincoides intermedia (northern blue-tongue skink)*. Australian Government, Canberra.
- Department of Climate Change, Energy, the Environment and Water (DCCEEW). 2023b. *Conservation Advice for Varanus mertensi (Mertens' Water Monitor)*. Australian Government, Canberra.
- Department of Climate Change, Energy, the Environment and Water (DCCEEW). 2023c. *Conservation Advice for Varanus mitchelli (Mitchell's Water Monitor)*. Australian Government, Canberra.
- Department of Environment (DoE). 2015. *Sawfish and River Sharks – Multispecies Recovery plan*. Commonwealth of Australia, Canberra.
<https://www.dcceew.gov.au/sites/default/files/documents/sawfish-river-sharks-multispecies-recovery-plan.pdf>.
- Department of the Environment (2014). *Tyto novaehollandiae kimberli in Species Profile and Threats Database*, Department of the Environment, Canberra. Available from:
<http://www.environment.gov.au/sprat>.
- Department of Environment and Natural Resource (DENR). 2018. *Northern Territory Stream Order, Strahler stream orders over the Northern Territory, topographic scale data 250k*, Spatial Data and Mapping Branch, Water Resources Division, Northern Territory Government, Darwin, NT.

Department of Environment Parks and Water Security (DEPWS) 2022a, SREBA Data Catalogue, <https://srebadata.nt.gov.au/> [accessed 6 July 2023].

Department of Environment Parks and Water Security (DEPWS) 2022b, Regional Report, Strategic Regional Environmental and Baseline Assessment (SREBA) for the Beetaloo Sub-basin, Northern https://depws.nt.gov.au/_data/assets/pdf_file/0005/1247018/sreba-beetaloo-regional-report.pdf. [accessed 10 December 2024]

Department of Environment Parks and Water Security (DEPWS) 2022c, Meta data: SREBA Beetaloo Geology. <https://srebadata.nt.gov.au/view/ntg-spa-000000076> [accessed 7 July 2023]

Department of Environment Parks and Water Security (DEPWS) 2022d, Aquatic Ecosystems Baseline Report, Strategic Regional Environmental and Baseline Assessment for the Beetaloo Sub-basin. <https://territorystories.nt.gov.au/10070/903891> [accessed 7 July 2023].

Department of Environment Park and Water Security (DEPWS). 2021a. *Threatened species of the Northern Territory – Tassel sedge Carex fascicularis*. Northern Territory Government. https://nt.gov.au/_data/assets/pdf_file/0020/208424/carex-fascicularis.pdf.

Department of Environment Park and Water Security (DEPWS). 2021b. Tennant Creek Regional Weeds Strategy. depws.nt.gov.au/_data/assets/pdf_file/0006/258099/tennant-creek-regional-weeds-strategy.pdf. Site accessed 6th July 2023.

Department of Environment Park and Water Security (DEPWS). 2021c. Katherine Regional Weeds Strategy. [Katherine Regional Weeds Strategy 2021-2026 \(nt.gov.au\)](https://nt.gov.au/_data/assets/pdf_file/0006/258099/tennant-creek-regional-weeds-strategy.pdf). Site accessed 6th July 2023

Department of Environment, Parks and Water Security (DEPWS). 2021d. *Threatened species of the Northern Territory – Grey Falcon Falco hypoleucos*. Northern Territory Government. https://nt.gov.au/_data/assets/pdf_file/0020/206354/grey-falcon.pdf.

Department of Environment, Parks and Water Security (DEPWS). 2021e. *Threatened species of the Northern Territory – Crested Shrike-tit (northern) Falcunculus frontatus whitei*. Northern Territory Government. https://nt.gov.au/_data/assets/pdf_file/0004/376168/crested-shrike-tit.pdf.

Department of Environment, Parks and Water Security (DEPWS). 2021f. *Threatened species of the Northern Territory – Night Parrot Pezoporus occidentalis*. Northern Territory Government. https://nt.gov.au/_data/assets/pdf_file/0016/206341/night-parrot.pdf

Department of Environment, Parks and Water Security (DEPWS). 2021g. *Threatened species of the Northern Territory – Australian Painted Snipe Rostratula australis*. Northern Territory Government. https://nt.gov.au/_data/assets/pdf_file/0018/206361/australian-painted-snipe.pdf.

Department of Environment, Parks and Water Security (DEPWS). 2021h. *Threatened species of the Northern Territory – Ghost Bat Macroderma gigas*. Northern Territory Government. https://nt.gov.au/_data/assets/pdf_file/0010/376138/ghost-bat.pdf

Department of Environment, Parks and Water Security (DEPWS). 2021i. *Threatened species of the Northern Territory - Bare-rumped sheath-tailed bat Saccolaimus saccolaimus nudiclunatus*. Northern Territory Government. Available from: https://nt.gov.au/_data/assets/pdf_file/0007/376117/bare-rumped-sheath-tailed-bat.pdf

Department of Environment, Parks and Water Security (DEPWS). 2021j. *Threatened species of the Northern Territory - Gulf snapping turtle Elseya lavarackorum*. Northern Territory Government. https://nt.gov.au/_data/assets/pdf_file/0008/376181/gulf-snapping-turtle.pdf

Department of Environment, Parks and Water Security (DEPWS). 2021k. *Threatened species of the Northern Territory – Mertens' Water Monitor Varanus mertensi*. Northern Territory Government. https://nt.gov.au/_data/assets/pdf_file/0018/206460/mertens-water-monitor.pdf

Department of Land Resource Management (DLRM). 2013. *Land Systems of the Southern part of the Northern Territory*. Northern Territory Government.

Directory of Important Wetlands in Australia (DIWA), Department of Climate Change, Energy, the Environment and Water (DCCEEW). <https://www.environment.gov.au/cgi-bin/wetlands/report.pl>.

- Dickman, C. R. 1996. *Impact of exotic generalist predators on the native fauna of Australia*. Wildlife Biology 2(3):185-195.
- Dickman C.R. 2009. *House cats as predators in the Australian environment: impacts and management*. Human-Wildlife Conflicts 3:41-48.
- Dostine, P.L., and Franklin, D.C. 2002. A comparison of the diet of three finch species in the Yinberrie Hills area, Northern Territory. *Emu* 102:159-164.
- Garnett, S and Baker, G.B. 2021. *The Action Plan for Australian Birds 2020*. CSIRO Publishing.
- Garnett, S., J. Szabo & G. Dutson. 2011. *The Action Plan for Australian Birds 2010*. CSIRO Publishing. Collingwood, Victoria.
- GHD. 2022. *Environmental Health Interim Baseline Report: Air Quality*. Strategic Regional Environmental and Baseline Assessment for the Beetaloo Sub-basin. DEPWS Technical Report 34/2022. NT Government.
- GISERA. 2020. *Characterising stygofauna and microbial assemblages in the Beetaloo Sub-basin*. Retrieved from Gas Industry Social and Environmental Research Alliance:
- Higgins, P.J. 1999. *Handbook of Australian, New Zealand and Antarctic Birds. Vol. 4: Parrots to Dollarbird*. Oxford University Press: Melbourne.
- Higgins, P.J. and Davies, S.J.J.F. 1996. *Handbook of Australian. New Zealand and Antarctic Birds, Volume 3, Snipe to Pigeons*. Oxford University Press, Melbourne.
- Holt R.M. and Bertram J.D., 1981. *The Barkly Tableland Beef Industry 1980*. Technical No. 41, June 1981, Alice Springs.
- Hose, G.C., Sreekanth, J., Barron, O. and Pollino, C. 2015. *Stygofauna in Australian Groundwater Systems: Extent of Knowledge*. CSIRO, Australia.
- HLA-Envirosciences, 2005, *Environmental Management Plan, Onshore Petroleum Exploration, Beetaloo Basin, NT*, Prepared for Sweetpea Corporation, NT.
- Humphreys G, Hamilton Z, Finston T, Hitchen Y. 2022. *Aquatic Ecosystems Baseline Report: Stygofauna. Strategic Regional Environmental and Baseline Assessment for the Beetaloo Sub-Basin*. DEPWS Technical Report 29/2022. Report to Northern Territory Department of Environment, Parks and Water Security. Biota Environmental Sciences and Helix Molecular Solutions.
- Menkhorst, P. and Knight F. 2011. *A Field Guide to the Mammals of Australia*. Oxford University Press, Sydney.
- Meyer, P. 2023. *Environmental Health Baseline Report: Water Quality. Strategic Regional Environmental and Baseline Assessment for the Beetaloo Sub-basin*. Report prepared for the Northern Territory Department of Environment, Parks and Water Security by Tetra Tech Coffey
- Northern Territory. Department of Natural Resources, Environment, The Arts And Sport (NRETAS). 2009. Lake Woods – Site of Conservation Significance. Biodiversity Conservation Unit. Division of Environment. Northern Territory Government, Palmerston.
- Orr, D. M., and Holmes, W. E. 1984. Mitchell grasslands. In: *'Management of Australia's Rangelands'*. (Eds G. N, Harrington, A. D. Wilson and M. D. Young.). pp. 241–254. CSIRO, Melbourne.
- Palmer, C., Woinarski J., and Ward S. 2012. *Threatened Species of the Northern Territory: Gouldian Finch Erythrura gouldiae*. Department of Land Resource Management, Northern Territory Government.
- Parks and Wildlife Commission of the NT (PWCNT). 2005. *Bullwaddy Conservation Reserve Plan of Management*, Parks and Wildlife Commission of the NT, Darwin.
- Pavey, C. 2006. *National Recovery Plan for the Greater Bilby Macrotis lagotis*. Northern Territory Department of Natural Resources, Environment and the Arts.
- Pizzey, G., and Knight, F. 2012. *The Field Guide to Australian Birds*. HarperCollins Publishers, Sydney.

- Rees G.N, Oberprieler, S., Nielsen, D., Watson, G., Shackleton, M. and Davis, J.A. 2020. *Characterisation of the stygofauna and microbial assemblages of the Beetaloo Sub-basin, Northern Territory*. CSIRO, Australia.
- Richards, C. Bond, M. (2023) *Environmental Health Baseline Report: Soils. Strategic Regional Environmental and Baseline Assessment for the Beetaloo Sub-basin*. Report prepared for the Northern Territory Department of Environment, Parks and Water Security by Tetra Tech Coffey
- Southgate, R. I. & Paltridge, R. 1998. *Recovery of the Greater Bilby Macrotis lagotis*. Final Report for Project Number 185, Nature Australia, Biodiversity Group, Endangered Species Program and Feral Pests Program.
- Smith, J.G., and Phillips, B.L. 2006. *Toxic tucker: the potential impact of cane toads on Australian reptiles*. Pacific Conservation Biology 12:40-49.
- Threatened Species Scientific Committee (TSSC). 2020b. *Conservation Advice Trichosurus vulpecula arnhemensis Northern Brushtail Possum*. Commonwealth Government.:
<http://www.environment.gov.au/biodiversity/threatened/species/pubs/83091-conservation-advice-11052021.pdf> .
- Threatened Species Scientific Committee (TSSC). 2020a. *Falco hypoleucos* Grey Falcon Conservation Advice. Commonwealth Government:
<https://www.environment.gov.au/biodiversity/threatened/species/pubs/929-conservation-advice-09072020.pdf>
- Tickell, S, J, 2003. Water Resource Mapping of the Barkly Tablelands. Department of Infrastructure, Planning and Environment, Northern Territory Government.
- Ward, S.J. 2008. Habitat-use, foraging and breeding ecology of the northern shrike-tit *Falcunculus frontatus whitei*. Report to NHT (Department of Natural Resources, Environment, the Arts and Sport, Darwin).
- Ward, S.J., Berghout, M. and Baker, B. 2009. Notes on the form and habitat of nests of the northern shrike-tit. *Northern Territory Naturalist*. Volume 21, pp. 54-60.
- Ward, S., Woinarski, J., Griffiths, T. and McKay, L. 2012. *Threatened Species of the Northern Territory: Yellow-spotted Monitor, Northern Sand Goanna, Floodplain Monitor Varanus panoptes*. Department of Land Resource Management, Northern Territory Government.
- Woinarski, J. and Hill, B. 2012. *Threatened Species of the Northern Territory: Northern Quoll Dasyurus hallucatus*. Northern Territory Department of Environment and Natural Resources, Northern Territory Government, Darwin, NT.
- Woinarski, J.C.Z., Pavey C., Kerrigan R., Cowie I. & Ward S. 2007. *Lost from our Landscape: Threatened Species of the Northern Territory*. Palmerston: Department of Natural Resources, Environment and the Arts.
- Young L, Patykowski J, Leiper I, Nano C, Fisher A, Gillespie G, Barnett G, Buckley K, Hanrahan N, McDonald P, Miller A, Ribot R, Ruykys L, Stewart A, Zimny A (2022). *Terrestrial Ecosystems Baseline Report: Strategic Regional Environmental and Baseline Assessment for the Beetaloo Sub-basin*. DEPWS Technical Report 36/2022. Flora and Fauna Division, Northern Territory Department of Environment, Parks and Water Security, Darwin.

Appendix A

Flora Atlas Records

Appendix A Flora Atlas Species Records

Table A Native flora recorded within 5 km of the SWP area

Family	Scientific Name
AMARANTHACEAE	<i>Gomphrena canescens</i>
AMARANTHACEAE	<i>Ptilotus fusiformis</i>
APOCYNACEAE	<i>Carissa lanceolata</i>
	<i>Wrightia saligna</i>
BIGNONIACEAE	<i>Dolichandrone heterophylla</i>
BORAGINACEAE	<i>Ehretia saligna</i>
BORAGINACEAE	<i>Heliotropium bracteatum</i>
CAPPARACEAE	<i>Capparis lasiantha</i>
CARYOPHYLLACEAE	<i>Polycarpaea corymbosa</i>
CELASTRACEAE	<i>Denhamia cunninghamii</i>
CELASTRACEAE	<i>Stackhousia intermedia</i>
COMBRETACEAE	<i>Macropteranthes kekwickii</i>
COMBRETACEAE	<i>Terminalia canescens</i>
COMMELINACEAE	<i>Murdannia graminea</i>
CONVOLVULACEAE	<i>Bonamia media</i>
	<i>Evolvulus alsinoides</i>
	<i>Polymeria ambigua</i>
	<i>Xenostegia tridentata</i>
CYPERACEAE	<i>Bulbostylis barbata</i>
	<i>Cyperus nervulosus</i>
	<i>Fimbristylis dichotoma</i>
	<i>Fimbristylis neilsonii</i>
	<i>Fimbristylis oxystachya</i>
	<i>Rhynchospora pterochaeta</i>
	<i>Rhynchospora wightiana</i>
	<i>Scleria brownii</i>
DROSERACEAE	<i>Drosera derbyensis</i>
EUPHORBIACEAE	<i>Euphorbia muelleri</i>
FABACEAE	<i>Acacia ancistrocarpa</i>
	<i>Acacia difficilis</i>
	<i>Acacia gonoclada</i>
	<i>Acacia hammondii</i>
	<i>Acacia holosericea</i>
	<i>Acacia shirleyi</i>
	<i>Acacia torulosa</i>
	<i>Acacia tumida</i> var. <i>kulparn</i>
	<i>Cajanus marmoratus</i>
	<i>Crotalaria ramosissima</i>
	<i>Desmodium filiforme</i>
	<i>Erythrophleum chlorostachys</i>
	<i>Indigofera linifolia</i>
	<i>Lysiphyllum cunninghamii</i>

Family	Scientific Name
	<i>Petalostylis cassioides</i>
	<i>Tephrosia leptoclada</i>
GOODENIACEAE	<i>Scaevola ovalifolia</i>
	<i>Scaevola parvifolia subsp. parvifolia</i>
LAMIACEAE	<i>Premna acuminata</i>
	<i>Premna serratifolia</i>
MALVACEAE	<i>Brachychiton paradoxus</i>
	<i>Corchorus sidoides</i>
	<i>Corymbia confertiflora</i>
	<i>Corymbia dichromophloia</i>
	<i>Corymbia ferruginea</i>
	<i>Corymbia setosa</i>
	<i>Corymbia terminalis</i>
	<i>Eucalyptus chlorophylla</i>
	<i>Eucalyptus leucophloia subsp. euroa</i>
	<i>Eucalyptus pruinosa subsp. pruinosa</i>
	<i>Eucalyptus tectifera</i>
	<i>Gossypium australe</i>
	<i>Grewia savannicola</i>
	<i>Hibiscus sturtii</i>
	<i>Hibiscus sturtii var. campylochlamys</i>
	<i>Melaleuca nervosa</i>
	<i>Melaleuca viridiflora</i>
	<i>Sida fibulifera</i>
	<i>Waltheria indica</i>
OLEACEAE	<i>Jasminum molle</i>
ONAGRACEAE	<i>Ludwigia perennis</i>
OROBANCHACEAE	<i>Buchnera linearis</i>
PHYLLANTHACEAE	<i>Phyllanthus carpentariae</i>
	<i>Phyllanthus exilis</i>
	<i>Phyllanthus maderaspatensis</i>
PICRODENDRACEAE	<i>Petalostigma pubescens</i>
POACEAE	<i>Aristida calycina var. calycina</i>
	<i>Aristida holathera</i>
	<i>Aristida hygrometrica</i>
	<i>Aristida inaequiglumis</i>
	<i>Aristida latifolia</i>
	<i>Aristida pruinosa</i>
	<i>Chrysopogon fallax</i>
	<i>Enneapogon lindleyanus</i>
	<i>Eragrostis tenellula</i>
	<i>Eriachne armittii</i>
	<i>Eriachne ciliata</i>
	<i>Eriachne melicacea</i>
	<i>Eriachne obtusa</i>

Family	Scientific Name
	<i>Eulalia aurea</i>
	<i>Mnesithea formosa</i>
	<i>Paspalidium rarum</i>
	<i>Schizachyrium fragile</i>
	<i>Setaria apiculata</i>
	<i>Setaria surgens</i>
	<i>Sorghum intrans</i>
	<i>Sporobolus australasicus</i>
	<i>Triodia bitextura</i>
	<i>Triodia inutilis</i>
	<i>Yakirra majuscula</i>
POLYGALACEAE	<i>Polygala crassitesta</i>
	<i>Polygala eriocephala</i>
PORTULACACEAE	<i>Calandrinia gracilis</i>
	<i>Portulaca bicolor</i>
	<i>Portulaca oleracea</i>
PROTEACEAE	<i>Grevillea parallela</i>
	<i>Grevillea striata</i>
	<i>Hakea arborescens</i>
RHAMNACEAE	<i>Alphitonia excelsa</i>
	<i>Ventilago viminalis</i>
RUBIACEAE	<i>Gardenia ewartii</i> subsp. <i>ewartii</i>
	<i>Gardenia pyriformis</i> subsp. <i>pyriformis</i>
	<i>Oldenlandia galioides</i>
	<i>Spermacoce argillacea</i>
	<i>Spermacoce brachystema</i>
SAPINDACEAE	<i>Atalaya hemiglauca</i>
	<i>Dodonaea hispidula</i>
	<i>Dodonaea physocarpa</i>
STYLIDIACEAE	<i>Stylidium adenophorum</i>
THYMELAEACEAE	<i>Pimelea punicea</i>
VIOLACEAE	<i>Afrohybanthus enneaspermus</i>

Appendix B

Protected Matters
Search Report 10 km
and 50 km



Australian Government

Department of Climate Change, Energy,
the Environment and Water

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: 13-Dec-2024

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

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:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	14
Listed Migratory Species:	13

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <https://www.dcceew.gov.au/parks-heritage/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:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	17
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:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	None
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	1

Details

Matters of National Environmental Significance

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	Buffer Status
BIRD			
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Chloebia gouldiae listed as Erythrura gouldiae Gouldian Finch [90091]	Endangered	Species or species habitat may occur within area	In feature area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area	In feature area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat may occur within area	In feature area
MAMMAL			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat may occur within area	In feature area
Trichosurus vulpecula arnhemensis Northern Brushtail Possum [83091]	Vulnerable	Species or species habitat likely to occur within area	In feature area
REPTILE			
Tiliqua scincoides intermedia Northern Blue-tongued Skink [89838]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Varanus mertensi Mertens' Water Monitor, Mertens's Water Monitor [1568]	Endangered	Species or species habitat may occur within area	In feature area
Varanus mitchelli Mitchell's Water Monitor [1569]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
SHARK			
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
Listed Migratory Species		[Resource Information]	
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Marine Species			
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Terrestrial Species			
Cecropis daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area	In feature area
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
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Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area	In feature area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]	
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			

Scientific Name	Threatened Category	Presence Text	Buffer Status
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Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area

Extra Information

Geological and Bioregional Assessments			[Resource Information]
Name	State	Website	Buffer Status
Beetaloo GBA region	NT	GBA website	In feature area

Caveat

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- distribution of listed threatened, migratory and marine species;
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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.

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- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

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Australian Government

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the Environment and Water

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: 17-Dec-2024

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

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:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	19
Listed Migratory Species:	13

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <https://www.dcceew.gov.au/parks-heritage/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:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	18
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:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	1
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	1

Details

Matters of National Environmental Significance

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	Buffer Status
BIRD			
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Chloebia gouldiae listed as Erythrura gouldiae Gouldian Finch [90091]	Endangered	Species or species habitat likely to occur within area	In feature area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat may occur within area	In feature area
MAMMAL			
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Trichosurus vulpecula arnhemensis Northern Brushtail Possum [83091]	Vulnerable	Species or species habitat likely to occur within area	In feature area
REPTILE			
Acanthophis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Elseya lavarackorum Gulf Snapping Turtle [67197]	Endangered	Species or species habitat may occur within area	In buffer area only
Tiliqua scincoides intermedia Northern Blue-tongued Skink [89838]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Varanus mertensi Mertens' Water Monitor, Mertens's Water Monitor [1568]	Endangered	Species or species habitat may occur within area	In feature area
Varanus mitchelli Mitchell's Water Monitor [1569]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
SHARK			
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Marine Species			
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Terrestrial Species			
Cecropis daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area	In feature area
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
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Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area	In feature area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Listed Marine Species	[Resource Information]		
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area overfly marine area	In feature area
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Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area

Reptile			
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773]		Species or species habitat may occur within area	In buffer area only

Extra Information

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In buffer area only

Geological and Bioregional Assessments				[Resource Information]
Name	State	Website		Buffer Status
Beetaloo GBA region	NT	GBA website		In feature area

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Appendix C

Stygofauna Recorded
within 50 km of SWP
area

Appendix C Stygofauna Recorded within 50 km of SWP area

Table G Stygofauna recorded within 50 km of the SWP area (Rees *et al.*, 2020; Humphreys *et al.*, 2022)

Stygofauna	Highest Classification	Bore		
		Hayfield Shenandoah Homestead*	Sturt Plains Homestead*	RN038816
Amoebozoa	Phylum	✓		
Adinetida	Order	✓		
Agaricomycotina	Class	✓		
Ascomycota	Phylum	✓	✓	
Bionectriaceae	Family	✓		
Capnodiales	Order	✓	✓	
Cochliopodiidae	Family	✓		
Crustacea	Class	✓	✓	
Demospongiae	Class	✓		
Discosea	Class	✓	✓	
Dothideomycetes	Class		✓	
<i>Enchytraeidae</i>	Genus			✓
Exobasidiomycetes	Class	✓		
Haplotaxida	Order	✓		
Helotiales	Order	✓		
Himatismenida	Class	✓	✓	
Hypocreales	Order	✓	✓	
Leotiomycetes	Order		✓	
Macrotrichidae	Family	✓		
Malacostraca	Class	✓	✓	
Maxillopoda	Class	✓		
Nematoda	Phylum	✓		
Oomycetes	Phylum	✓	✓	
Ploima	Order	✓	✓	
Porifera	Phylum	✓		
Saprolegniales	Order	✓		
Sordariomycetes	Family	✓	✓	
Stemonitidae	Family	✓		
Tricladida	Order	✓		
Vannellidae	Family	✓		

* Stygofauna identified by eDNA

APPENDIX B.1

Cultural Heritage Assessment (AECOM, 2024b)

17 April 2025

Alana Court
Senior Approvals Manager
Tamboran B2 Pty Ltd
PO Box 2264

Dear Alana

Cultural Heritage Assessment - Shenandoah South Sand Wash Plant

1.0 Introduction

Tamboran B2 Pty Ltd (Tamboran) is seeking to expand their gas exploration program within exploration permit (EP) areas EP98 and EP117, south-east of Daly Waters in the Beetaloo Sub-basin, Northern Territory. Tamboran engaged AECOM Australia Pty Ltd (AECOM) to provide a heritage assessment to further develop a previous clearance area known as the Kyalla 117 N2 well site. AECOM's assessment has considered a range of activities controlled under Regulation (r.) 5 of the Petroleum (Environment) Regulations 2016 (the Regulations), including land clearance, earthworks, and the placement of gas exploration infrastructure (AECOM Australia Pty Ltd, 2023a, 2023b, 2023c, 2024). Tamboran has requested a heritage assessment of the area to support the submission of the Environment Management Plan required under r. 6 of the Regulations.

This heritage assessment covers the proposed Shenandoah South (SS) Sand Wash Plant (SWP) at the Kyalla 117 N2 well site within the Shenandoah South Exploration and Appraisal area (SS E&A area). The SS SWP measures 350 m x 320 m (11.2 ha) and is on land adjacent to the Kyalla 117 N2 well pad and within the area assessed in 2017 (Figure 1).

The following heritage assessment of the SS SWP has been completed in accordance with relevant legislation (see Appendix A), and draws on desktop review of existing heritage data from the Australian Heritage database, the NT Heritage Branch and archaeological survey reports, as well as the results of the previous field inspections by representatives of AECOM and Bamarrnganja Traditional Owners (AECOM Australia Pty Ltd, 2023a, 2023b, 2023c, 2024).

2.0 Project Location and Overview

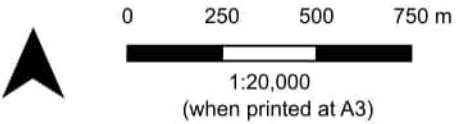
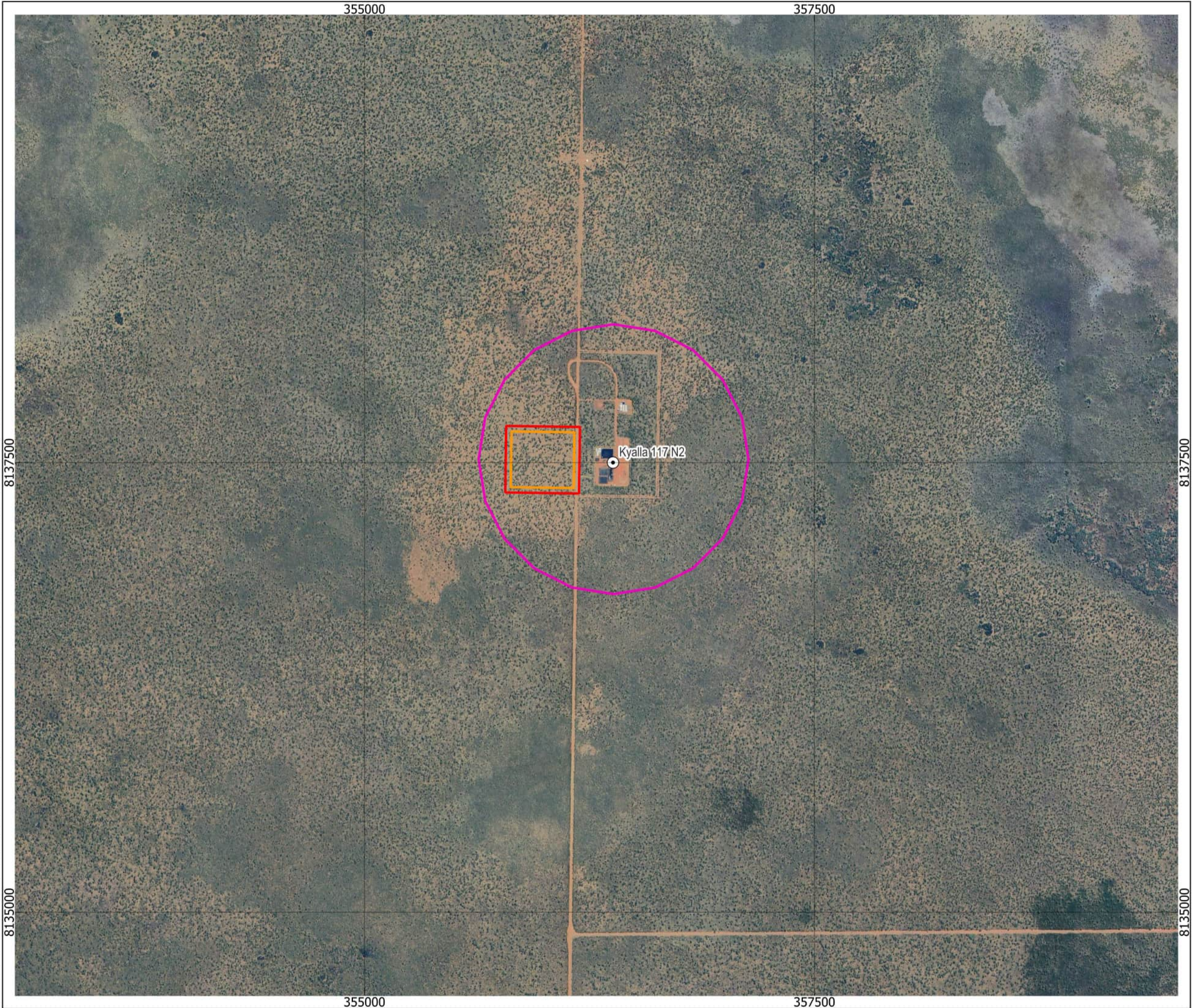
Tamboran is proposing to expand their gas exploration program in the Beetaloo Sub-basin. As part of these development efforts, a wash plant is proposed adjacent to the Kyalla 117 N2 well site, adjacent to the existing well pad (Table 1, Figure 1). The SS SWP will involve activities specified under r. 5 of the Regulations, including land clearing, earthworks, and the construction and operation of a facility in connection with a technical works programme for a petroleum interest.

While the SS SWP itself will only occupy 11.2 ha, an area of 15 ha (the Study Area) has been established for the purposes of this assessment. This wider Study Area entirely encompasses the likely impacts associated with project works and allows some flexibility in final siting (Figure 1).

Table 1 Project Coordinates

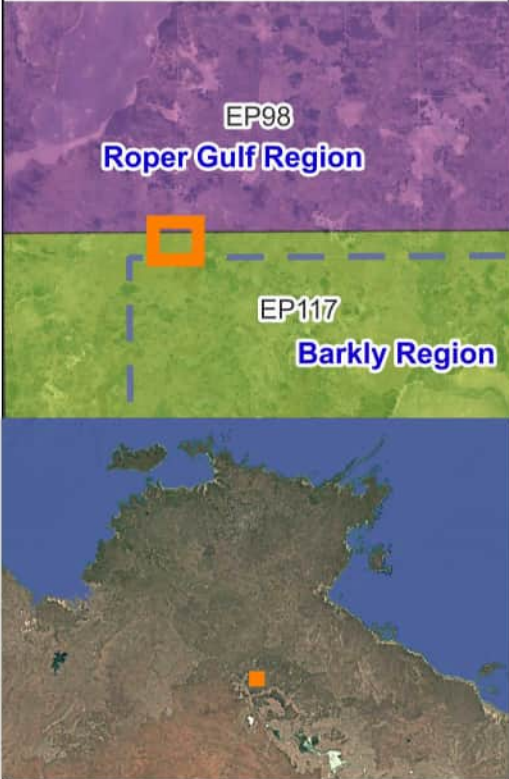
Name	Potential Works	Centroid	
		Datum: GDA94 Zone 53	
		Easting	Northing
Kyalla 117 N2	SS SWP	355990	8137518

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LEGEND

- Kyalla 117 N2**
- Well Pad Point 
- Well Pad Project Area 
- Shenandoah South Sand Wash Plant Project Area**
- Shenandoah South Sand Wash Plant (SS SWP) 
- Study Area 
- Boundaries**
- Local Government Area 
- Exploration Permit**
- EP117 
- EP98 



Data Sources: AECOM, Google Satellite, Northern Territory Government, Tamboran

CRS: GDA94 Zone 53

Tamboran B2 Pty Ltd
Shenandoah South Sand Wash Plant Cultural Heritage Assessment
SS SWP and Study Area

PROJECT ID	60667354	Figure 1
CREATED BY	KC	
LAST MODIFIED	16-4-2025	
VERSION	1	

3.0 Methodology

The contents of this report have been compiled on the basis of desktop review, as outlined in the following section.

3.1 Aboriginal heritage

In accordance with legislative and project requirements, the Aboriginal cultural heritage desktop assessment comprises:

- Searches of Commonwealth and Territory heritage registers to identify known heritage places
- Searches of the National Native Title Tribunal (NNTT) to identify relevant Native Title claims or determinations
- Review of Aboriginal Areas Protection Authority (AAPA) certificates to identify sacred sites or exclusion areas
- Review of physiographic information to identify areas with high potential for Aboriginal heritage sites
- Review of past relevant archaeological survey reports and assessments to understand the heritage context.

3.1.1 Predictive Modelling

Across Australia, numerous archaeological studies in different environmental zones and contexts have demonstrated a correlation between the permanence of a water source and the permanence and/or complexity of Aboriginal occupation (e.g. Rowland & Connolly, 2002). AECOM's analysis shows most archaeological sites in the Beetaloo Basin are located within 100 m of a water source. Of the two artefact scatters not associated with a water source, one was associated with a stone outcrop (chert) suitable for stone tool manufacture. The other was associated with a seasonally inundated flood plain rather than a permanent or ephemeral water source (Appendix B).

Previous studies have drawn a connection between stands of bullwaddy and lancewood-bullwaddy and heritage sites, including sacred sites and artefact scatters (AECOM, 2020; HLA-Envirosciences Pty Ltd, 2006a; HLA-Envirosciences Pty Ltd, 2007). However, our most recent studies have shown the relationship between vegetation types and Aboriginal heritage sites is a shared correlation with the presence of water, rather than a predictor in its own right. As such, areas with the highest potential for sensitive landforms are those surrounding soaks and depressions, permanent or ephemeral water sources, as well as non-flooding areas adjacent to established channels and areas containing outcropping stone suitable for stone tool manufacture (AECOM, 2012; HLA-Envirosciences Pty Ltd, 2006a).

As part of this assessment, AECOM has used this predictive model to identify the presence of landforms with Aboriginal cultural heritage sensitivity (sensitive landforms) in and around the Study Area. Details on the predictive modelling are included in Appendix C.

3.2 Historical Heritage

In accordance with legislative and project requirements, the historical cultural heritage desktop assessment comprises:

- Searches of Commonwealth and Territory heritage registers to identify known heritage places
- Review of past relevant survey reports and assessments to understand the heritage context
- Review of historical mapping and imagery to identify previous structures or other forms of development of potential heritage significance.

4.0 Register Searches

4.1 Native Title

A search of the Native Title Register on 27 November 2024 shows one Native Title determination exists over the Study Area (see Table 2).

Table 2 Native title current for SS wash plant area

Type	Site	Name	Summary
Native Title	SS SWP	NTD21/2010 Shenandoah Pastoral Lease	Native Title exists in parts of the determination area and is held by the Kinbininggu and Bamarrngganja group.

It is noted that the Native Title Petroleum Exploration Agreement between Tamboran, the NLC and Traditional Owners include clauses for the protection of sacred sites, objects and sensitive areas related to Aboriginal activities in the area, including cultural, hunting and foraging activities. It also includes clauses such as site clearances to occur prior to any ground activities and clauses for the protection of the environment and site rehabilitation.

4.2 Commonwealth Heritage Registers

A search of the Australia Heritage Database on 27 November 2024 identified that there are no statutory or non-statutory heritage places within or adjacent to the Study Area.

4.3 Northern Territory Heritage Register

A search of the public aspects of the Northern Territory Heritage Register (NTHR) on 27 November 2024 did not identify any heritage places or artefacts within or adjacent to the Study Area.

As part of the wider heritage assessments in the Beetaloo Basin (AECOM 2024), a request was lodged with the Northern Territory Heritage Branch for a search of confidential aspects of the NTHR on 19 March 2024. Responses on 4 June 2024 identified that there are no nominated, provisionally declared, or declared Aboriginal archaeological or Macassan heritage places or objects within the wider EP areas (Appendix D).

4.4 Aboriginal Areas Protection Authority

Aboriginal Areas Protection Authority (AAPA) Authority Certificate C2024/031 applies to Tamboran exploration activities in the Shenandoah South E&A area. This AAPA certificate identifies the extent of recognised sacred sites and established Restricted Works Areas, none of which overlap with the Study Area.

5.0 Previous Archaeological Investigations

The majority of archaeological investigations near the Study Area have been associated with either linear infrastructure parallel to the Stuart Highway, or to natural gas exploration activities associated with the Beetaloo Basin. Of the assessments relevant to the Study Area, the majority of heritage sites identified are artefact scatters composed of commonly found local raw material (quartz, silcrete and quartzite). One stone arrangement and one ochre resource area have also been recorded. AECOM has been involved in numerous other heritage assessments in the Beetaloo Basin, including assessments on the Shenandoah-Hayfield leases and adjacent properties with similar physiographic contexts.

Previous surveys of the wash plant area are discussed in the following section, with summary detail on regional studies provided in Appendix B.

5.1 AECOM 2019

A heritage assessment including site inspection of the Study Area was undertaken by AECOM archaeologist on 28 to 29 August 2017. This inspection was part of a wider survey of the Kyalla 117 N2 well site and 500 m buffer and involved helicopter and pedestrian survey of the proposed exploration area and access tracks.

A separate anthropological survey was conducted by AAPA representatives and Traditional Owners. Results from the anthropological survey were not available for review at the time of this report and are not included, although the AAPA certificate provided does not indicate any restricted work areas in close proximity to the Study Area.

At arrival at the inspection target, the helicopter made a series of passes to assist in the identification of landforms/ecological features of interest to the heritage survey. Upon landing, survey targeted these areas, or in cases where no landform/ecological features were identified, general survey would be undertaken targeting areas of surface ground exposure (Figure 1 and Figure 2).

During the inspection notes were taken on landform, ground surface visibility (GSV) and Ground Surface Integrity (GSI) (Appendix E). The aim of the inspection was to identify any surface expressions of Aboriginal archaeological and cultural heritage values. Photographic records were taken at each proposed disturbance location.

5.1.1 Results

No culturally sensitive landforms or archaeological sites were observed. GSV was varied across the surveyed areas, ranging from 31-50%. GSI was generally high, with a lack of previous significant ground disturbance over the majority of the survey area (see Table 3 for summary).

Although the pedestrian survey did not cover the entirety of the Kyalla 117 N2 well site, archaeologists considered the sample sufficient to characterise the area, and to determine low potential for heritage sites.

Plate 1 and Plate 2 provide photographs illustrating the landscape context and GSV conditions encountered at the Kyalla 117 N2 well site clearance area.

Table 3 2017 survey results for Kyalla 117 N2 well site

Location	GSV%	GSI	Surface Archaeology	Subsurface Potential	Impact Potential
Kyalla 117 N2	31 – 50%	High	None identified	Low	Low to no impact



Plate 1 Kyalla 117 N2 general context



Plate 2 Kyalla 117 N2 aerial context

6.0 Heritage Assessment

6.1 Aboriginal Heritage

There are no registered Aboriginal archaeological sites or sacred sites in or adjacent to the Study Area, and the previous survey of the area identified no elements of Aboriginal heritage value.

A review of satellite imagery and physiographic information indicates that no watercourses intersect with the Study Area (Figure 2), and that the surface geology for the area does not contain raw stone materials suitable for stone artefact manufacture (Figure 3). As such, no sensitive landforms exist in or near the Study Area, and the archaeological potential of the area is considered to be low. The archaeological potential of the Study Area is considered further in Appendix C.

6.2 Historical Heritage

There are no registered historical heritage sites in or adjacent to the Study Area, and the previous survey of the area identified no elements of historical heritage value.

Heritage listings and previous reports for the broader region indicates a range of possible heritage sites in the area, including military sites (particularly sites associated with WWII), mines and mining infrastructure, early townships, pastoral homesteads and infrastructure including airfields, railways, roads, bridges and telegraph lines (Quaternary Archaeological Surveys, 1998).

However, a review of satellite imagery and historical pastoral and cadastral maps indicated no documented development in the Study Area. The Overland Telegraph line is visible on several historical maps, but this is located more than 20 km to the west of the Study Area. Given these factors, the historical heritage potential of the Study Area is low.

6.3 Impact Assessment

No cultural heritage sites or areas of heritage values have been identified within or adjacent to the Study Area. Based on the desktop assessment, no impacts are anticipated.

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LEGEND

Kyalla 117 N2

Well Pad Point



Well Pad Project Area



Shenandoah South Sand Wash Plant Project Area

SS SWP



Study Area



Boundaries

Local Government Area



Exploration Permit

EP117

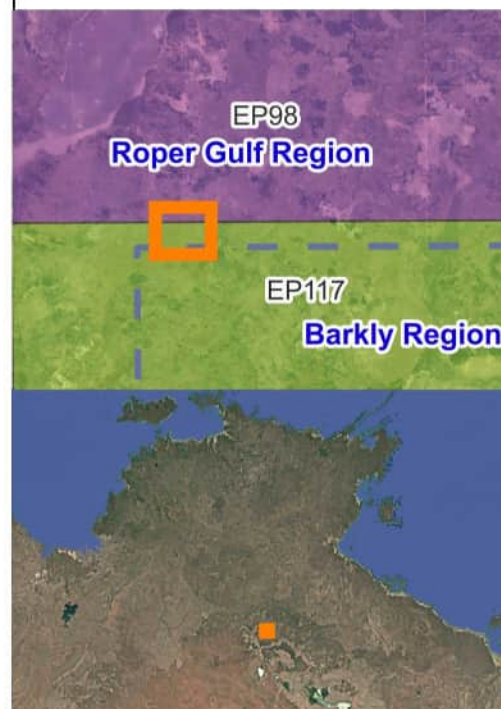


EP98



Sensitive Landforms

Water Source



Data Sources:
AECOM
Google Satellite
Northern Territory Government
Tamboran

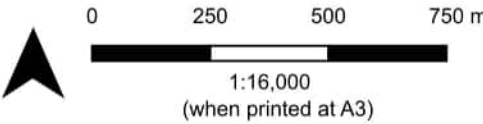
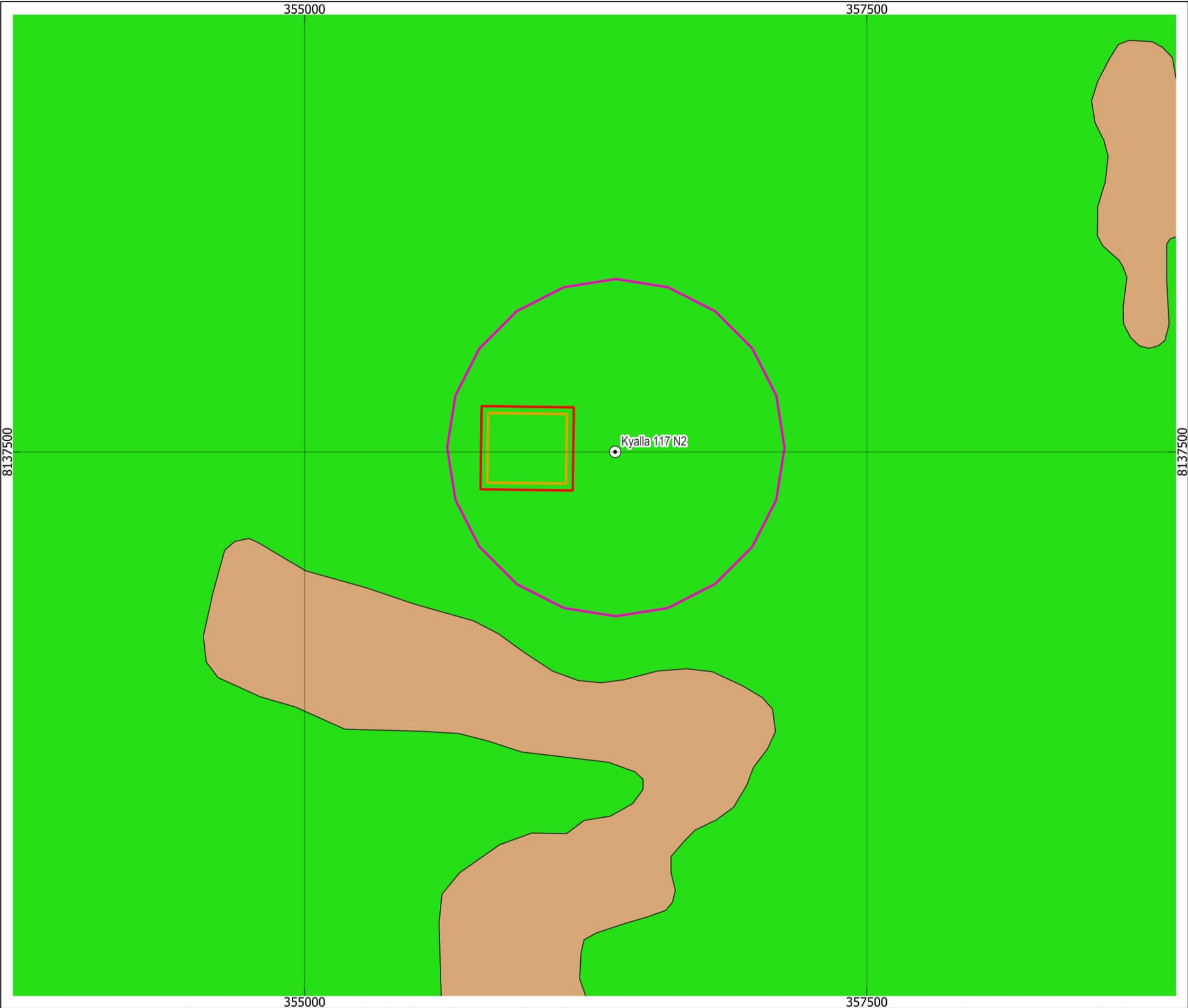
CRS:
GDA94 Zone 53

Tamboran B2 Pty Ltd
Shenandoah South Sand Wash
Plant Cultural Heritage Assessment
Sensitive Landforms

PROJECT ID 60667354
CREATED BY KC
LAST MODIFIED 16-4-2025
VERSION 1

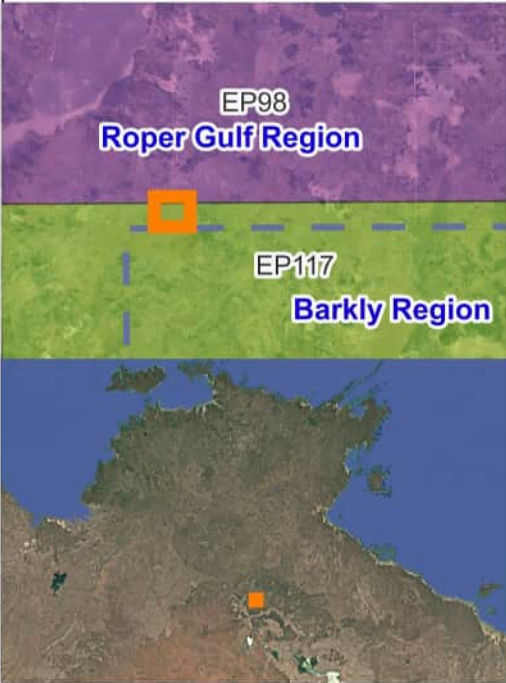
Figure
2

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LEGEND

- Kyalla 117 N2**
- Well Pad Point
- Well Pad Project Area
- Shenandoah South Sand Wash Plant Project Area**
- SS SWP
- Study Area
- Boundaries**
- Local Government Area
- Exploration Permit**
- EP117
- EP98
- Surface Geology**
- Laterite and lateritic rubble and soil
- Residual soil, ferruginous gravel, sand, talus



Data Sources:
AECOM
Google Satellite
Northern Territory Government
Tamboran

CRS:
GDA94 Zone 53

Tamboran B2 Pty Ltd
Shenandoah South Sand Wash
Plant Cultural Heritage Assessment
Surface Geology

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VERSION 1

Figure
3

7.0 Key Findings

The key findings of this heritage assessment are:

- There are no registered Aboriginal sacred or archaeological sites, or historical heritage sites in or adjacent to the Study Area.
- An aerial and targeted pedestrian survey completed in 2017 for the Kyalla 117 N2 well site, including the location of the Study Area, identified no Aboriginal archaeological sites or culturally sensitive landforms, and no historical heritage sites.
- A review of physiographic information indicates there are no sensitive landforms in the Study Area, and the Aboriginal archaeological potential of the area is low.
- A review of historical documents identified no known historical development in the Study Area, and the potential for historical heritage places is considered low.

8.0 Recommendations

There are no known heritage values in the Study Area, and the potential for unknown heritage sites is considered low. However, the following recommendations are made to manage residual risk, and ensure compliance with legislative requirements:

- The SS wash plant construction activities should be carried out in accordance with the conditions of all relevant AAPA Certificates, including Authority Certificate C2024/031.
- To avoid impacts to unidentified Aboriginal heritage sites, cultural managers (Native Title holders) should inspect all Project works areas prior to any clearing or access.
- The Tamboran unexpected heritage finds stop work procedure should be implemented for the duration of proposed works.
- Where heritage places or objects are identified, they should be avoided.
- If impacts to any heritage place or object cannot be avoided, an approval must be sought under Part 3.2 of the *Heritage Act 2011*.
- Induction of staff on site should include reference to the unexpected finds procedure and any relevant heritage no-go zones.
- Any Aboriginal heritage finds, or historical heritage finds of potential significance must be documented (described, photographed and GPS located) and reported to the NT Heritage Branch in accordance with Section 114 of the *Heritage Act 2011*.

Yours faithfully



Karene Chambers
Heritage Professional



References

AECOM Australia Pty Ltd (2011) *Archaeological Assessment - Drill Sites and Access Roads: Beetaloo Basin, Barkly Region NT*, Unpublished report to Falcon Oil and Gas Australia Limited.

— (2012a) *EP99 Archaeological Survey, Beetaloo Basin*, Unpublished report for Falcon Oil and Gas Australia.

— (2012b) *Interim Report Archaeological Surveys 2011*, Unpublished report for Hess Australia (Beetaloo) Pty Limited.

— (2014) *Aboriginal & Historic Heritage Assessment*, Unpublished report for Origin Energy Resources Limited.

— (2015) *Paltar Petroleum Limited: Aboriginal & Historic Heritage Assessment*, Unpublished report to Paltar Petroleum Limited.

— (2019) *Aboriginal and Historic Heritage Assessment: 2018 Exploration Lease Areas*, Unpublished report for Origin Energy Resources Limited.

— (2020) *Cultural Heritage Assessment: EP136 - Beetaloo Sub-Basin, NT*, Unpublished report for Sweetpea Petroleum Pty Ltd.

— (2021) *Cultural Heritage Assessment: Amungee NW 1 and Velkerri 76 S2*, Unpublished report for Origin Energy Resources Ltd.

— (2023a) *Cultural Heritage Assessment: Amungee NW 3*, Unpublished report for Tamboran B2 Pty Ltd.

— (2023b) *Cultural Heritage Assessment: Kyalla Study Area*, Unpublished Report for Tamboran Resources Ltd.

— (2023c) *Cultural Heritage Assessment Report: Shenandoah and Amungee Heritage Scouting*, Unpublished report for Tamboran B2 Pty Ltd, Brisbane, Australia.

— (2024) *Cultural Heritage Assessment: Beetaloo Basin Heritage Scouting - Shenandoah South Exploration and Appraisal Program Area*.

AECOM Australia Pty Ltd (AECOM) (2012) 'Final Report Archaeological Surveys 2011/2012: Onshore Seismic Exploration Program, Beetaloo Basin, NT'.

— (2024) *Cultural Heritage Assessment: Amungee North-West, Shenandoah North, Shenandoah South and Kyalla*.

Heritage Surveys (1999) *Additional archaeological assessments, Daly Waters to McArthur River Gas Pipeline, Northern Territory*, Unpublished report to Northern Territory Power and Water Authority.

Hermes M (1986) *Amadeus Basin to Darwin Natural Gas Pipeline - Spread 2: Internal report on archaeological findings*, Unpublished report to the NT Museums and Art Galleries.

HLA-Envirosciences Pty Ltd (2006a) *Archaeological Assessment 2006 for the Sweetpea Petroleum Seismic Program, Beetaloo Basin, Northern Territory, 2006*, Unpublished report for Sweetpea Petroleum Pty Ltd.

— (2006b) *Beetaloo Basin: Cooee Hill and 80 Metre Tower Archaeological Assessment*, Unpublished report for Sweetpea Petroleum Pty Ltd.

— (2006c) *Beetaloo Basin: Newcastle Creek Archaeological Assessment*, Unpublished report for Sweetpea Petroleum Pty Ltd.

— (2006d) *Beetaloo Basin: Yaroo, South Martyr's Tree and Dunmarra Archaeological Assessment*, Unpublished report for Sweetpea Petroleum Pty Ltd.

— (2007) *Beetaloo Basin: Newcastle Creek (Seismic Line 13A) Archaeological Assessment*, Unpublished report for Sweetpea Petroleum Pty Ltd.

Quaternary Archaeological Surveys (1998) *Archaeological survey of the Stuart Highway to Mataranka*

Homestead Optic Fibre Cable Corridor, Northern Territory, Unpublished report for Telstra.

Rowland M and Connolly M (2002) 'Towards GIS Mapping and Spatial Modelling of Archaeological Sites in the Southeast Queensland Bioregion', *Queensland Archaeological Research*, 13(August 2000):39, doi:10.25120/qar.13.2002.67.

Smith MA (1986) 'An Investigation of Possible Pleistocene Occupation at Lake Woods, Northern Territory', *Australian Archaeology*, 22:60–74.

Appendix A – Legislation

Commonwealth Legislation

Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) took effect on the 16 July 2000. Under section 26 of the EPBC Act it is stated that:

A person must not take on Commonwealth land an action that has, will have or is likely to have a significant impact on the environment.

Under section 28 of the EPBC Act it is stated that:

The Commonwealth or a Commonwealth agency must not take inside or outside the Australian jurisdiction an action that has, will have or is likely to have a significant impact on the environment inside or outside the Australian jurisdiction.

An action is defined as a project, development, undertaking, activity, series of activities, or alteration. An action will also require approval if:

- It is undertaken on Commonwealth land and will have or is likely to have a significant impact;
- It is undertaken outside Commonwealth land and will have or is likely to have a significant impact on the environment on Commonwealth land; and
- It is undertaken by the Commonwealth and will have or is likely to have a significant impact.

The EPBC Act defines 'environment' as both natural and cultural environments and therefore includes Aboriginal and historic heritage items. Under the Act, protected heritage items are listed on the National Heritage List (items of significance to the nation) or the Commonwealth Heritage List (items belonging to the Commonwealth or its agencies). These two lists replaced the Register of the National Estate (RNE) which is no longer a statutory list.

Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (the ATSIHP Act) provides for the preservation and protection of places, areas and objects of particular significance to Indigenous Australians. The stated purpose of the ATSIHP Act is the 'preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters, being areas and objects that are of particular significance to Aboriginals in accordance with Aboriginal tradition' (section 4).

Under the Act, 'Aboriginal tradition' is defined as "the body of traditions, observances, customs and beliefs of Aboriginals generally or of a particular community or group of Aboriginals, and includes any such traditions, observances, customs or beliefs relating to particular persons, areas, objects or relationships" (Section 3). A 'significant Aboriginal area' is an area of land or water in Australia that is of 'particular significance to Aboriginals in accordance with Aboriginal tradition' (Section 3). A 'significant Aboriginal object', on the other hand, refers to an object (including Aboriginal remains) of like significance.

For the purposes of the Act, an area or object is considered to be injured or desecrated if:

- In the case of an area:
 - it is used or treated in a manner inconsistent with Aboriginal tradition;
 - the use or significance of the area in accordance with Aboriginal tradition is adversely affected;
 - passage through, or over, or entry upon, the area by any person occurs in a manner inconsistent with Aboriginal tradition;
- in the case of an object:
 - it is used or treated in a manner inconsistent with Aboriginal tradition.

The ATSIHP Act can override state and territory laws in situations where a state or territory has approved an activity, but the Commonwealth Minister prevents the activity from occurring by making a

declaration to protect an area or object. However, the Minister can only make a decision after receiving a legally valid application under the ATSIHP Act and, in the case of long term protection, after considering a report on the matter. Before making a declaration to protect an area or object in a state or territory, the Commonwealth Minister must consult the appropriate Minister of that state or territory (section 13).

Native Title Act 1993

The *Native Title Act 1993* (NT Act) provides for the recognition and protection of native title for Indigenous peoples. The NT Act recognises native title for land over which native title has not been extinguished, and where persons able to establish native title are able to prove continuous use, occupation or other classes of behaviour and actions consistent with a traditional cultural possession of those lands. It also makes provision for Indigenous Land Use Agreements (ILUA) to be formed.

Aboriginal Land Rights (Northern Territory) Act 1976

The *Aboriginal Land Rights Act* (ALRA) changed Aboriginal reserves within the Northern Territory to freehold title held in trust. The Act mandated the formation of Land Councils to act in the interests of Northern Territory Aboriginal people in the areas of land, access to lands, employment and the development of businesses. The Act also defined Sacred Sites as sites that are sacred, or otherwise significant, in the Aboriginal Tradition'. The Act protected these sites from damage, whether accidental or intentional. The NT Aboriginal Sacred Sites Act 1989 uses this definition of sacred in its purpose of protecting these sites outside of Land Trust lands. On Pastoral Lease Lands, the general procedure is for the AAPA to conduct the Sacred Site surveys with the relevant Site Custodians, then issue an Authority Certificate under the Act.

Territory Legislation

Heritage Act 2011

The *Heritage Act 2011* provides for the protection of both natural and cultural heritage (Aboriginal, historical and Macassan heritage) within the Northern Territory. The Act establishes the Heritage Council (consisting of eleven members) and the NT Heritage Register. It sets the process by which places become heritage places and allows for interim protection of places.

It is an offence to remove or damage heritage places or objects or to mislead or obstruct heritage officers regarding the provision of requested information or entry to works, vehicles or premises that are likely to have been involved in an offence against the Heritage Act. Compliance with the requirements of the Act must be adhered to at all times.

Northern Territory Aboriginal Sacred Sites Act 1989

The *Northern Territory Aboriginal Sacred Sites Act 1989* was established to provide a system that protects sacred sites whilst providing for the development of land.

The Aboriginal Areas Protection Authority (AAPA) is a statutory authority established under the Sacred Sites Act and is responsible for overseeing the protection of sacred sites on land and sea across the whole of Australia's Northern Territory.

The Act establishes the protection of Aboriginal sacred sites through:

- Sacred site avoidance surveys and issuing authority certificates for any development proposals.
- Giving the public information about existing sacred sites through abstracts of Authority records and access to the registers the Authority maintains.
- Establishing and maintaining a Register of Sacred Sites
- Manages the rights of traditional custodians to access Sacred Sites.

The Act also establishes a range of offences and associated penalties that are aimed at protecting sacred sites. It is an offence to desecrate or disturb a site without the approval of the relevant custodians. A register of known sites exists to assist in identifying the likelihood of disturbance and

potential need to obtain approval. The Act also establishes a duty-of-care to notify the AAPA of any potential disturbance to Aboriginal sacred sites.

Appendix B – Previous Archaeological Investigations

Table 4 provides a summary of previous archaeological investigations undertaken in the local area.

Table 4 Previous archaeological assessments relevant to the wash plant area

Researchers	Assessment Type	Locality	Key Findings
Smith (1986)	Excavation	Lake Woods	<i>In situ</i> artefacts dated to 6,000 years.
Hermes (1986)	Survey	Amadeus Basin to Katherine	Large scale survey for a proposed gas pipeline targeting areas of high cultural sensitivity between Daly Waters and Katherine. Thirty-two sites were recorded, mostly comprising artefact scatters associated with watercourses.
Quaternary Archaeological Surveys (1998)	Survey	Stuart Highway to Mataranka Homestead	Large scale survey for a fibre optic cable corridor. Three isolated artefacts were recorded, as well as one historic heritage site consisting of seven concrete structures likely dating to World War II (WWII).
Heritage Surveys (1999)	Survey	Daly Waters to McArthur River	Nine archaeological sites were identified in this survey, including rockshelters and artefact scatters.
HLA Envirosciences (HLA) (2006a, 2006b, 2006c, 2006d, 2007), now AECOM.	Survey	Beetaloo Basin	Several archaeological sites were recorded within several exploration permit areas, including artefact scatters, isolated artefacts and stone cairns. A preliminary predictive model was developed based on site modelling and landform sensitivity.
AECOM (2011, 2012a, 2012b)	Survey	Beetaloo Basin	Several archaeological sites were identified during surveys of seismic survey lines and exploratory drilling locations, including several large artefact scatters (>1 km in extent), quarry sites and isolated artefacts. A predictive model was developed, refined and used in the field to identify 'hot spots' that have Indigenous archaeological potential.
AECOM (2014)	Survey	Beetaloo Basin	Heritage assessment completed for Origin exploration wells, including areas within EP98. One isolated artefact was identified.
AECOM (2015)	Survey	Beetaloo Basin	Large scale survey for four exploration drilling locations. One large artefact scatter and three smaller artefact scatters were identified.
AECOM (2019)	Survey	Beetaloo Basin	Heritage assessment completed for proposed exploration lease areas, including Kyalla 117 N2 on the Shenandoah pastoral lease. No surface archaeological sites were identified within the Shenandoah lease area.

Researchers	Assessment Type	Locality	Key Findings
AECOM (2020)	Survey	Beetaloo Basin	Heritage assessment completed for seismic survey areas within nearby EP136. The survey identified 25 Aboriginal archaeological sites, including several large artefact scatters associated with Newcastle Creek. Based on the findings of the assessment, AECOM identified the following landforms as having Aboriginal cultural heritage sensitivity: • Non-flood prone areas adjacent to established watercourses • Areas with distinctive vegetation patterning, such as those associated with <i>Macropteranthes kekwickii</i> (bullwaddy) • Areas adjacent to flood plains where a noticeable change in vegetation was identified • Areas on the periphery of lagoons and 'chain of ponds' features.
AECOM (2021)	Survey	Beetaloo Basin	Heritage assessment completed for seismic survey areas within the Amungee NW-1 and Velkerri 76 S2 project areas. A targeted survey assessment identified nine Aboriginal archaeological sites surrounding soaks and depressions and in non-flood prone areas adjacent to drainage channels.
AECOM (2024)	Survey	Beetaloo Basin	Heritage assessment completed for 17 potential well pads, three laydown areas, three seismic lines, and three access tracks across the Amungee North-West (NW), Shenandoah North, Shenandoah South and Kyalla project areas. Pedestrian surveys were undertaken for the well pads and laydown areas, and targeted pedestrian surveys were undertaken for seismic survey lines in areas containing landforms with cultural heritage sensitivity, including water sources and areas containing bullwaddy vegetation. All impact areas were subject to aerial survey. The survey identified two Aboriginal archaeological sites (both artefact scatters) associated with linear seasonal water sources and large drainage depressions surrounded by sparse vegetation and bullwaddy stands. During the survey, Traditional Owners also identified one area – a waterhole – with potential intangible cultural significance.

Researchers	Assessment Type	Locality	Key Findings
AECOM (2024)	Survey	Beetaloo Basin	Heritage assessment completed for an exploration and appraisal program area for 70 seismic lines in a 315 km² area within the Shenandoah, Shenandoah East and Hayfield pastoral leases. Targeted aerial (helicopter) and pedestrian surveys were undertaken for areas containing landforms with cultural heritage sensitivity, including areas surrounding soaks and depressions, permanent or ephemeral water sources, as well as non-flooding areas adjacent to established channels and areas containing outcropping stone suitable for stone tool manufacture. The survey identified 15 Aboriginal archaeological sites, including seven artefact scatters, seven isolated artefacts and one ochre source. During the survey, Traditional Owners also identified one area – a sinkhole – as having intangible cultural significance.

Appendix C – Predictive Modelling

Predictive Modelling

1.0 Predictive Model Methodology

A predictive model for Aboriginal archaeological sensitivity in the Study Area was developed based on:

- A review of previous cultural heritage assessments
- Cultural heritage register search results
- Landscape modelling (including analysis of satellite and historical aerial imagery)
- A summary of the physiographic setting, surface geology, soils, vegetation, hydrology, topography, climatic and palaeoclimatic conditions
- An overview of the Aboriginal history of the region, including ethno-historic sources and post-contact Aboriginal history
- An overview of the archaeological context of the region, including consideration of previously developed predictive models (e.g. HLA-Envirosciences Pty Ltd 2006)
- An overview of the non-Indigenous history of the region.

Archaeological sensitivity was determined by two key factors:

- Subsurface archaeological potential: the type and location of archaeological sites likely to occur in an area, as indicated by landform and available resources (Table 1)
- Integrity: the likelihood that archaeological sites remain intact, as determined by historical land use and ground disturbance (Table 2).

Archaeological sensitivity is determined by the assessment of subsurface archaeological potential and ground surface integrity, as shown in Table 3.

Table 1 Definitions for subsurface archaeological potential

Subsurface Archaeological Potential	Definition
Low	Areas where subsurface archaeological materials are unlikely to occur due to unfavourable environmental conditions.
Moderate	Areas where subsurface archaeological materials may occur. Reasonably favourable environmental conditions exist, although high artefact counts or densities are unlikely. Subsurface evidence is likely to be the product of random discard events by Aboriginal people in the past.
High	Areas that are known or highly likely to contain subsurface archaeological material. The presence of archaeological materials typically reflects optimal environmental conditions. High artefact counts or densities and other archaeological features are likely due to repeated or intensive activity by Aboriginal people in the past.

Table 2 Ground Surface Integrity (GSI) ratings and descriptions

GSI rating	Definition
Low	The ground surface has been subjected to significant disturbance (for example, earthworks or excavations). Little to no integrity remains.
Moderate	The ground surface has been subject to moderate disturbance (for example, native vegetation clearance) but retains a reasonable degree of integrity.
High	The ground surface is unmodified or minimally modified.

Table 3 Archaeological sensitivity matrix

Sensitivity	Subsurface archaeological potential		
Integrity	High	Moderate	Low
Intact (high GSI)	High	Moderate	Low
Disturbed (moderate GSI)	Moderate	Low	Very low
Disturbed (low GSI)	Low	Very low	Nil

2.0 Landscape Context

Environmental variables such as landform, geology and ecology have a significant influence on how people act in the landscape, while subsequent land use and disturbance determine whether evidence of past activities are preserved.

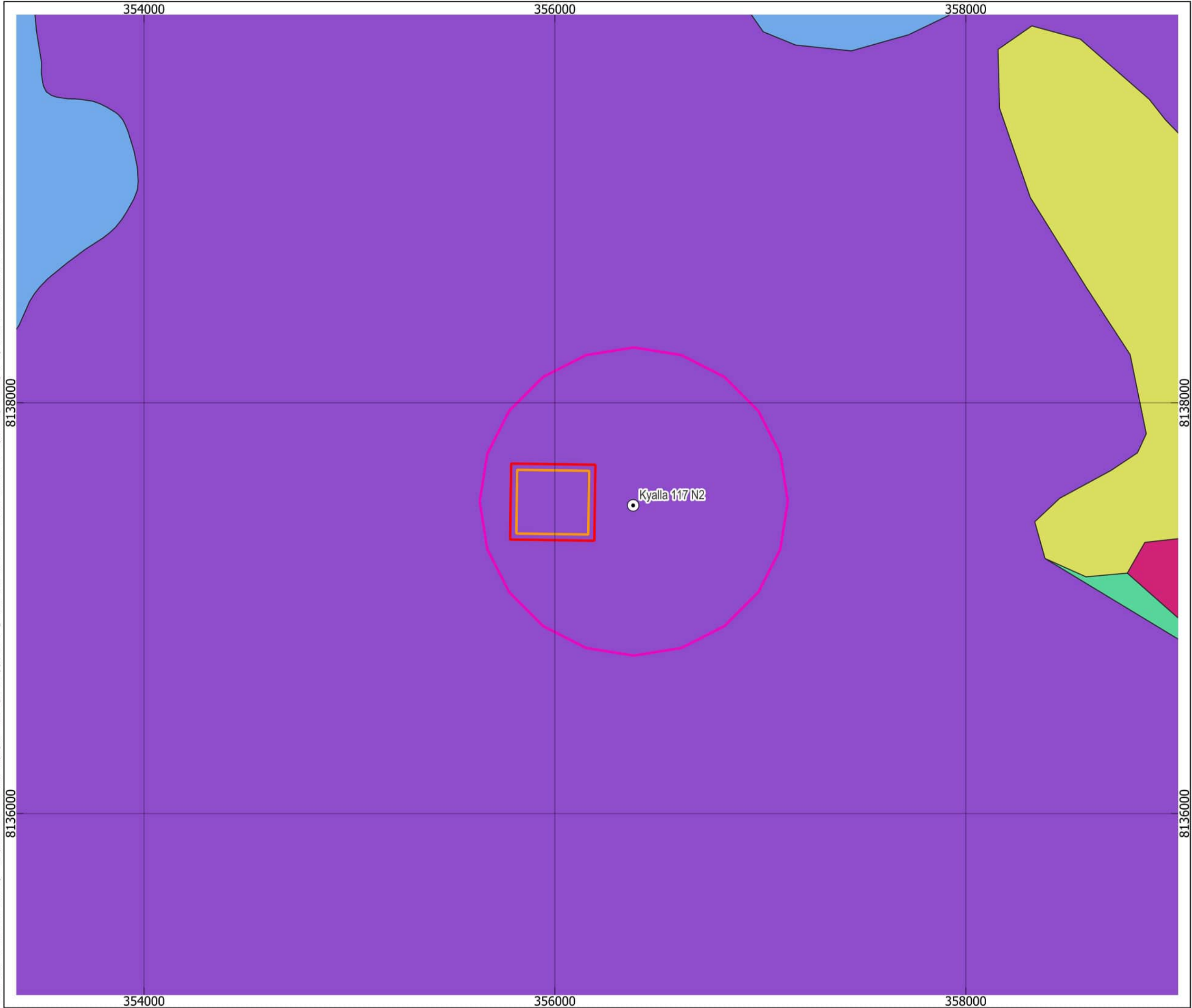
The environmental context of the Study Area is outlined in Table 4 and the relationship between the environmental variables and Aboriginal archaeological sensitivity are further discussed in Section 4.0.

Table 4 Environmental context

Environmental Variable	Key Observations
Topography	The Study Area's elevation is recorded as relatively flat, at approximately 270 m Australian Height Datum (AHD). A detailed digital elevation model was not available for the Study Area, so general topographic descriptions are provided.
Hydrology	Stream Order (SO) 1 watercourses have no tributaries. A SO 2 watercourse is formed at the confluence of two SO 1 watercourses; SO 3 watercourses form at the confluence of two SO 2 watercourses; and so on, through to SO 7. No SO watercourses are mapped within the Study Area. No unmapped waterholes, floodplains and drainage lines, identified from a review of satellite imagery, exist within the Study Area. A waterhole or spring is present outside the Study Area, to the northwest (see Figure 2 in main report body). Aboriginal settlement patterns are strongly associated with the availability of water, and there is high potential for both tangible and intangible heritage values around watercourses, particularly higher stream orders and/or channelised water sources. The archaeological potential of landforms surrounding mapped and unmapped water sources is discussed in Sections 4.3 and 4.4.
Geology	The surface geology of the Study Area is shown in Figure 3 in the main report body. The surface geology in the Study Area is mapped as Cenozoic laterite (Czl), described as laterite and lateritic rubble and soil (Northern Territory Government (Northern Territory Geological Survey) 2017). The next closest mapped surface geology is Cenozoic soil (Czs), which located approximately 600m to the south of the Study Area and is described as residual soil, ferruginous gravel, sand and talus (Northern Territory Government (Northern Territory Geological Survey) 2017). No other surface geologies are mapped within 1 km of the Study Area. The archaeological potential of the surface geology in the Study Area is discussed in Section 4.4.
Vegetation Mapping	A Land Condition Assessment (LCA) has been undertaken by AECOM for the Study Area, and mapped the vegetation communities in and around the Study Area (Figure 1). The mapped vegetation type for the Study Area is <i>Corymbia dichromophloia</i> and/or <i>Erythrophleum chlorostachys</i> mid high open woodland. The potential of different vegetation communities to contain Aboriginal archaeological sites is explored in Sections 4.4 and 4.4.2.
Past Land Use, Impacts and Erosion/Deposition	Land use activities may have caused ground disturbance within the Study Area, including vegetation clearing and the construction of access tracks, roads and fence lines along the eastern boundary of the Study Area.

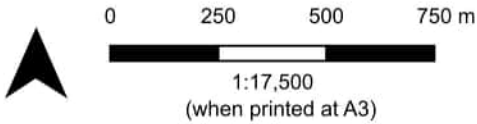
Environmental Variable	Key Observations
	Prescribed burning is often used in the Northern Territory in pastoral areas for bushfire prevention, pasture improvement, grazing management and weed control, among other reasons (Australian Fire and Emergency Services Authorities Council 2015; Bryant 2008; Northern Territory Government 2022). Prescribed burns may have been undertaken on the Shenandoah pastoral lease for some or all of these purposes. Aboriginal fire regimes have also been used in the region historically and prior to European settlement for hunting and land management purposes. In addition, unplanned bushfires and wildfires have occurred in the region. The Study Area has been affected by fire in the past, which would have impacted the vegetation and ground surface. Water movement may also have affected the Study Area. Fluvial movement generally increases around floodplains, water holes and watercourses and is influenced by slope, elevation and surface geology, which determine whether sedimentary processes are depositional or erosional. As the Study Area is relatively flat and does not contain and is not in proximity to known water sources, it is likely that any fluvial movement in the Study Area would be minor.

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Well Pad Point 

Well Pad Project Area 

Shenandoah South Sand Wash Plant Project Area

SS SWP 

Study Area 

LCA Mapped Vegetation Communities

1 - Acacia shirleyi mid high woodland 

2a - Corymbia dichromophloia ± 

Erythrophleum chlorostachys mid high open woodland

4b - Corymbia polycarpa ± 

Erythrophleum chlorostachys mid high open woodland

4a - Acacia sp. ± Melaleuca viridiflora tall shrubland 

4b - Melaleuca viridiflora, Terminalia canescens low sparse shrubland 



Data Sources:
AECOM
Google Satellite
Northern Territory Government
Tamboran

CRS:
GDA94 Zone 53

**Tamboran B2 Pty Ltd
Shenandoah South Sand Wash
Plant Cultural Heritage Assessment
Predictive Modelling
Vegetation Groups**

PROJECT ID 60667354
CREATED BY KC
LAST MODIFIED 16-4-2025
VERSION 1

**Figure
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3.0 Previous Predictive Model Iterations and Developments

The first iteration of the predictive model for the Beetaloo Basin used by AECOM was developed in HLA-Envirosciences (HLA, 2006) (now AECOM). The predictive model has since been developed and refined by AECOM for subsequent cultural heritage assessments in the Beetaloo Basin. A summary of the original 2006 predictive model and subsequent iterations is provided below.

3.1 Archaeological Assessment 2006 for the Sweetpea Petroleum Seismic Program, Beetaloo Basin, Northern Territory, 2006

In 2006, HLA was engaged by Sweetpea Petroleum Pty Ltd (Sweetpea) to undertake heritage assessments for proposed seismic lines as part of gas exploration in Exploration Permit (EP) 76, EP98, EP99 and EP117. Following the assessment of the seismic lines, a predictive model was developed by HLA to inform the methodology for future archaeological surveys. The predictive model was based on an earlier model developed by Foley (1981a, 1981b), which was designed to incorporate taphonomic and behavioural processes influencing broad patterns of archaeological deposition by humans across a 'home range'. Foley's model considered different environmental and cultural contexts but did not specifically focus on one region or cultural group.

The HLA model used the principles of Foley's original model but developed region-specific and local-level predictions tailored to the Beetaloo Basin region and the project areas. The HLA model incorporated the results of archaeological surveys undertaken for Sweetpea and the findings of a literature review and analysis of previously identified archaeological sites in the Beetaloo Basin. The model considered the known distribution of archaeological sites in relation to:

- Slope (in particular, eroding, stable or aggrading land surfaces)
- Hydrology (proximity to semi- and permanent creeks and water holes)
- Known or predicted raw material sources (in this case, siliceous rock outcrops or gravels, i.e. surface geology).

The predictive model initially suggested that archaeological sites would be sparsely distributed across the landscape and most likely to occur in association with permanent and semi-permanent water, as well as raw stone materials suited to stone tool manufacture (e.g. outcropping rock or exposed fluvial gravels).

Following additional archaeological survey, the model was further refined, with sites predicted to occur along channelled creeks or chains of ponds associated with permanent or semi-permanent water rather than wide flood channels or ephemeral lakes with less distinct banks and boundaries. Sites were also predicted to occur along transitional vegetation types (i.e. ecotones, which were used as a proxy for topographic transitions) and in association with raw stone material sources suitable for stone tool manufacture. Based on these criteria, the model delineated areas of high, moderate and low archaeological potential.

The model identified elevated ground (e.g. crests and ridges) as more important predictors of site location on floodplains compared to areas adjacent to stream channels and drainage lines not prone to flooding. The model also attempted to identify areas containing stable land surfaces and those subject to erosion and deposition to assess the probability of archaeological sites being *in situ* (stable land surfaces), redeposited (depositional landforms) or disturbed (erosional landforms).

A summary of the predictive model is provided in Table 5. The predictive model is contextualised through comparison with cumulative effects of artefact discard and site formation as described by Foley (2006), which are described in Table 6.

Although the model emphasises the importance of raw stone materials, it does not provide a detailed consideration of surface geology due to a lack of available information and mapping. The report noted that future iterations of the model could consider other factors, such as stock route alignments, which appear to be correlated with archaeological site occurrence in previous studies. Stock routes were not incorporated in the model as the authors interpreted the association of stock routes with archaeological sites as the result of sampling bias, a product of the ease of access to stock routes and a biased survey methodology. In addition, stock routes were considered to have lower archaeological sensitivity due to

high levels of ground disturbance associated with stock and vehicle movement. Similar assumptions were made regarding the occurrence of sites in relation to modern linear infrastructure.

Although the predictive model did not predict the location of all known archaeological sites, it had moderate success (37%) in predicting site occurrence in the broader region and strong success (86%) in predicting site occurrence in the Sweetpea project areas. The lower accuracy for the broader region was attributed to the presence of sampling biases in previous surveys, a lack of consideration of stock routes, and a lack of digital data, particularly surface geology and detailed watercourse mapping.

Table 5 Predictive Model Data - Excerpt from HLA (2006:155)

Landform	Slope Angles	Site Formation Processes	Known Archaeological Sites	Probability of Surface Archaeology	Probability of Subsurface Archaeology	Comparison with Foley (1981b) – see Table 6
Lower slopes and flats away from water	Level or very gently inclined	Aggrading	No	Low	Low	b and c
Upper or mid-slopes away from water	Gently inclined	Eroding or stable	No	Low	Low	a, d and e
Mid- or upper slopes, crests and ridges away from water	Moderately inclined or steeper	Eroding or stable	No	Low	Low	a, d and e
Lower slopes or flats near water	Level or very gently inclined	Aggrading	Yes – NC 1 to NC 4 (inclusive), Yaroo 1, 2, 4	High	Moderate	b and c
Lower slopes or flats near water	Very gently inclined	Eroding or stable	Yes – CHT-1, Yaroo 3, 3A, 3B, Dunmarra 1 and 2	High	Moderate	b and c
Upper or mid-slopes near water	Gently inclined	Aggrading or stable	No	Moderate	Low	a, b and c
Mid- or upper slopes, crests and ridges near water	Moderately inclined or steeper	Eroding or stable	No	Low	Low	a, d and e

Table 6 Cumulative Effects of Artefact Discard and Site Formation (After Foley, 1981b) – Excerpt from HLA (2006:61)

Effect	Description
a	Cumulative effect of simple artefact discard
b	Cumulative effect of artefact discard on landscape suddenly buried
c	Cumulative artefact discard on a gradually aggrading landscape
d	Effect of gradual exposure on artefact distribution
e	Effect of bioturbation on artefact distribution

3.2 Final Report Archaeological Surveys 2011/2012: Onshore Seismic Exploration Program, Beetaloo Basin, NT, 2012

AECOM was commissioned in 2011 and 2012 by Hess Australia (Beetaloo) Pty Limited (Hess) to undertake an archaeological assessment of a proposed onshore seismic exploration program in

https://aecom.sharepoint.com/sites/BNE_Heritage/Shared Documents/Projects/60667354 - Tamboran/2024_11 Kyalla 117 N2 Well Site/Report/Predictive Modelling Appendix.docx

Revision 1 – 17-Apr-2025

Prepared for – Tamboran B2 Pty Ltd – ABN: 42 105 431 525

portions of EP98, EP117 and EP76 (AECOM, 2012). The assessment used and refined the predictive model developed by HLA (2006). The HLA (2006) model was applied to the project areas to inform the survey methodology and targeted survey effort. Relief, hydrology and soil conditions were used to predict areas of high, moderate and low archaeological potential. A representative sample of vegetation types within the project areas was also chosen for the survey.

Of the project areas identified as having high or moderate archaeological potential by the HLA (2006) model, only 21% contained archaeological sites. However, all archaeological sites identified during the 2011 survey were identified within 50 m of an ephemeral waterway. All archaeological sites identified during the 2012 survey were either situated close to water sources, on elevated landforms (e.g. crests or ridges), or associated with outcropping siliceous stone. As such, the HLA (2006) model was assessed as effectively identifying landscape features with archaeological potential (i.e. channelised creeks, raw stone material sources and elevated landforms).

AECOM (2012) note that a paucity of accurate mapping and geospatial data for the project areas constrained the application of the predictive model. For instance, many watercourses mapped as channelised streams were found to be floodplains or washouts in the field. The report recommends updating the model regularly to increase its efficacy as new geospatial data becomes available, re-evaluating future iterations using current geospatial data for key parameters, and updating the field survey methodology and sampling areas in accordance with the updated model. AECOM (2012) produced a second iteration of the predictive model, retaining most of the features of the original 2006 version, but used slope and elevation to assess archaeological potential rather than using ecotones as a proxy for topography.

The targeted field survey informed by the predictive model identified seven archaeological sites in the 33 areas identified as moderate or high potential by the model. As such, 21% of moderate or high potential areas contained archaeological sites. While the discovery of archaeological sites was low, most archaeological sites in the sampling areas were associated with one of the key factors used by the model to determine potential (i.e. the presence of raw material, the presence of a channelised creek, the presence of elevation, etc.).

3.3 Aboriginal and Historic Heritage Assessment, 2014 and Beetaloo Road Addendum: Aboriginal and Historic Heritage Assessment, 2016.

In 2014 and 2016, additional heritage assessments were undertaken by AECOM (2014, 2016) on behalf of Origin Energy Resources Limited (Origin) for project areas in EP98 and EP117. The HLA (2006) and AECOM (2012) iterations of the predictive model were mentioned in the archaeological review sections of the reports but did not inform the survey methodology. No changes were made to the model. The archaeological sites identified during these assessments were incorporated into future iterations of the predictive model.

3.4 Cultural Heritage Assessment: EP136 - Beetaloo Sub-Basin, NT, 2020

In 2020, Sweetpea engaged AECOM (2020) to undertake a heritage assessment for seismic exploration in EP136. Archaeological surveys were conducted in accordance with a survey methodology informed by an updated predictive model. This iteration of the predictive model builds upon the previous iterations by including archaeological site types and locations identified since 2012, and using updated geospatial data for semi- and permanent water sources and surface geology. The updated model identified the following landforms as having elevated archaeological potential:

- Non-flood-prone areas adjacent to watercourses
- Areas with certain vegetation types, including those associated with *Macropteranthes kekwickii* (bullwaddy)
- Areas adjacent to flood plains where a noticeable change in vegetation is identified
- Areas on the periphery of lagoons and 'chain of ponds' features.

These features were identified and mapped using the project areas' updated geospatial data and satellite imagery. Areas identified for seismic exploration intersecting these areas (n = 71) had elevated archaeological potential, and a random sample (n = 20) was selected for the survey. In addition, areas

not associated with the above features, and therefore predicted to have lower archaeological potential, were also selected for survey ($n = 4$) to assess the efficacy of the predictive model. The survey results showed that newly recorded archaeological sites were found in areas identified by the predictive model as having elevated archaeological potential. No archaeological sites were recorded in the areas identified by the predictive model as having low archaeological potential.

This version of the predictive model retained many of the features of the AECOM (2012) model but combined topography and proximity to water sources as predictors, unlike the 2012 iteration, which employed topography and proximity to water as standalone predictors. It reintroduced some consideration of vegetation type and used satellite imagery to identify landforms with elevated archaeological potential (such as areas adjacent to unmapped water sources).

3.5 Cultural Heritage Assessment: Amungee NW 1 and Velkerri 76 S2, 2021

AECOM (2021) was engaged by Origin to undertake a heritage assessment of two proposed 3D seismic survey areas within EP98 and EP76. A targeted field survey was undertaken as part of the assessment in accordance with a survey methodology informed by the most recent iteration of the predictive model. Areas targeted for investigation included the following features, identified using satellite imagery:

- Areas surrounding soaks and depressions
- Non-flood-prone areas adjacent to watercourses.

A total of 16 investigation areas were identified and targeted during the survey. In addition, the survey included 15 areas with a range of vegetation types that were not associated with these features. Nineteen archaeological sites were identified during the survey, all recorded in areas around soaks and depressions and within non-flood-prone landforms adjacent to watercourses. No further adjustments were made to the predictive model following the survey. Compared with previous model iterations, the 2021 iteration focused primarily on proximity to available water sources, with no or limited consideration of other environmental factors.

3.6 Cultural Heritage Assessment Report: Kyalla Study Area, 2023a and Cultural Heritage Assessment Report: Shenandoah and Amungee Heritage Scouting, 2023b

In 2023, AECOM was engaged by Tamboran B2 Pty Ltd (Tamboran) to conduct heritage assessments in several areas within EP98 and EP117 identified for gas exploration and extraction activities (AECOM 2023a, 2023b). A targeted field survey was undertaken in accordance with a survey methodology informed by the AECOM (2020) predictive model. The 2020 model was used instead of the 2021 model, although the reason for this is unclear in the report.

The targeted survey methodology was informed by the predictive model, focusing the survey effort on areas with elevated archaeological potential, including:

- Areas surrounding soaks, depressions and permanent water sources
- Non-flood-prone areas adjacent to established watercourses
- Dense patches of *Macropteranthes kekwickii* (bullwaddy), or bullwaddy and *Acacia shirleyi* (lancewood) woodland vegetation

This iteration of the predictive model reintegrated vegetation type as a predictor based on the resources provided by specific vegetation groups (e.g. shade). Two archaeological sites were recorded during the survey. One was associated with a minor, non-perennial watercourse; the other was adjacent to a large drainage depression with bullwaddy woodland vegetation to the north. No adjustments to the predictive model were made upon completion of the field survey.

4.0 Aboriginal Archaeological Predictive Modelling

AECOM has developed an Aboriginal cultural heritage predictive model for the Beetaloo Basin to inform field survey methodology, future site investigations, and infrastructure placement. The model synthesises environmental data, historical observations, and archaeological information to map archaeological potential for the Study Area. The predictive model builds upon previous models developed for heritage assessments in the region (Section 3.0). Archaeological potential is mapped for individual site types and a composite model incorporates all site types.

4.1 Site Types

Common Aboriginal archaeological site types are described below.

4.1.1 Isolated Artefacts

Isolated artefacts indicate random loss or deliberate discard of single artefacts, the remnants of a now dispersed and disturbed artefact scatter, or an otherwise obscured or sub-surface artefact scatter.

4.1.2 Open Artefact Scatters

Open artefact scatters are defined as two or more artefacts not within a rock shelter and no more than 50 metres away from any other constituent artefact. This site type may occur almost anywhere that Aboriginal people have travelled and may be associated with hunting and gathering activities, short or long-term camps, and the manufacture and maintenance of stone tools.

Artefact scatters typically consist of surface scatters or sub-surface distributions of flaked stone discarded during the manufacture of stone tools. They can also include other artefactual rock types such as hearth and anvil stones. Less commonly, artefact scatters may consist of archaeological features such as hearths and stratified artefact concentrations related to activity areas.

Artefact density can vary considerably between and across individual sites. Small ground exposures revealing low-density scatters may indicate background scatter rather than a spatially or temporally distinct artefact assemblage. These sites are classed as 'open' and occur on land surfaces unprotected by rock overhangs, and are sometimes referred to as 'open camp sites'.

4.1.3 Culturally Modified Trees

Aboriginal culturally modified trees contain evidence (referred to as 'scars') of bark removal (and sometimes wood) by Aboriginal people in the past. Bark was removed from trees for a wide range of reasons. It was a raw material used to manufacture various tools, vessels and commodities such as string, water containers, roofing for shelters, shields and canoes. Bark was also removed while gathering food, such as collecting wood-boring grubs or creating footholds to climb trees for possum hunting or bark removal. Due to the multiplicity of uses and the continuous process of occlusion (or healing) following removal, it is difficult to accurately determine the intended purpose of any particular example of bark or wood removal. Scarred trees may occur anywhere that mature trees survive. The identification of scars as Aboriginal cultural heritage can be problematic because some forms of natural trauma and European bark extraction have created similar scars. Some scarred trees date back to the historic period Aboriginal people removed bark for both their own purposes and for roofing early European houses. Consequently, the distinction between European and Aboriginal scarred trees may not be clear.

4.1.4 Rock Art Sites

Rock art sites contain artworks created by Aboriginal people on rock surfaces. These include stencils, prints and drawings in rock shelters, and engravings or pecking. Rock shelter paintings usually contain small figures, other forms such as kangaroo and emu tracks, sets of stripes or bars, detailed x-ray images, hand prints and hand stencils.

4.1.5 Grinding Grooves

Grinding groove sites contain oval-shaped indentations in sandstone outcrops made by Aboriginal people shaping and sharpening edge-ground stone axes. Aboriginal people sometimes carried small pieces of sandstone with them for sharpening axes.

4.1.6 Hearth Sites

Hearth sites contain the remains of an Aboriginal fireplace or campsite, represented archaeologically by concentrations of charcoal, ash and/or hearth stones, baked clay heat retainers, discoloured/burnt earth or other materials such as heat-treated stone fragments or fragments of termite mounds.

4.1.7 Quarry Sites

Quarry sites and stone procurement sites typically comprise exposures of stone material where evidence for human collection, extraction and/or preliminary processing has survived. Typically, these involve extracting siliceous or fine-grained igneous and meta-sedimentary rock types to manufacture artefacts. The presence of quarry/extraction sites depends on the availability and accessibility of suitable rock formations.

4.1.8 Burials

Burials are internments of human remains, typically in the ground, although tree and termite mound burials have occurred in the Australian context, as have cremations. Burials may also be associated with ritual sites.

4.2 Integrity

As discussed in Section 1.0, archaeological sensitivity is determined by assessing both subsurface archaeological potential and ground surface integrity. In formulating a predictive model for Aboriginal archaeological site location, post-depositional processes affecting Aboriginal archaeological deposits need to be considered. In all but the best preservation conditions, very little of the organic material culture from past Aboriginal occupation survives. Culturally modified trees can survive for several hundred years, but rarely longer, due to natural senescence and historical vegetation clearing. Fire regimes and bushfires can damage or destroy cultural scars and culturally modified trees (see Section 2.0) while causing natural scarring of some trees.

Generally, more durable materials like stone, shell, and bone are preserved. Archaeological materials can also be found outside their original depositional context due to:

- Wind and water erosion and transport over short and long-time scales
- Ground disturbance associated with historical activities, including:
 - Grazing and cropping and associated ploughing, trampling and erosion
 - Land degradation associated with exotic pests such as goats and rabbits
 - The installation of farming infrastructure, such as dams, utilities, roads, fences, stockyards and residential buildings.

In disturbed areas, some residual archaeological potential can remain. While many sites are unlikely to be intact, some intact archaeological deposits can be preserved beneath the ground surface. Areas containing mature, uncleared vegetation have a higher potential for intact surface sites and subsurface archaeological deposits due to a lack of ground disturbance. As such, archaeological sensitivity is understood as a function of archaeological potential and ground surface integrity, as outlined in Table 3.

4.3 Archaeological Sensitivity in the Study Area

Across Australia, numerous archaeological studies in different environmental zones and contexts demonstrate that Aboriginal archaeological sites correlate strongly with patterns of land use and resource exploitation by Aboriginal people in the past. Perhaps the most significant of these correlations is that between the permanence of a water source, the intensity of Aboriginal occupation, and the resultant complexity of archaeological sites (Hermes 1986:5; HLA-Envirosciences Pty Ltd 2006; see also Rowland and Connolly 2002; Clarkson 2006; HCA 2019). In addition, elevated landforms around watercourses appear to be correlated with the presence of Aboriginal archaeological sites.

Aboriginal use of the landscape and the location of archaeological sites is also related to the availability or accessibility of other resources, including plant and animal foods, stone and ochre raw material

sources, and landforms suitable for rock shelters. Consequently, most archaeological sites are close to permanent and ephemeral water sources, often associated with other resources.

Broadly, sites are more likely to occur and be preserved on elevated landforms, sometimes associated with ecotones, along permanent or semi-permanent watercourses and other reliable water sources, with sites less likely to occur adjacent to ephemeral water sources, and rarely within flood plains, although sites can be strongly associated with elevated landforms around seasonally inundated areas (HLA-Envirosciences Pty Ltd 2006; Gregory 1998).

Knowledge of the environmental contexts of the Study Area (Section 2.0) and a desktop review of the known local and regional archaeological record (Appendix A, Table 7; see also Section 3.0) allows for the following predictions to be made regarding the probability of different Aboriginal site types existing within the Study Area. Aboriginal archaeological site types that are likely to occur within the Study Area include:

- Low-density artefact scatters
- Isolated artefacts.

Particular tree species of suitable age, size and bark or wood type may have been used for shelter construction or the manufacture of material culture items and could exhibit evidence of cultural modification.

Some Aboriginal archaeological sites can occur in areas distant from water sources where important or rare resources are located. For example, Aboriginal quarries are associated with outcropping stone sources suitable for stone tool manufacture, regardless of water availability (HLA-Envirosciences Pty Ltd 2006; Clarkson 2006). Other sites away from water sources are generally smaller and less complex, associated with hunting and travelling camps.

As discussed, proximity to available water is a key predictor of Aboriginal archaeological site location. No potential water sources were identified in or within 200 m of the Study Area. The absence of water suggests the Study Area is unlikely to have supported Aboriginal occupation sites.

Watercourse mapping and recent satellite imagery identified no mapped watercourses and no unmapped waterholes, floodplains or drainage lines inside or within 200 m of the Study Area. Landforms surrounding SO1 watercourses or higher, channelised drainage lines, or waterholes with distinct, deep depressions (allowing for more permanent water retention within a distinct area), would be identified as having high archaeological potential.

It is expected that archaeological sites will have high potential to occur within 200 m of distinct, channelised water sources, including SO1 and higher watercourses. Areas within 200 m of floodplains and other water sources without distinct edges but not within the inundation areas of those water sources will have moderate potential for archaeological sites. Areas not near any water sources will have low archaeological potential.

Occupation sites, including artefact scatters, isolated artefacts, and hearths, are likely to occur in areas near water sources, as described above. Topographies that provide effective access through the surrounding landscape, such as the open basal valley slopes and the valleys of creeks, will tend to contain more and larger sites, including camp sites evidenced by open artefact scatters. Isolated artefacts can occur anywhere within the landscape but are more likely to occur in topographies where open artefact scatters typically occur.

The surface geology indicates no alluvial sediment is present in the Study Area. Quaternary alluvial sediments are often associated with river systems and flood plains, either contemporary or past. Areas mapped as Quaternary alluvium would therefore be interpreted as a potential unmapped water source. However, none were identified within the Study Area.

Based on previous studies in the region, the most likely archaeological site types in the Study Area are artefact scatters and isolated artefacts. However, the frequency, size and complexity of any such sites will be significantly constrained by the paucity of locally available and suitable stone source materials. The surface geological mapping indicates no outcroppings of stone suitable for tool manufacture in the Study area (see Table 4), suggesting a reliance on imported stone or cobbles deposited by fluvial movement. In either case, suitable stone source material is likely to have been carefully curated and not easily discarded.

There may be some potential for grinding grooves where suitable raw material occurs, particularly near water. Flat, low outcrops of fine-grained sandstone close to a water source were preferred. Axe-grinding grooves are usually located on the edges of rivers, creeks, lakes and swamps or near dry or drained water bodies. Surface geology mapping indicates an absence of surface geologies suited to grinding groove and grinding stone production within the Study area, with no mapped sandstone, granite or similar geologies.

Surface geologies containing suitable raw material for stone quarries (e.g. fine grained siliceous material) have not been identified in the Study Area. Stone quarries are therefore considered unlikely to occur in the Study Area. As the surface geology mapping is broad scale, there remains potential for outcrops of stone suited to artefact manufacture or grinding grooves to occur in the Study Area. Large outcropping stone formations are not visible in recent satellite imagery, and any stone outcrops are likely to be discrete.

Rock art is possible in areas with outcropping rock, with increased likelihood in areas containing precipitous or cliff slopes and within (or in the vicinity of) rock shelters and caves. No such areas have been identified in the Study Area, so rock art sites and rock shelter sites are considered unlikely to occur in the Study Area.

Uncleared areas of vegetation have the potential to retain culturally modified trees (Figure 2). Certain vegetation groups are more suited to the creation and retention of cultural scars (Figure 3), with bullwaddy and other shrub dominated vegetation groups not well suited due to shrub growth forms being un conducive to scar creation and retention, with a thin trunk and many branches. Likewise, grassland dominant vegetation groups are considered to have limited potential for culturally modified trees due to a general paucity of trees in these vegetation groups. In addition, due to fire and termite activity in the area (see Table 4), culturally scarred trees are considered unlikely to occur in the Study Area. A lack of recorded culturally modified trees in available studies and reports for the local and broader regions supports this.

Burials are generally found in soft sediments such as aeolian sand, alluvial silts and rock shelter deposits. In valley floor and plain landforms, burials are more likely to occur in locally elevated topographies rather than poorly drained sedimentary contexts. Burials have also been found on rocky hilltops in some limited areas. Burials are generally only visible where sub-surface sediments have been disturbed or where an erosional process has exposed them. It is possible that Aboriginal burials could be found within the Study Area, with increased likelihood in areas containing sandy sediments adjacent to watercourses. However, burials are a rare site type regionally.

A paucity of water and stone material resources suggests that the potential for most site types within the Study Area is low. This potential is further reduced in areas subject to ground disturbance, such as the construction of tracks and fence lines inside the Study Area. In areas associated with potential water sources without channelisation or other distinct edges (i.e. floodplains), the potential for archaeological sites would be assessed as moderate, and for areas in proximity to channelised water sources, SO watercourses, or other water sources with distinct edges, the archaeological potential would be assessed as high. However, no water sources have been identified within or in proximity to the Study Area.

Previous iterations of the predictive model have identified vegetation transitions as being associated with archaeological sites (HLA-Envirosciences Pty Ltd 2006). However, this observation was made primarily for vegetation transitions associated with or adjacent to water sources. An analysis of archaeological sites recorded in the region also demonstrates that open woodland vegetation is almost equally likely as vegetation transitions to contain archaeological sites when associated with water sources (see Appendix A), indicating that the stronger predictor is the presence of water rather than vegetation type or transition. This observation likewise applies to the previous iterations of the model, which posited that distinctive vegetation patterning broadly, or bullwaddy or bullwaddy-lancewood vegetation groups more specifically, were associated with increased archaeological potential.

The potential for intact archaeological deposits to remain along the eastern boundary of the Study Area is limited by historical ground disturbance, which includes vegetation clearance, levelling of some ground surfaces, and construction of tracks and fence lines. As a consequence of this disturbance, any surface archaeological sites present in the areas impacted by these processes are likely to have been disturbed, displaced from their original location, damaged, or potentially destroyed. In these disturbed

areas, archaeological sensitivity is reduced. Where archaeological potential would be high, but the ground surface has been disturbed (i.e. GSI is low), the archaeological sensitivity is low. Where archaeological potential would be moderate, but GSI is low due to previous disturbance, archaeological sensitivity is very low. Where archaeological potential is considered low and GSI is low, the archaeological sensitivity is nil (Table 3).

Despite associated disturbance, stock routes have previously been identified as possibly having elevated potential for archaeological sites (Section 3.1; see also HLA 2006). However, no stock routes are identified on contemporary and historical maps available for the Study Area.

4.4 Mapping the Aboriginal Archaeological Sensitivity

A series of maps have been generated that plot the likelihood of different Aboriginal archaeological site types occurring in the Study Area, based on the predictive statements in Section 4.3, for artefacts and hearths (Figure 4), and Aboriginal modified trees (Figure 5). These maps are presented below, along with an explanation of the methodology used to develop them and a discussion of their limitations. Finally, a map combining the sensitivity for all Aboriginal archaeological sites is presented (Figure 6).

Areas previously subject to heritage assessment were not mapped. GSI was considered in mapping archaeological sensitivity. Discrete areas impacted by construction and land clearing activities are expected to have low GSI, with reduced archaeological sensitivity. In addition, erosional areas associated with fluvial movement, such as the inundation areas of flood plains, are also expected to have reduced GSI and archaeological sensitivity.

4.4.1 Artefact Sites and Hearths

Figure 4 shows portions of the Study Area with low, moderate and high archaeological sensitivity for artefact sites (including artefact scatters and isolated artefacts) and hearth sites. Artefact sites and hearth sites are considered together, as these site types often co-occur at occupation sites (Smith 2006; Wallis and Collins 2013; Fanning et al. 2009; Holdaway et al. 2017), and the same environmental factors influence their occurrence in the landscape. The Study Area was classified according to:

- **High sensitivity:** areas within 200m of mapped SO watercourses and other channelised drainage lines, as well as waterholes with distinct, deep depressions.
- **Moderate sensitivity:** areas within 200 m of unmapped minor watercourses, drainage lines, waterholes and floodplain areas with indistinct edges, but outside of high sensitivity areas and outside of the inundation area of flood plains.
- **Low sensitivity:** areas outside the high and moderate sensitivity areas, or areas with high potential but low GSI.
- **Very low sensitivity:** areas with moderate sensitivity but low GSI.

4.4.2 Culturally Modified Trees

Figure 5 provides a map of uncleared, vegetated areas within the Study Area with low, moderate and high sensitivity to contain Aboriginal culturally modified trees. The map was created using satellite imagery and publicly available vegetation mapping geospatial data to map the vegetated areas (Figure 2), removing vegetation groups unlikely to retain cultural scars – that is, grassland and shrubland vegetation groups (Figure 3; see also Table 4). The area was then classified into low, moderate and high sensitivity areas in accordance with the methodology used for artefact and hearth sites.

4.4.3 All Site Types Combined

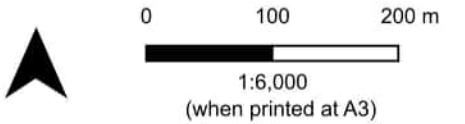
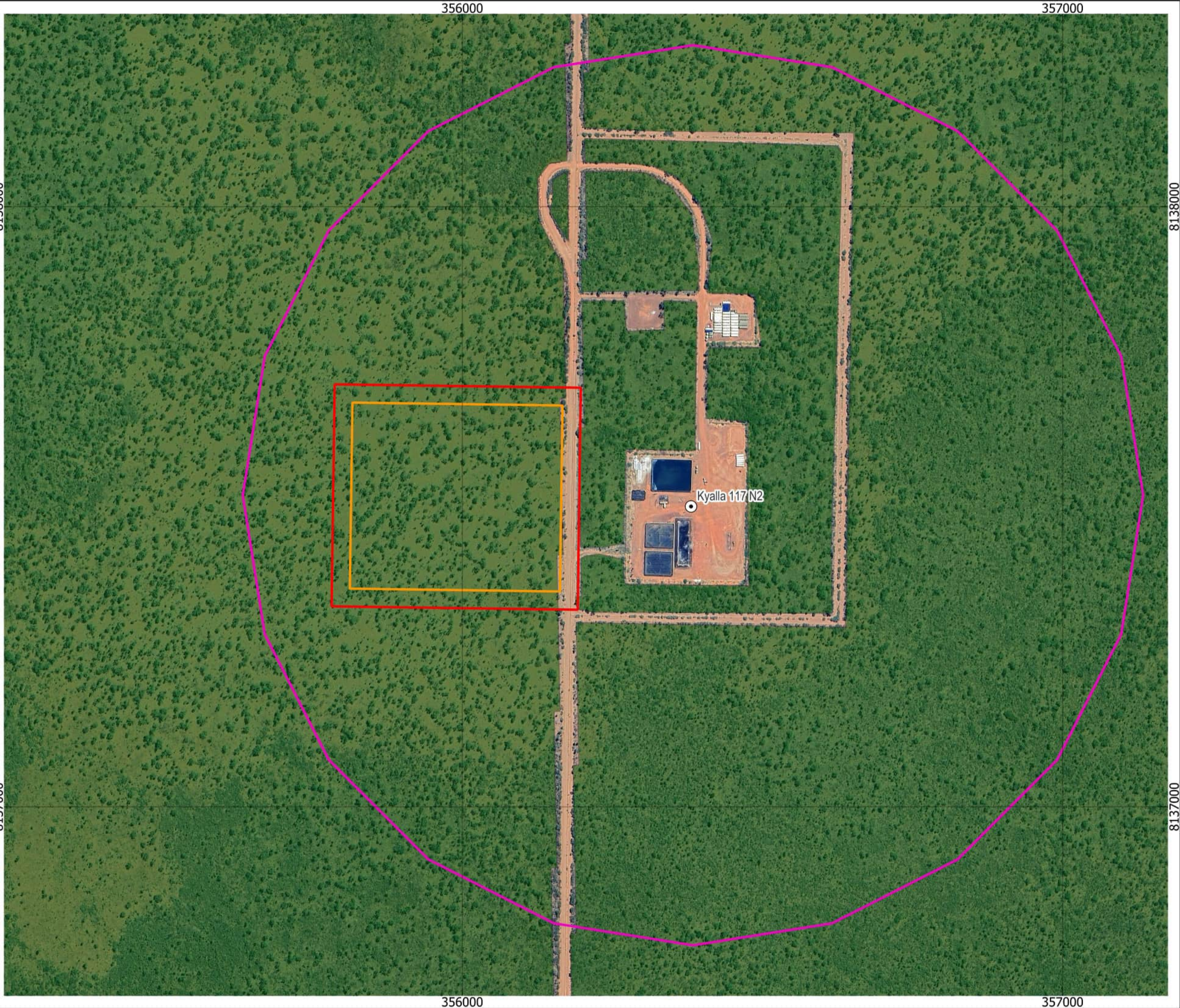
Figure 6 shows portions of the Study Area with low, moderate and high sensitivity to contain all (mapped) Aboriginal site types combined (i.e. artefact and hearth sites, and culturally modified trees). The map was created by overlaying low, moderate and high sensitivity areas for each site type. As such, areas with higher intensities of colour and redder hues indicate areas with higher sensitivity to contain Aboriginal archaeological sites. Areas with lower intensities of colour and yellower hues indicate areas with lower sensitivity to contain Aboriginal archaeological sites.

4.5 Limitations

The predictive modelling draws on existing site data and previous studies and uses survey observations to make predictions about the archaeological sensitivity of specific landforms. The predictive model is limited by the availability, accuracy, and scale of the geospatial data available for the study area. While some data is large-scale with sufficient detail to support fine-grained analysis – such as the vegetation group mapping – other datasets are small-scale and, therefore, more limited in identifying features of interest within the Study Area, such as the 250K surface geology mapping and stream order mapping. Small-scale datasets are unlikely to pick up on large-scale features in the landscape. Where possible, satellite imagery has also been examined to mitigate this and identify large-scale landscape features.

The predictive model has been updated over almost 20 years to incorporate the results of a number of archaeological surveys and to test the underlying assumptions of the model to ensure appropriate

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LEGEND

Kyalla 117 N2

Well Pad Point



Well Pad Project Area



Shenandoah South Sand Wash Plant Project Area

SS SWP



Study Area



Vegetation

Uncleared Vegetation



Data Sources:
AECOM
Google Satellite
Northern Territory Government
Tamboran

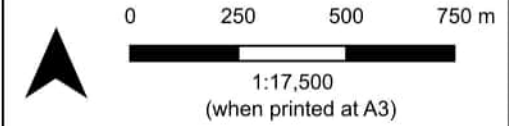
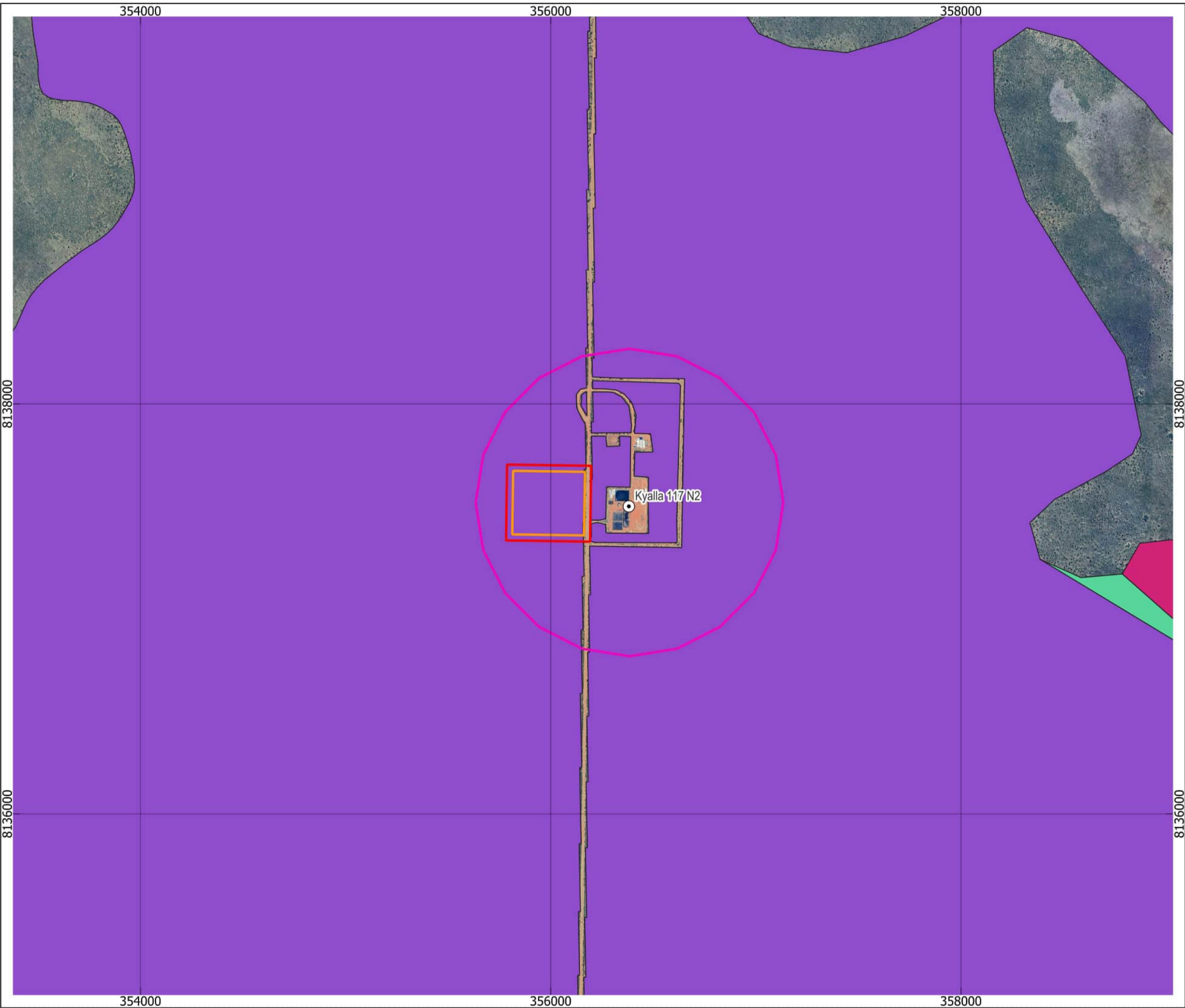
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GDA94 Zone 53

Tamboran B2 Pty Ltd
Shenandoah South Sand Wash
Plant Cultural Heritage Assessment
Predictive Modelling
Uncleared Vegetation

PROJECT ID 60667354
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LAST MODIFIED 16-4-2025
VERSION 1

Figure
2

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LEGEND

Kyalla 117 N2

- Well Pad Point
- Well Pad Project Area

Shenandoah South Sand Wash Plant Project Area

- SS SWP
- Study Area

Uncleared Vegetation Groups Suitable for Aboriginal Culturally Modified Trees

- 1 - Acacia shirleyi mid high woodland
- 2a - Corymbia dichromophloia ± Erythrophleum chlorostachys mid high open woodland
- 3a - Corymbia polycarpa ± Erythrophleum chlorostachys mid high open woodland

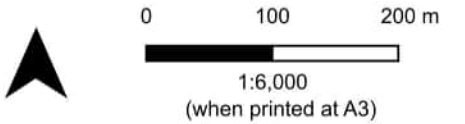


Data Sources: AECOM, Google Satellite, Northern Territory Government, Tamboran
CRS: GDA94 Zone 53

Tamboran B2 Pty Ltd
Shenandoah South Sand Wash Plant Cultural Heritage Assessment Predictive Modelling
Uncleared Vegetation Groups Suitable for Aboriginal Culturally Modified Trees

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LEGEND

- Kyalla 117 N2**
- Well Pad Point
- Well Pad Project Area
- Shenandoah South Sand Wash Plant Project Area**
- SS SWP
- Study Area
- Archaeological Sensitivity for Artefact Sites and Hearths**
- Low

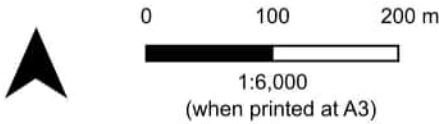


Data Sources: AECOM, Google Satellite, Northern Territory Government, Tamboran
CRS: GDA94 Zone 53

Tamboran B2 Pty Ltd
Shenandoah South Sand Wash Plant Cultural Heritage Assessment
Predictive Modelling
Archaeological Sensitivity for Artefact Sites and Hearths

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VERSION	1	

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LEGEND

- Kyalla 117 N2**
- Well Pad Point
- Well Pad Project Area
- Shenandoah South Sand Wash Plant Project Area**
- SS SWP
- Study Area
- Archaeological Sensitivity for Aboriginal Culturally Modified Trees**
- Low

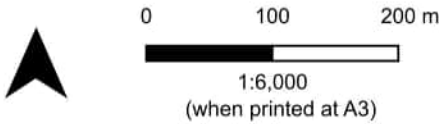
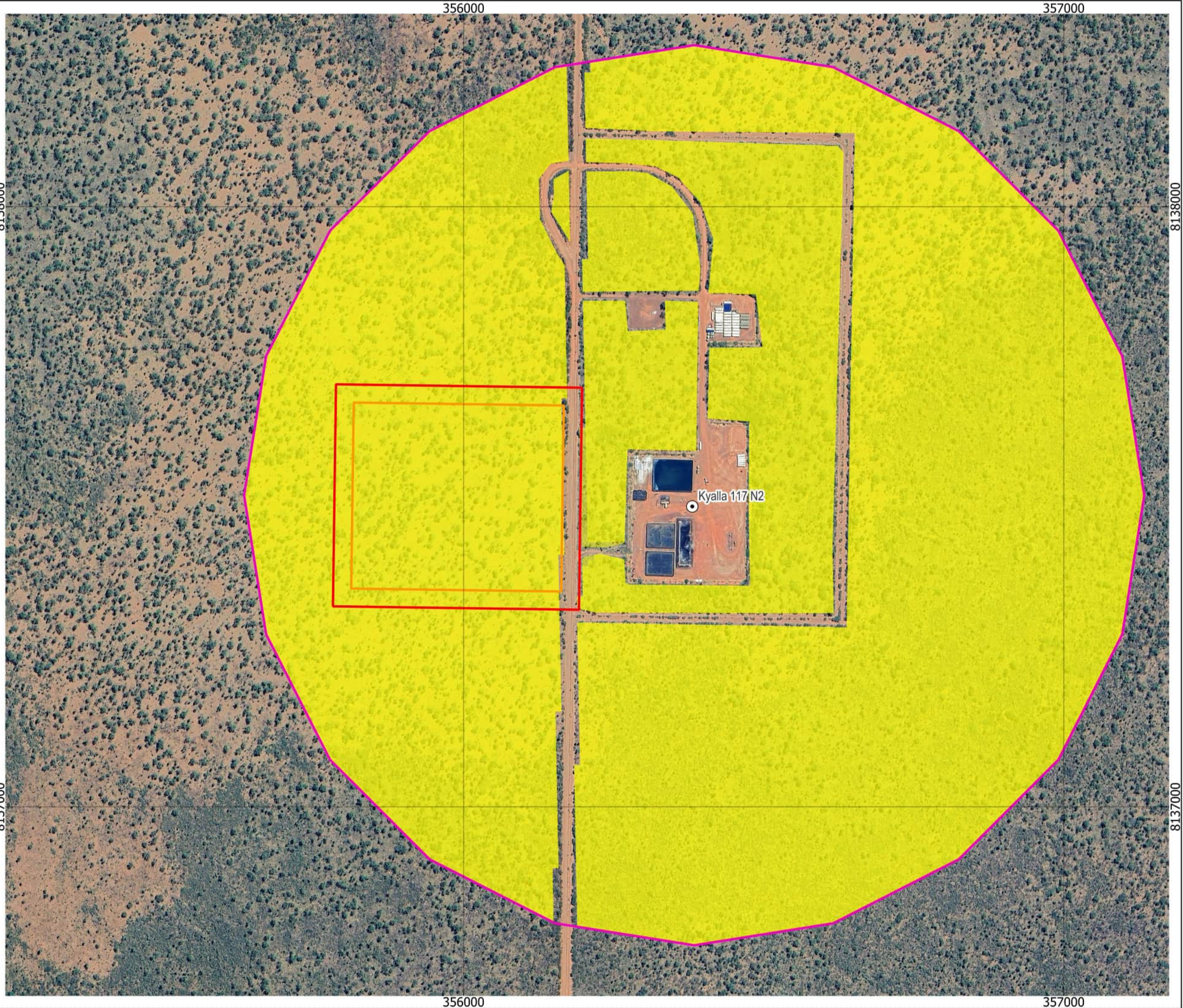


Data Sources: AECOM, Google Satellite, Northern Territory Government, Tamboran
CRS: GDA94 Zone 53

**Tamboran B2 Pty Ltd
Shenandoah South Sand Wash
Plant Cultural Heritage Assessment
Predictive Modelling
Archaeological Sensitivity for
Aboriginal Culturally Modified Trees**

PROJECT ID	60667354	Figure 5
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LAST MODIFIED	16-4-2025	
VERSION	1	

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LEGEND

- Kyalla 117 N2**
- Well Pad Point 
- Well Pad Project Area 
- Shenandoah South Sand Wash Plant Project Area**
- SS SWP 
- Study Area 
- Archaeological Sensitivity for All Archaeological Sites**
- Low 



Data Sources: AECOM, Google Satellite, Northern Territory Government, Tamboran
CRS: GDA94 Zone 53

Tamboran B2 Pty Ltd
Shenandoah South Sand Wash Plant Cultural Heritage Assessment
Predictive Modelling
Archaeological Sensitivity for All Archaeological Sites

PROJECT ID	60667354	Figure 6
CREATED BY	KC	
LAST MODIFIED	16-4-2025	
VERSION	1	

5.0 References

AECOM Australia Pty Ltd (2014) *Aboriginal & Historic Heritage Assessment*, Unpublished report for Origin Energy Resources Limited.

— (2016) *Beetaloo Road Addendum: Aboriginal & Historic Heritage Assessment*, Unpublished report to Origin Energy Resource Limited.

— (2020) *Cultural Heritage Assessment: EP136 - Beetaloo Sub-Basin, NT*, Unpublished report for Sweetpea Petroleum Pty Ltd.

— (2021) *Cultural Heritage Assessment: Amungee NW 1 and Velkerri 76 S2*, Unpublished report for Origin Energy Resources Ltd.

— (2023a) *Cultural Heritage Assessment: Kyalla Study Area*, Unpublished Report for Tamboran Resources Ltd.

— (2023b) *Cultural Heritage Assessment Report: Shenandoah and Amungee Heritage Scouting*, Unpublished report for Tamboran B2 Pty Ltd, Brisbane, Australia.

AECOM Australia Pty Ltd (AECOM) (2012) 'Final Report Archaeological Surveys 2011/2012: Onshore Seismic Exploration Program, Beetaloo Basin, NT'.

— (2024) *Cultural Heritage Assessment: Beetaloo Basin Heritage Scouting - Shenandoah South Exploration and Appraisal Program Area*.

Australian Fire and Emergency Services Authorities Council (2015) *Overview of Prescribed Burning in Australasia*.

Bryant C (2008) *Understanding Bushfire - Trends in Deliberate Vegetation Fires in Australia*, doi:10.1111/j.1467-8500.1981.tb00527.x.

Clarkson C (2006) 'Interpreting Surface Assemblage Variation in Wardaman Country, Northern Territory: An Ecological Approach', in S Ulm and I Lilley (eds) *An Archaeological life; Papers in Honour of Jay Hall*, Aboriginal and Torres Strait Islander Studies Unit, The University of Queensland, Brisbane.

Department of Environment Parks and Water Security (2022) 'SREBA Beetaloo Vegetation Map'.

Fanning PC, Holdaway SJ and Phillipps RS (2009) 'Heat-retainer hearth identification as a component of archaeological survey in western NSW, Australia', in *Terra Australis*, ANU E Press, Canberra.

Foley R (1981a) 'A Model of Regional Archaeological Structure', *Proceedings of Prehistoric Society*, 47.

— (1981b) *Off-site Archaeology and Human Adaption in Eastern Africa. An Analysis of Regional Artefact Density in the Amboseli, Southern Kenya*, BAR Intern, British Archaeological Reports, Oxford.

Gregory RL (1998) *Aboriginal Settlement Patterns in the Ord-Victoria River Region*, Northern Territory University.

Heritage Consulting Australia Pty Ltd (2019) *An Aboriginal and non-Indigenous archaeological assessment of proposed works in EP161, Southern Scope, McArthur Basin, Northern Territory*.

Hermes M (1986) *Amadeus Basin to Darwin Natural Gas Pipeline - Spread 2: Internal report on archaeological findings*, Unpublished report to the NT Museums and Art Galleries.

HLA-Envirosciences Pty Ltd (2006) *Archaeological Assessment 2006 for the Sweetpea Petroleum Seismic Program, Beetaloo Basin, Northern Territory, 2006*, Unpublished report for Sweetpea Petroleum Pty Ltd.

Holdaway SJ, Davies B and Fanning PC (2017) 'Aboriginal use of fire in a landscape context: Investigating presence and absence of heat-retainer hearths in Western New South Wales, Australia', *Current Anthropology*, 58(August):S230–S242, doi:10.1086/691436.

Northern Territory Government (2022) *Savanna Regional Bushfire Management Plan 2022-23*.

Northern Territory Government (Northern Territory Geological Survey) (2010) 'Daly Waters 250K

Geology’.

—— (2017) ‘Tanumbirini Outcrop Geology 250k’.

Rowland M and Connolly M (2002) ‘Towards GIS Mapping and Spatial Modelling of Archaeological Sites in the Southeast Queensland Bioregion’, *Queensland Archaeological Research*, 13(August 2000):39, doi:10.25120/qar.13.2002.67.

Smith MA (2006) ‘Characterizing Late Pleistocene and Holocene Stone Artefact Assemblages from Punitjarra Rockshelter: A Long Sequence From the Australian Desert’, *Records of the Australian Museum*, 58:371–410.

Wallis LA and Collins S (2013) ‘Just Passing Through: Archaeological Investigations of a Late Holocene Open Site in the Mitchell Grass Downs, Inland Northwest Queensland’, *Queensland Archaeological Research*, 16:45–64, doi:10.25120/qar.16.2013.223.

Appendix A – Previously Recorded Archaeological Sites

Table 7 Matrix summarising number of archaeological sites identified in previous archaeological studies for the region by vegetation type, proximity to water and presence/absence of stone sources or outcrops

	Vegetation type	Stone source / outcrop suitable for artefact manufacture	Water		
			In proximity to water	Not in proximity to water	Proximity to water unknown
Number of sites	Open woodland	Absent	22	3	
		Present	2		
	Closed woodland	Absent	1	1	1
		Present			
	Grassland	Absent	3		
		Present			
	Shrubland	Absent			
		Present			
	Ecotone / transition / edge of different vegetation types	Absent	28	1	
		Present			
	Riparian	Absent	2		
		Present			
	Woodland (unspecified) / forest	Absent	11		
		Present	1		
	Other vegetation type	Absent	6		1
		Present	4		
	Cleared	Absent	5	4	2

		Present			
	Vegetation unknown	Absent	7		
		Present	1		

Table 8 Previously recorded archaeological sites associated with sensitive landforms in the region

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
2006	Cooee Hill and 80 Metre Tower	Artefact Scatter	CHT 1	Flat adjacent to first order stream with waterholes	- Site extent cleared of vegetation (unformed track) - Adjacent vegetation of open woodland dominated by Eucalypt species and lancewood with scattered bullwaddy		- Surface and subsurface artefacts - Erosional context with water movement	HLA-Envirosciences Pty Ltd (2006)
2006	Yaroo, South Martyr's Tree and Dunmarra	Artefact Scatter	Yaroo 1	Flat adjacent to a channelised first order stream	Bloodwood and ironwood with mixed grassland		- Surface artefacts - Silcrete cobbles located 7 km to the east	
2006	Yaroo, South Martyr's Tree and Dunmarra (Yaroo)	Artefact Scatter	Yaroo 2	Flat adjacent to a channelised first order stream	Closed lancewood and bullwaddy woodland		- Surface artefact - Silcrete cobbles	

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
				Bloodwood, ironwood, lancewood and bullwaddy vegetation with spinifex			located 7 km to the east	
2006	Yaroo, South Martyr's Tree and Dunmarra (Yaroo)	Isolated Artefact	Yaroo 3	Flat of a first order stream	Open blue leaved mallee woodland and mixed grassland	Numerous fluvial silcrete cobbles	Surface artefact	
2006	Yaroo, South Martyr's Tree and Dunmarra (Yaroo)	Isolated Artefact	Yaroo 3A	Flat adjacent to a first order stream	Open blue leaved mallee woodland and mixed grassland	Numerous fluvial silcrete cobbles	Surface artefact	
2006	Yaroo, South Martyr's Tree and Dunmarra (Yaroo)	Isolated Artefact	Yaroo 3B	Flat adjacent to a first order stream	Open blue leaved mallee woodland and mixed grassland	Numerous fluvial silcrete cobbles	Surface artefact	
2006	Yaroo, South Martyr's Tree and Dunmarra (Yaroo)	Artefact Scatter	Yaroo 4	Flat adjacent to a channelised first order stream	Open blue leaved mallee woodland and mixed grassland		Surface artefacts	
2006	Yaroo, South Martyr's Tree and Dunmarra (Yaroo)	Artefact Scatter	Yaroo 5	Flat adjacent to a channelised first order stream	Open blue leaved mallee woodland and mixed grassland	- Siliceous siltstone cobbles - Silcrete cobbles located 1 km to the east	- Surface artefacts - Heat shattered stones	

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
2006	Yaroo, South Martyr's Tree and Dunmarra (Dunmarra)	Isolated Artefact	Dunmarra 1	Flat of a first order stream	Open bloodwood, ironwood, lancewood and bullwaddy woodland with turkey bush shrubs		Surface artefact	
2006	Yaroo, South Martyr's Tree and Dunmarra (Dunmarra)	Isolated Artefact	Dunmarra 2	Flat of a first order stream	Open bloodwood, ironwood, lancewood and bullwaddy woodland with turkey bush shrubs		Surface artefact	
2006	Newcastle Creek	Artefact Scatter (Background Scatter)	NC1	- Depression bisected by a first order stream (Newcastle Creek) - Edge of a floodplain	Ecotone – transition from <i>Terminalia</i> sp. open woodland to open lancewood woodland		Surface artefacts	
2006	Newcastle Creek	Artefact Scatter (Background Scatter)	NC2		Open lancewood woodland with scattered golly leave grevillea and <i>Acacia</i> sp.	Abundant chert outcrops	- Surface artefacts - Flat terrain located 5 km from Newcastle Creek	

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
2006	Newcastle Creek	Isolated Artefact	NC3	50 m from first order stream (Newcastle Creek)	Open <i>Terminalia</i> sp. and <i>Eucalyptus</i> sp. woodland		Surface artefact	
2006	Newcastle Creek	Artefact Scatter and Stone Cairns	NC4	30 m from first order stream (Newcastle Creek)	<i>Terminalia</i> sp. and <i>Eucalyptus</i> sp. open woodland	Numerous chert cobbles	Surface artefacts	
2011	Eastern program area (Amungee Mungee Station)	Artefact Scatter	AM-AS1-11	- Semi-perennial chain of ponds creek bed system - Floodplain				AECOM (2012)
2011	Eastern program area (Amungee Mungee Station)	Artefact Scatter	AM-AS2-11	Semi-perennial creek system				
2011	Eastern program area (Amungee Mungee Station)	Isolated Artefact	AM-IA1-11	Semi-perennial creek system				
2011	Eastern program area (Amungee Mungee Station)	Isolated Artefact	AM-IA2-11	Ephemeral swamp and small channel	Open eucalypt woodland			
2012	Western/Southern program area (Kalala, Newcastle Waters and Beetaloo Stations)	Artefact Scatter	KA-AS2-12	Ephemeral creek line in proximity	Eucalypt vegetation	Exposed conglomerate and siltstone geology		

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
2012	Western/Southern program area (Kalala, Newcastle Waters and Beetaloo Stations)	Artefact Scatter	KA-AS1-12	Large channelised creek				
2012	Western/Southern program area (Kalala, Newcastle Waters and Beetaloo Stations)	Artefact Scatter	BL-AS1-12	Washout creek	Eucalypt and bullwaddy vegetation			
2014	Kalala S-1, Amungee NW-1, Beetaloo W-1 and Beetaloo C-1	Isolated Artefact	BT-IA1-14		Site extent cleared of vegetation (track)		- Surface artefact - Not <i>in situ</i>, likely associated with water movement	AECOM (2014)
2016	Newcastle Waters	Isolated Artefact	BT-16-IA2		Site extent cleared of vegetation (firebreak)		- Surface artefact - Not <i>in situ</i>, likely associated with water movement	AECOM (2016)
2019	EP161 Tanumbirini – Southern Works Program	Isolated Artefact	IF1	Beside a minor tributary (no stream order) of Inacumba Creek	Eucalypt and hakea woodland with abundant grass cover			HCA (2019)

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
					• Mapped as snappy gum low open woodland			
2019	EP161 Tanumbirini – Southern Works Program	Isolated Artefact	IF2	• On a minor tributary (first stream order) of Inacumba Creek	• Scattered eucalypt woodland • Mapped as riparian woodland (ephemeral streams)			
2019	EP161 Tanumbirini – Southern Works Program	Isolated Artefact	IF3	• Adjacent to October Creek floodplain	• Eucalypt woodland • Mapped as <i>Corymbia</i> / <i>Eucalyptus</i> woodland on sandstone		• 1.5 km to the north of October Creek • Mapped as 650 m from a first order stream	
2019	EP161 Tanumbirini – Southern Works Program	Isolated Artefact	IF4	• Adjacent to October Creek floodplain	• Scattered eucalypts with no grass cover • Mapped as <i>Corymbia</i> / <i>Eucalyptus</i> woodland on sandstone		• Mapped as 350 m from a first order stream	
2019	EP161 Tanumbirini – Southern Works Program	Isolated Artefact	IF5	• Adjacent to October Creek floodplain	• No grass or tree cover • Mapped as tussock grassland		• Mapped as 450 m from a first order stream	

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
							Theorised to have been eaten by an emu and transported to current location	
2019	EP161 Tanumbirini – Southern Works Program	Isolated Artefact	IF6	200 m from the edge of October Creek floodplain	- Eucalypt woodland with dense grass cover - Mapped as <i>Acacia</i> shrubland and hummock grassland on sandplains		Mapped as 350 m from a first order stream	
2019	EP161 Tanumbirini – Southern Works Program	Isolated Artefact	IF7	Adjacent to October Creek headwaters	- Sparse tree cover and scattered grasses - Mapped as tussock grassland			
2019	EP161 Tanumbirini – Southern Works Program	Isolated Artefact	IF8	80 m to the east of October Creek channel	- Scattered eucalypts and shrubs - Mapped as <i>Corymbia</i> / <i>Eucalyptus</i> woodland on sandstone			

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
2019	EP161 Tanumbirini – Southern Works Program	Isolated Artefact	IF9		- Dense bullwaddy stand with abundant grass cover and dense shrubs - Dense stand of bullwaddy in a well vegetated area		- Plateau near the headwaters of Inacumba, October and Newcastle Creeks - Several hundred metres to the east of area subject to inundation 1.4 km to the southwest of Inacumba Creek headwaters	
2019	EP161 Tanumbirini – Southern Works Program	Isolated Artefact	IF10		- Dense woodland with eucalypts, scattered patches of bullwaddy and tea tree, and dense spinifex understory - Mapped as snappy gum low open woodland		Plateau near the headwaters of Inacumba, October and Newcastle Creeks	
2019	EP161 Tanumbirini –	Isolated Artefact	IF11		Eucalypt woodland with		Plateau near the	

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
	Southern Works Program				sapling regrowth, dense shrub and spinifex understory • Mapped as snappy gum low open woodland		headwaters of Inacumba, October and Newcastle Creeks • At least 1.8 km from Inacumba Creek / nearest watercourse	
2019	EP161 Tanumbirini – Southern Works Program	Isolated Artefact	IF12		• Site extent cleared of vegetation (windrow of track) • Adjacent to eucalypt woodland with dense grass cover and bullwaddy thicket		• 2.6 km from a minor tributary of October Creek • 4.3 km from the Newcastle Creek floodplain	
2019	EP161 Tanumbirini – Southern Works Program	Isolated Artefact	IF13	• 150 m from a drainage line that flows towards the October Creek floodplain	• Bullwaddy thicket in open eucalypt woodland with sparse grass cover			
2019	EP161 Tanumbirini – Southern Works Program	Isolated Artefact	IF14	• Minor gully leading to the October Creek floodplain	• Grass tussock • Adjacent to sparse eucalypt			

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
					woodland with grass tussocks			
2019	EP161 Tanumbirini – Southern Works Program	Isolated Artefact	IF15		Bullwaddy thickets and tea tree forest		On clear ground prone to inundation	
2019	EP161 Tanumbirini – Southern Works Program	Isolated Artefact	IF16	Drainage line immediately to the west	- Site extent cleared of vegetation (windrow of firebreak) - Adjacent to eucalypt woodland with sparse grass cover		Adjacent to shallow flood zone	
2019	EP161 Tanumbirini – Southern Works Program	Artefact Scatter	Tanumbirini Creek Site 1	Northern bank of minor channel of Tanumbirini Creek (second order stream) and floodplain	Mapped as intersection between riparian woodland (ephemeral streams), and <i>Bauhinia</i> and <i>Corymbia</i> open woodland on sandy clay			
2019	EP161 Tanumbirini – Southern Works Program	Artefact Scatter	Inacumba Creek Site 1	Immediately adjacent to Inacumba Creek (third order stream) and	Broad area described as Eucalypt and acacia woodland on densely		On cattle pad immediately adjacent to access track	

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
				adjacent floodplain	grassed banks, and a densely vegetated creek channel		High potential for subsurface artefacts	
2019	EP161 Tanumbirini – Southern Works Program	Artefact Scatter	October Creek Site 1	On minor gully leading to October Creek and the October Creek floodplain	Lancewood grove		Potential for subsurface artefacts	
2019	EP161 Tanumbirini – Southern Works Program	Artefact Scatter	October Creek Site 2	On minor gully leading to October Creek and the October Creek floodplain	Lancewood grove		Large silcrete block located near the site, deliberately transported to the area	
2019	EP161 Tanumbirini – Southern Works Program	Artefact Scatter	Lagoon Creek Site 1	On minor gully flowing into Lagoon Creek	Lancewood with well vegetated grass and shrubs			
2019	EP161 Tanumbirini – Southern Works Program	Artefact Scatter	Lagoon Creek Site 2	- On tributary of Lagoon Creek - Near a reliable rock well	Edge of lancewood grove			
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-19-AS7	Adjacent to large lagoon and adjacent to and	Mapped across riparian vegetation (ephemeral			AECOM (2020)

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
				within Newcastle Creek	streams); coolabah low open woodland on clay, and; coolabah, <i>Lophostemon</i> and <i>Gutta Percha</i> swamps • Site extent also partially cleared of vegetation (track)			
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-19-AS8	• Adjacent to large lagoon and Newcastle Creek	• Site extent cleared of vegetation (track)			
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-19-AS9	• Adjacent to and within Newcastle Creek	• Mapped as coolabah, <i>Lophostemon</i> and <i>Gutta Percha</i> swamps			
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-19-AS10	• Adjacent to and within Newcastle Creek	• Mapped across <i>Corymbia</i> / <i>Eucalyptus</i> woodland (run-on areas and heavier soils); coolabah low open woodland on clay, and; coolabah, <i>Lophostemon</i> and			

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
					<i>Gutta Percha</i> swamps • Site extent also partially cleared of vegetation (track)			
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-19-AS11	• Adjacent to a lagoon	• Mapped across <i>Corymbia</i> / <i>Eucalyptus</i> open woodland on sandy loam; lancewood forest; <i>Eucalyptus chlorophylla</i> low open woodland, and; coolabah low open woodland on clay			
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-19-AS12	• Adjacent to Newcastle Creek	• Mapped across coolabah low open woodland on clay and tussock grassland			
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-19-AS13	• Adjacent to and within Newcastle Creek	• Mapped across <i>Corymbia</i> / <i>Eucalyptus</i> woodland (run-on areas and heavier soils); coolabah low open			

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
					woodland on clay, and; coolabah, <i>Lophostemon</i> and <i>Gutta Percha</i> swamps			
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-19-AS14	Adjacent to a seasonal water source (depression)	- Mapped across riparian woodland (ephemeral streams); snappy gum low open woodland; silver box low open woodland, and; tussock grassland - Site extent also partially cleared of vegetation (track)			
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-19-AS15	30 m west of a small creek line - Adjacent to a floodplain	Mapped across snappy gum low open woodland, and <i>Melaleuca</i> low open woodland on floodplains and drainage depressions			
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-19-AS16	Adjacent to and within	Mapped across riparian woodland			

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
				Newcastle Creek and lagoon	(ephemeral streams); coolabah low open woodland on clay, and; tussock grassland			
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-19-AS17	Adjacent to and within Newcastle Creek	Mapped across coolabah low open woodland on clay, and tussock grassland			
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-19-AS18	Adjacent to and within a tributary of Newcastle Creek	Mapped across snappy gum low open woodland; silver box low open woodland, and; coolabah low open woodland on clay			
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-19-AS19	Adjacent to and within Newcastle Creek	Mapped across <i>Eucalyptus chlorophylla</i> low open woodland and coolabah low open woodland on clay			

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
2020	EP136 Beetaloo Sub-Basin	Isolated Artefact	BT-19-IA1	200 m to the south of Newcastle Creek	Site extent cleared of vegetation (track)			
2020	EP136 Beetaloo Sub-Basin	Isolated Artefact	BT-19-IA2		Site extent cleared of vegetation (track)		480 m to the south of Newcastle Creek	
2020	EP136 Beetaloo Sub-Basin	Isolated Artefact	BT-19-IA3		Site extent cleared of vegetation (track)		680 m to the south of Newcastle Creek	
2020	EP136 Beetaloo Sub-Basin	Isolated Artefact	BT-19-IA4		Site extent cleared of vegetation (track)			
2020	EP136 Beetaloo Sub-Basin	Isolated Artefact	BT-19-IA5		Mapped at intersection of silver box low open woodland and bullwaddy shrubland and woodland		Adjacent to cleared track	
2020	EP136 Beetaloo Sub-Basin	Isolated Artefact	BT-19-IA6		Mapped as <i>Melaleuca</i> low open woodland on floodplains and drainage depressions		- Adjacent to cleared track 350 m to the west of Newcastle Creek	

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
2020	EP136 Beetaloo Sub-Basin	Isolated Artefact	BT-19-A7	• Adjacent to Newcastle Creek	• Site extent cleared of vegetation (track)			
2020	EP136 Beetaloo Sub-Basin	Isolated Artefact	BT-19-IA8	• Adjacent to tributary of Newcastle Creek	• Mapped as coolabah low open woodland on clay			
2020	EP136 Beetaloo Sub-Basin	Isolated Artefact	BT-19-IA9	• Within tributary of Newcastle Creek	• Mapped as coolabah low open woodland on clay			
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-20-AS01	• Adjacent to a flood plain				
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-20-AS02	• Southern side of a creek line				
2020	EP136 Beetaloo Sub-Basin	Artefact Scatter	BT-20-AS03	• Adjacent to a billabong on Newcastle Creek	• Mapped as <i>Corymbia</i> / <i>Eucalyptus</i> woodland (run-on areas and heavier soils)			
2021	Amungee NW 1	Artefact Scatter	BT-21-AS10	• Within a large ephemeral channel with small drainage depressions / soaks	• Mapped across <i>Eucalyptus chlorophylla</i> low open woodland and silver box low open woodland			AECOM (2021)

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
2021	Amungee NW 1	Artefact Scatter	BT-21-AS11	• Adjacent to and within a large drainage depression	• Large clearing surrounded by dense vegetation • Mapped across lancewood forest and bullwaddy shrubland and woodland			
2021	Amungee NW 1	Artefact Scatter	BT-21-AS12	• South of a drainage depression	• A clearing amongst thick vegetation • Mapped across lancewood forest and bullwaddy shrubland and woodland			
2021	Amungee NW 1	Isolated Artefact	BT-21-IA01	• Flat terrain in an area with numerous drainage depressions	• Mapped as <i>Corymbia</i> / <i>Eucalyptus</i> woodland (run-on areas and heavier soils)			
2021	Amungee NW 1	Isolated Artefact	BT-21-IA02	• Flat terrain in an area with numerous drainage depressions	• Mapped as <i>Corymbia</i> / <i>Eucalyptus</i> woodland (run-on areas and heavier soils)			

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
2021	Amungee NW 1	Isolated Artefact	BT-21-IA03	Flat terrain in an area with numerous drainage depressions	Mapped as <i>Corymbia</i> / <i>Eucalyptus</i> woodland (run-on areas and heavier soils)			
2021	Amungee NW 1	Isolated Artefact	BT-21-IA04	170 m northeast of a large drainage depression	Mapped as lancewood forest		Located on top of a low ridge line	
2021	Amungee NW 1	Isolated Artefact	BT-21-IA05	120 m southwest of a large drainage depression	Mapped as bullwaddy shrubland and woodland			
2021	Amungee NW 1	Isolated Artefact	BT-21-IA06	170 m southwest of a large drainage depression	Mapped on edge of bullwaddy shrubland and woodland, and <i>Corymbia</i> / <i>Eucalyptus</i> open woodland on sandy loam			
2021	Velkerri 76 S2	Artefact Scatter	BT-21-AS01	Edge of a clearing surrounding a drainage depression / soak	Mapped across <i>Corymbia</i> / <i>Eucalyptus</i> woodland (run-on areas and heavier soils) and lancewood forest			

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
2021	Velkerri 76 S2	Artefact Scatter	BT-21-AS02	Slightly elevated terrain east of a large drainage depression / soak	Mapped as <i>Melaleuca</i> low open woodland on floodplains and drainage depressions			
2021	Velkerri 76 S2	Artefact Scatter	BT-21-AS03	Slightly elevated terrain east of a large drainage depression / soak	Mapped as <i>Melaleuca</i> low open woodland on floodplains and drainage depressions			
2021	Velkerri 76 S2	Artefact Scatter	BT-21-AS04	Slightly elevated, flat terrain east of a large drainage depression / soak	Mapped as <i>Melaleuca</i> low open woodland on floodplains and drainage depressions			
2021	Velkerri 76 S2	Artefact Scatter	BT-21-AS05	Slightly elevated terrain east of a large drainage depression / soak	Mapped as <i>Melaleuca</i> low open woodland on floodplains and drainage depressions			
2021	Velkerri 76 S2	Artefact Scatter	BT-21-AS06	Flat terrain in an area with numerous drainage depressions / soaks of various sizes	Mapped as coolabah low open woodland on clay			

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
2021	Velkerri 76 S2	Artefact Scatter	BT-21-AS07	Flat terrain in an area with numerous drainage depressions / soaks of various sizes	Mapped as coolabah low open woodland on clay	Abundant natural stone suitable for stone tool manufacture		
2021	Velkerri 76 S2	Artefact Scatter	BT-21-AS08	Flat terrain in an area with numerous drainage depressions / soaks of various sizes	Mapped as coolabah low open woodland on clay			
2021	Velkerri 76 S2	Artefact Scatter	BT-21-AS09	- Flat terrain on the edge of a large ephemeral channel - Near to drainage depressions / soaks	- Transition zone with notable vegetation change - Mapped as coolabah low open woodland on clay		Located where the flat channel meets a rise	
2021	Velkerri 76 S2	Artefact Scatter	BT-21-AS13	Edge of a large clearing surrounding a drainage depression / soak	Mapped across lancewood forest; bullwaddy shrubland and woodland, and; <i>Corymbia</i> / <i>Eucalyptus</i> woodland (run-on			

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
					areas and heavier soils)			
2022	Kyalla	Artefact Scatter	TAM_22_AS_01	Surrounding and within a large drainage depression	- Bullwaddy stands - Mapped across <i>Corymbia</i> / <i>Eucalyptus</i> open woodland on sandy loam; bullwaddy shrubland and woodland; silver box low open woodland; coolabah low open woodland on clay; coolabah, <i>Lophostemon</i> and <i>Gutta Percha</i> swamps; <i>Melaleuca</i> low open woodland on floodplains and drainage depressions			AECOM (2023a)
2023	Amungee NW-3	Artefact Scatter	TAM_23_AS_01	Linear seasonal water source (creek line)	Mapped across <i>Eucalyptus chlorophylla</i> low open woodland			AECOM (2023b)

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
					and silver box low open woodland			
2024	Shenandoah South	Isolated Artefact	TAM_24_IA_01	Within drainage depression	Mapped as coolabah low open woodland on clay			AECOM (2024)
2024	Shenandoah South	Isolated Artefact	TAM_24_IA_02	Adjacent to first order stream	Mapped as <i>Bauhinia</i> and <i>Corymbia</i> open woodland on sandy clay			
2024	Shenandoah South	Isolated Artefact	TAM_24_IA_03	Adjacent to first order stream	Mapped as <i>Eucalyptus chlorophylla</i> low open woodland			
2024	Shenandoah South	Isolated Artefact	TAM_24_IA_04	Adjacent to first order stream	Mapped as <i>Eucalyptus chlorophylla</i> low open woodland			
2024	Shenandoah South	Isolated Artefact	TAM_24_IA_05	Adjacent to first order stream	Mapped as <i>Melaleuca</i> low open woodland on floodplains and drainage depressions			
2024	Shenandoah South	Isolated Artefact	TAM_24_IA_06	Adjacent to drainage depression	Mapped as <i>Eucalyptus chlorophylla</i> low open woodland			

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
2024	Shenandoah South	Isolated Artefact	TAM_24_IA_07	Adjacent to minor drainage line	Mapped as lancewood forest	Silcrete outcrop		
2024	Shenandoah South	Artefact Scatter	TAM_24_AS_01	Adjacent to first order stream	Mapped as riparian woodland (ephemeral streams)			
2024	Shenandoah South	Artefact Scatter	TAM_24_AS_02	Adjacent to first order stream	Mapped as riparian woodland (ephemeral streams) and lancewood woodland			
2024	Shenandoah South	Artefact Scatter	TAM_24_AS_03	Adjacent to first order stream	Mapped as riparian woodland (ephemeral streams) and lancewood woodland			
2024	Shenandoah South	Artefact Scatter	TAM_24_AS_04	Adjacent to first order stream	Mapped as riparian woodland (ephemeral streams) and lancewood woodland			
2024	Shenandoah South	Artefact Scatter	TAM_24_AS_05	Adjacent to first order stream	Mapped as silver box low open woodland			
2024	Shenandoah South	Artefact Scatter	TAM_24_AS_06	Adjacent to first order stream	Mapped as <i>Eucalyptus</i>			

Survey Year	Survey Location	Site Type	Site Name	Associated Water Source(s)	Associated Vegetation Type(s)	Associated Stone Outcrop / Resource(s)	Other Site Context	Source
					<i>chlorophylla</i> low open woodland			
2024	Shenandoah South	Artefact Scatter	TAM_24_AS_07	Adjacent to minor drainage line	Mapped as silver box low open woodland and snappy gum low open woodland			

Appendix D – Heritage Register Searches

Search Results

No results found.

Enter at least one search criterion.

[Search Hints](#)

Search Reset form	
Place name	
Street name	
Town or suburb	State
	--All-- v
Country	

Advanced search options

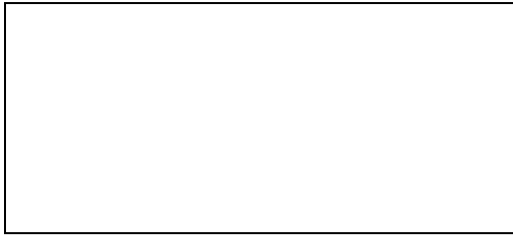
List	
All Lists v	
<i>Different lists will provide different status and class options</i>	
Local Government Area	Place ID number
Roper Gulf	
Legal status	Class
--All-- v	--All-- v
Keyword Search	
☒ Description	☒ Statement of Significance
☒ Place history	
Latitude/Longitude	
N Longitude 1 S Longitude 2 E W E Latitude 2 S S	
☐ Wholly within region ☒ Wholly or partially within region	
<i>Longitude coordinates should be entered as ddd.mm.ss</i> <i>Latitude coordinates should be entered as dd.mm.ss</i>	
Map Ref No	
<i>1:100,000 eg 2357</i> <i>1:250,000 eg SF-50-01</i>	

Search Hints

- Not all fields need to be filled in. The fewer you fill in the more results you will get.
- If you cannot find a place, check spelling and try alternative names. Reduce the number of words that you include and use fewer fields.

- The Local Government field used on its own will provide a comprehensive list of places in an area.

Report Produced: Wed Nov 27 14:05:41 2024



Heritage
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Northern Territory

[Back to search](#)

Filtered by: Birdum Roper Gulf Shire

Search Results

No results found

If you have any questions or want more information about sites with restricted or limited access call Heritage NT
(08) 8999 5039 or email Heritage.Branch@nt.gov.au



Add Data

Layers

Washplant_Location-Nov2024.kml

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Layer List

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Applications (Schedule) ...

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Section 31 Agreements ...

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Future Act Determination Applications ...

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Future Act Objections ...

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Future Act Notices (Current) ...

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Mining Tenements ...

☐

Petroleum Tenements ...

☒

Washplant_Location-Nov2024.kml ...

☒

Northern Territory State Layers ...

☒

Local Government Areas ...

☐

Indigenous Land Interests ...

(1 of 2)

Determinations: Shenandoah Pastoral Lease

Name

Shenandoah Pastoral Lease

Tribunal No

DCD2012/007

Fed Court No

NTD21/2010

Fed Court Name

Jackson v Northern Territory of Australia

Determined

27 Jun 2012

Method

Consent

Outcome

Native title exists in parts of the determination area

Date Registered

29 Jun 2012

RNTBC Name

Top End (Default PBC/CLA) Aboriginal Corporation RNTBC

Zoom to



National Native Title Register Details

[Back to search results](#)

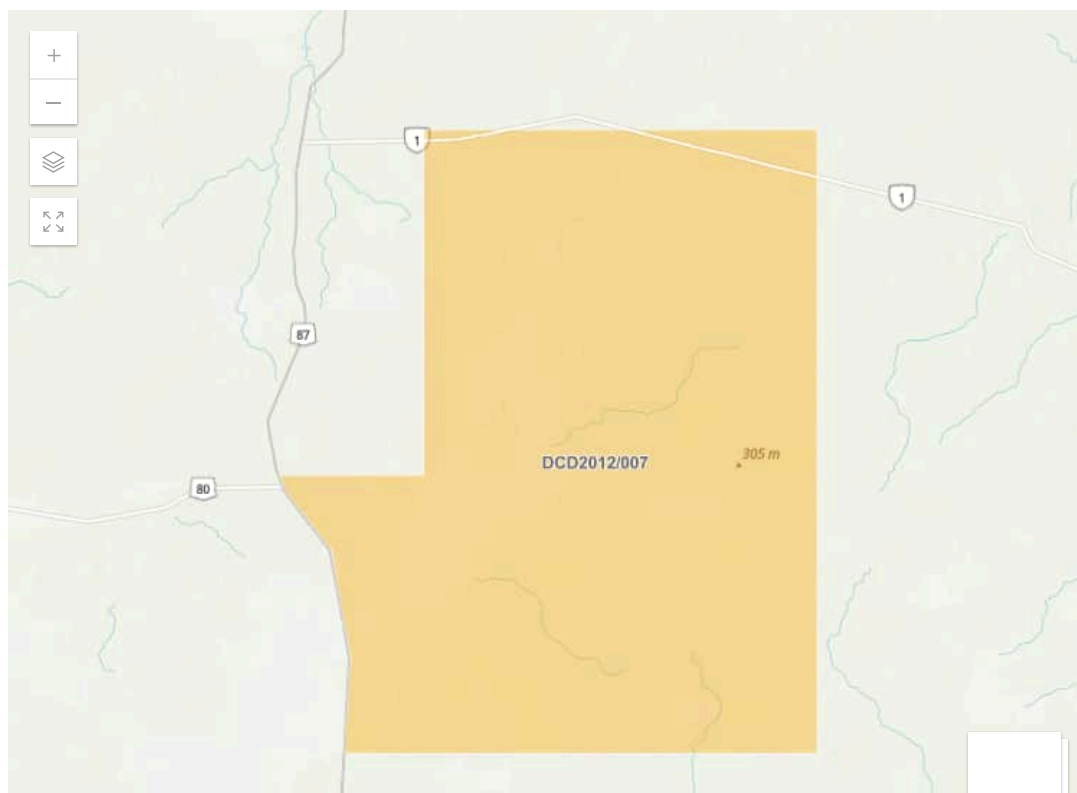
DCD2012/007 - Shenandoah Pastoral Lease

Tribunal file no.	DCD2012/007
Federal Court file no(s)	NTD21/2010
Short name	Shenandoah Pastoral Lease
Case name	Jackson v Northern Territory of Australia
Determination type	Claimant
State or Territory	Northern Territory
Legal process	Consent
Determination outcome	Native title exists in parts of the determination area
Representative A/TSI body area(s)	Northern Northern Territory
Local government area(s)	Roper Gulf Region
Determination date	27/06/2012
Date/s of effect	27/06/2012
Registered on National Native Title Register	Registered
Registered Native Title Body Corporate	Top End (Default PBC/CLA) Aboriginal Corporation RNTBC <i>Note: current contact details for the Registered Native Title Body Corporate are available from the Office of the Registrar of Indigenous Corporations www.oric.gov.au</i>

Register extract and attachments

Register extract	NNTRExtract_DCD2012_007.pdf
Register extract attachment/s	DCD2012_007 1. Map of Determination Area.pdf DCD2012_007 2. Map of interests granted under Mining and Energy Pipelines Acts (NT).pdf

Native Title Determination



View this map in NTV: **DCD2012/007**

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Appendix E – Archaeological Assessment Criteria

Ground Surface Visibility and Integrity

Table 5 Ground Surface Visibility (GSV) ratings, ranges and descriptions

GSV rating	Percentage GSV	Description
Nil to poor	0-25%	GSV is not sufficient for the visual detection of cultural material. Instead, the assessment relies on assessing the archaeological potential and integrity of the landforms in the area. Where sufficient risk exists that unidentified cultural material may be present, further assessment or management may be required. The area may need to be resurveyed once GSV conditions improve, or other management measures may be needed (for example, a Post Clearance Assessment).
Poor to good	26-50%	GSV is sufficient to visually detect cultural material.
Good to very good	51-75%	GSV is sufficient to visually detect cultural material.
Very good to excellent	76-100%	GSV is sufficient to visually detect cultural material.

Table 6 Ground Surface Integrity (GSI) ratings and descriptions

GSI rating	Definition
Low	The ground surface has been subjected to significant disturbance (for example, earthworks or excavations). Little to no integrity remains.
Moderate	The ground surface has been subject to moderate disturbance (for example, native vegetation clearance) but retains a reasonable degree of integrity.
High	The ground surface is unmodified or minimally modified.

Archaeological Potential and Sensitivity

Table 7 Definitions of subsurface archaeological potential

Subsurface archaeological potential	Definition
Low	Areas where subsurface archaeological materials are unlikely to occur due to unfavourable environmental conditions.
Moderate	Areas where subsurface archaeological materials may occur. Reasonably favourable environmental conditions exist, although high artefact counts or densities are unlikely. Subsurface archaeological material is likely to be the product of random discard events by Aboriginal people in antiquity.
High	Areas that are known or highly likely to contain subsurface archaeological material. The presence of archaeological materials typically reflects optimal environmental conditions. High artefact counts or densities and other archaeological features are likely due to repeated or intensive activity by Aboriginal people in antiquity.

Table 8 Archaeological sensitivity matrix

Sensitivity		Subsurface archaeological potential		
		High	Moderate	Low
GSI	Intact (high GSI)	High	Moderate	Low
	Disturbed (moderate GSI)	Moderate	Low	Very Low
	Disturbed (low GSI)	Low	Very Low	Nil

APPENDIX B.2

Unexpected Heritage Finds Procedure

Doc #: TB2-HSE-PRO-016

Unexpected Heritage Finds Procedure

Beetaloo Sub-basin

EP 76, EP 98 and EP 117

REV	DATE	REASON FOR ISSUE	EDITOR	APPROVER
0	26 Sept 2024	Issued for use	L Pugh	M Kernke
1	17 Feb 2025	Update heritage contacts	A Court	M Kernke

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1 Purpose

The purpose of this procedure is to set out the actions to be undertaken by Tamboran B2 Pty Ltd (Tamboran) staff and contractors if a suspected find of Aboriginal and non-Aboriginal cultural heritage is made during civil construction and seismic activities.

2 Scope

This procedure covers the requirements associated with:

- The identification of cultural heritage artefacts or areas within the Beetaloo Permit Area – EP 76, EP 98 and EP 117.
- The assessment of the risk and control measures to be taken if a suspected Indigenous and non-Indigenous cultural heritage find is discovered; including investigation, notification, recording and reporting, means of communication, measures to avoid cultural heritage and dispute resolution.

It applies to all fieldwork conducted in the Beetaloo Sub-basin.

3 Responsibility

These personnel are responsible for the following activities:

Vice President (VP) Environment and Permit Approvals	Heritage specialist and regulator engagement
Site Supervisor	Procedure issue and maintenance
Field Operations Manager	Implementation of this procedure
Heritage Specialist	Third party engaged to provide specialist heritage advice
All Tamboran Employees and Contractors	Complying with this procedure

4 Requirements

The following management measures will be implemented for all unexpected heritage finds and are to be included as part of toolbox discussions during civil construction activities.

4.1 Aboriginal cultural heritage

Aboriginal finds can include the following:

- Stone artefacts - sharp edged rocks that have identifiable features demonstrating evidence of human modification.
- Scarred trees - trees with symmetrical scars that might demonstrate evidence of removal of bark for use in coolamons, shields and huts.
- Grindstones - large sandstone items (either fixed in bedrock or mobile) that have manmade grooves in them demonstrating use.
- Stone axes - heavy hatchet head like stone items, typically with the leading edge sharpened
- Bone and shell - potential historical food waste dumps (also known as middens).

4.2 Historical cultural heritage

Historical finds include the following:

- Glass - coloured glass, bottles (complete or fragmentary, etc.).
- Metal - identifiable metallic objects such as cutlery, buckles, framing equipment, woodworking metal equipment, etc.
- Ceramic - plates, cups, ink wells, pipes, etc.
- Wood - identifiable human manufactured wooden items.
- Stone - identifiable human manufactured stone items (Figure 1).
- Bone and shell - potential historical food waste dumps.



Figure 1 Example of silcrete flake and quartz flake

4.3 Unexpected finds procedure

The following procedure is to be followed:

1. If an unexpected heritage find is identified during proposed works within the Project Area, work will stop immediately in the immediate area and the Tamboran Site Supervisor will be notified of the find.

2. A minimum 10 m area radius is to be cordoned off by temporary fencing around the suspected archaeological site.
3. The VP Environment and Permit Approvals should immediately contact the Senior Heritage Officer, NT Heritage Branch on 08 8999 5039 or email heritage.branch@nt.gov.au. **Note that contacting the NT Heritage Branch is compulsory under the NT Heritage Act for any finds.**
4. Do not resume work in the exclusion zone until a clearance is given by the Senior Heritage Officer attending.
 - a. Before work can recommence, there may also be a further requirement to seek a permit through the Heritage Branch.
 - b. A stop work remains in place until after the Heritage Council has made a decision regarding the Application to Carry Out Works.

4.4 Discovery of human remains

In all cases when human remains are located it is important to remember:

- The discovery of any human remains must as soon as possible be reported to the NT Police.
- It is an offence to interfere with human remains, whether buried or not.

The following process should be adhered to:

1. Work is to immediately cease, and a 50 m temporary cordon be established.
2. The Tamboran Site Supervisor and VP Environment and Permit Approvals must be immediately notified of the find.
3. If human remains are suspected, the Site Project Manager must contact the NT Police assistance line on 131 444 to advise them of the presence of human remains.
4. Police will then take control of the site and establish the area as a potential crime scene.
5. Police will undertake appropriate scientific or other procedures to assist the coroner in making an appropriate determination about the remains.
6. Police will contact the Senior Heritage Officer, NT Heritage Branch and the CEO of the Aboriginal Areas Protection Authority if necessary.
7. Resume work only after completion of Police and NT Heritage Branch investigations and appropriate removal of remains according to the NT *Coroners Act*.

5 Records

The following records should be kept and maintained in order to demonstrate compliance with the requirements of this procedure:

- Staff training/induction records.
- Unexpected finds incidents reporting; records of all finds to be kept on file, including correspondence with the relevant Government departments.

6 Definitions

Archaeological places or objects	Archaeological places or objects exist within or in the vicinity of the Tamboran Permit Areas. All such materials are protected under the <i>Heritage Act 2011 (NT)</i> .
Aboriginal cultural heritage	Has the same meaning as in the relevant Aboriginal cultural heritage legislation. It includes pre-settlement and post-settlement significant Aboriginal areas, and significant Aboriginal objects.
Aboriginal heritage awareness training	Training may consist of any of: • Briefings on relevant Aboriginal cultural heritage • Briefings on particular arrangements with Aboriginal parties • Identification of aboriginal heritage artefacts • Awareness sessions run for Tamboran staff by traditional owner/custodian groups
Burial sites	Possibility of burial sites located within the Permit Area. Under the Northern Territory Criminal Code and <i>Coroners Act 1993 (NT)</i> it is an offence to interfere with remains of a deceased person. Under the <i>Heritage Act 2011 (NT)</i> , it is an offence to interfere with historical human remains (both Aboriginal and non-Aboriginal) without authorization under this Act.
Cultural heritage duty of care	Has the same meaning as due diligence as defined in Aboriginal Cultural Heritage legislation guidelines applicable to the relevant State in which activities are occurring.
Find	Means a significant Aboriginal object or, evidence of archaeological or historic significance of Aboriginal occupation of an area or Aboriginal human remains, found in the course of undertaking an activity covered by the guidelines.
Traditional custodian	A descendant of an Aboriginal ethnic group that occupied a particular region before European settlement, recognised as being traditionally responsible for cultural heritage of that area.
Traditional owners	A descendant of the Aboriginal ethnic group that occupied a particular region before European settlement, as recognised by Australian law.

7 References

1. Northern Territory Aboriginal Sacred Sites Act 1989
<https://legislation.nt.gov.au/en/Legislation/NORTHERN-TERRITORY-ABORIGINAL-SACRED-SITES-ACT-1989>
2. Northern Territory *Heritage Act 2011* <https://legislation.nt.gov.au/Legislation/HERITAGE-ACT-2011>
3. Aboriginal Areas Protection Authority Certificate

APPENDIX C

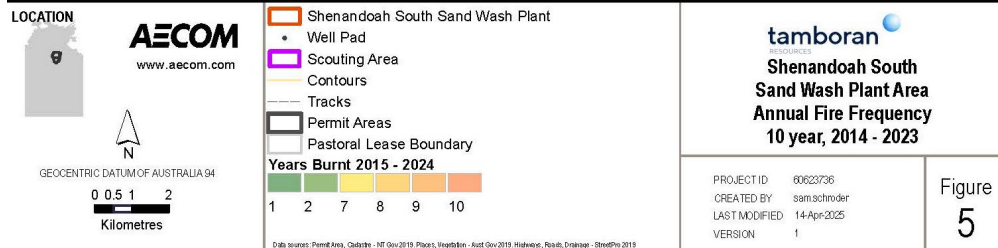
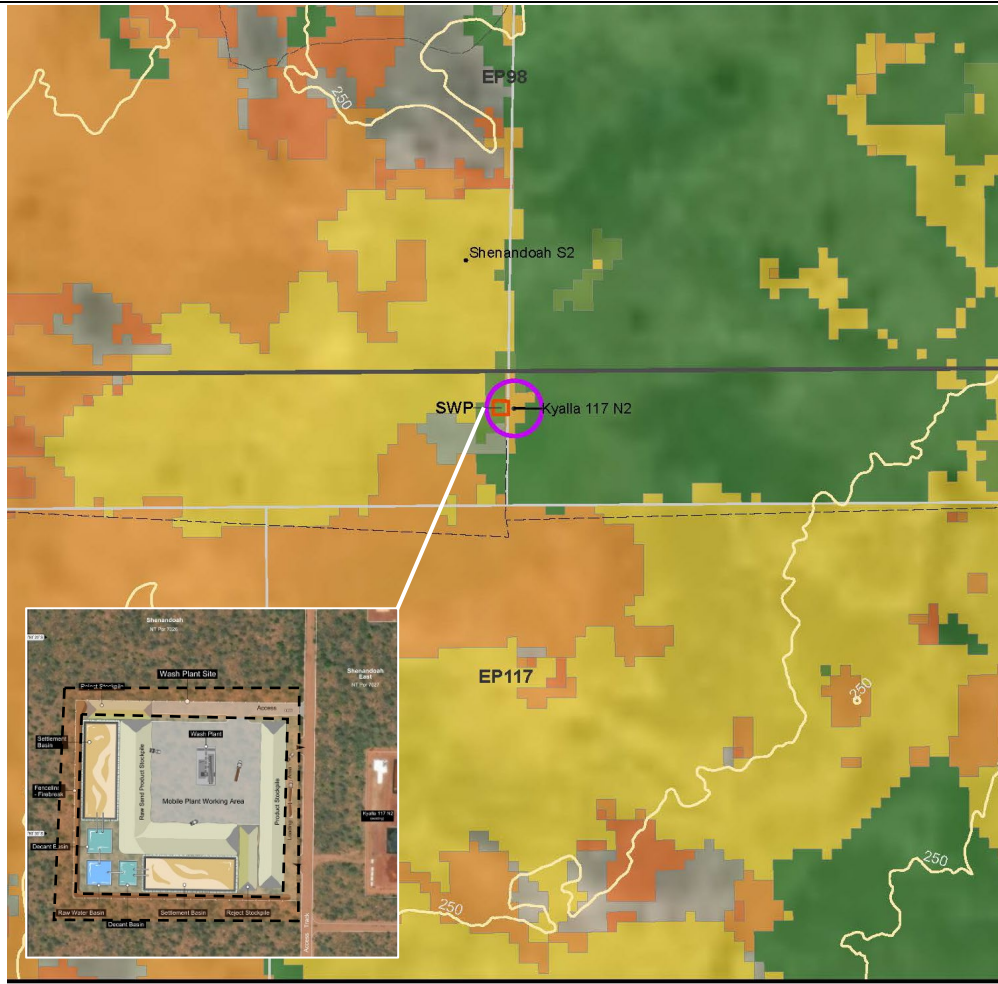
Bushfire Management Plan

Location of SWP

Co-ordinates	355995 E; 8137514 N
Property and land uses	Gas exploration, cattle grazing, and native title rights and interests recognised by the native title determinations over the land and waters.
Site fire management aim	To reduce the occurrence of, and minimise the impact of bushfires, thereby reducing the threat to life, property, cultural values and the environment.
Site fire management objectives	Mitigate the potential impact of unplanned fires on Tamboran's people, assets and operations and neighboring land uses.
Fire history (10 years) NAFI, 2025)	Fire scar mapping (2015-2024) indicates the exploration area has burnt within the last 2 years on the Shenandoah East station and approximately every 7-10 years on Shenandoah and Beetaloo stations (refer Figure below). Field observations at Kyalla 117 N2 and SWP site indicates low intensity fire when last burnt.

Fire Management Risks

- Ignitions (humans and lightening) on or off site resulting in harm to workers and loss of equipment.
- Altered landscape fire regimes as result of regulated activities leading to conflict i.e. more or less fire, change in pattern and timing. Noting SWP area was last burnt was 2 years ago.
- Bullwaddy and Lancewood vegetation communities occur in areas across the permit and are fire sensitive. Hot fires can reduce habitat quality for both flora and fauna species that use these vegetation communities.
- Spread of high fuel load grassy weeds could increase fire intensity, e.g. gamba, grader and buffel grass, adjacent infrastructure areas and access tracks.



The BMP should be read in conjunction with the overarching Environment Management Plan and Emergency Response Plan for Tamboran's operations in the Beetaloo Basin.

Bushfire Officers	Contact Details	
	Ian Beck Mobile: [REDACTED] Satellite Phone: [REDACTED] Email: [REDACTED]	John Glover Mobile: [REDACTED] Satellite Phone: [REDACTED] Email: [REDACTED]
Properties	Contact Details	Name
Hayfield/Shenandoah Station	[REDACTED]	Justin & Sally Dyer
Beetaloo Station	[REDACTED]	Scotty & Jane Armstrong
Properties	Contact Details	
Emergency	000 or 112 mobile	
NT Bushfires – Katherine office (Savanna)	(08) 8973 8871	
NT Bushfires – Alice Springs office (Barkly)	(08) 8952 3066	
NAFI North	https://www.firenorth.org.au/nafi3/	
Secure NT (Fire Bans)	https://securent.nt.gov.au/alerts	
Fire incident map	https://www.pfes.nt.gov.au/incidentmap/	
Bushfire Management Actions		
Sand wash plant (SWP) area	- Remove and or maintain vegetation within the well pad area and implement erosion and sediment control plan. - Treat emerging vegetation with herbicide. - Adequate fire protection equipment to be provided to prevent fires, the spread of fire, injury to personnel, and to ensure local bushfire and other fire regulations are observed. Including up to 3 water trucks in the vicinity of the SWP that can be deployed to fight a fire. - When site is not in use, the plant area can be sufficient to satisfy asset protection zone (APZ) requirements depending on the level of infrastructure and assets present.	
Fire management break	- A 10 m wide cleared perimeter around SWP area during operations. - A 4 m wide fire access trail incorporated during operations.	
Fire access trail	Create and maintain 4 m wide access trail by grading or spraying.	
Asset protection zone (APZ)	- Site manager to assess fuel load prior to establishment of SWP and again at end of wet season if infrastructure is still in place (refer to fuel load criteria). - Monitor for grassy weeds and control where appropriate. - In deemed necessary, conduct controlled burns where other controls are not effective and in consultation with neighbouring properties. - Ensure 4 m wide fire access trail around the perimeter of the APZ is trafficable by firefighting appliances.	
Neighboring property fire management zone	- Fire management planning meeting with neighboring properties prior to commencing activities and reviewed annually. - Neighbor to advise proponent of planned burns. - Work with pastoralist to assist in responding to fire where it is safe and practicable.	

Annual Works Calendar

Month	Bushfire Risk	Action	Month	Bushfire Risk	Action
January	No rating	No fire management activity.	July	Extreme / catastrophic	- Manage vegetation onsite including weeds. - Manage fire break and fire access trail. - Monitor NAFI, fire danger rating and fire weather warnings (daily or as required), and visually check horizon for smoke. - Liaise with neighbour regarding bushfires.
February	No rating	No fire management activity.	August	Extreme / catastrophic	- Monitor NAFI, fire danger rating and fire weather warnings (daily or as required), and visually check horizon for smoke. - Liaise with neighbour regarding bushfires.
March	No rating	- Weed survey. - Planning meeting with neighbour. - Annual fire mapping to monitor changes to fire frequency in the relevant area.	September	Extreme / catastrophic	- Monitor NAFI, fire danger rating and fire weather warnings (daily or as required), and visually check horizon for smoke. - Liaise with neighbour regarding bushfires.
April	Moderate	No fire management activity.	October	Extreme / catastrophic	- Monitor NAFI, fire danger rating and fire weather warnings (daily or as required), and visually check horizon for smoke. - Liaise with neighbour regarding bushfires.
May	Moderate	- No fire management activity. - Review the preparedness planning requirements.	November	High	- Monitor NAFI, fire danger rating and fire weather warnings (daily or as required), and visually check horizon for smoke. - Liaise with neighbour regarding bushfires.
June	High	- Manage vegetation onsite including weeds. - Manage fire break and fire access trail. - Monitor NAFI, fire danger rating and fire weather warnings. - Liaise with neighbour regarding bushfires.	December	No rating	- No fire management activity. - Review the preparedness planning requirements.

Bushfire Preparedness and Planning

Mandatory for all High, Extreme and Catastrophic Fire Danger Rating System (FDRS) days

The following must be reviewed daily. If fire alerts are active or presenting with a known risk (fire in the area), personnel must execute their contingency plans which need to encompass the following:

- ☐ Procedure on identifying and notifying of a bushfire.
- ☐ Critical equipment to be removed / isolated/ shut down.
- ☐ Safe evacuation routes from site and muster points.
- ☐ Communication methods:
 - ✓ Team channels and / or phone numbers
 - ✓ Area channels and/or phone numbers
- ☐ Closest 'safe havens'.

Monitoring

- ☐ Provide timely advice on changes in level of fire risk as available.
- ☐ Monitor team and area common channels for bushfire early warning.
- ☐ Update changes in work location.

Bushfire First Responder Checklist

The following sequence must be followed by the first person responding to a fire:

- Danger** – Remove yourself and others from danger is safe to do so.
- Alarm** – Raise the alarm either on common radio channel or other agreed process.
- Gather Information** –
 - ☐ Location – Direction from known reference points, (e.g. roads and Tamboran's infrastructure such as well pad location).
 - ☐ Impacts (actual and potential) – Life, property and the environment.
 - ☐ Fire characteristics – Grass or woodlands, flame height, fire front and direction of travel.
 - ☐ Weather – Wind strength and direction.
 - ☐ Response in progress – What response is underway and by who (Tamboran contractors, pastoralist or emergency services).
 - ☐ Response required – Tamboran contractors and / or pastoralist and / or emergency services.
 - ☐ Access – Safe access and egress routes.
- Notify Tamboran** – Fire Officer/Supervisor
- Notify Pastoralists** – Refer to property contacts
- Notify Emergency Services**—Call 000 or 112 if Tamboran and pastoralist unable to manage situation
- Respond and Monitor**—If safe to do so in consultation with pastoralist

CSIRO Fuel Load Assessment

- Fuel quantity (tonnes of fuel per ha)
- Assess vegetation type i.e. grassland, shrubland, scrub, woodland or forest
- Fuel size and shape e.g. fine fuel such as grass that burns quick vs course fuel (thick branches/trunks) that burn slowly.
- Fuel arrangement (i.e. separation of understory to canopy, dense or light understory).
- Moisture content (strong winds, high temperatures and low humidity will decrease moisture content).



APPENDIX D

Weed Management Plan

BEETALOO EXPLORATION PROJECT WEED MANAGEMENT PLAN

Review record

REV	DATE	REASON FOR ISSUE	AUTHOR	APPROVER
0	05/10/2018	Issue for release	A Court	M Kerne
1	29/03/2019	Issue for release	A Court	M Kerne
2	20/05/2019	Minor Update	A Court	M Kerne
2.1	10/09/2019	Minor update	M Kerne	M Hanson
2.2	10/09/2019	Minor update to include feedback from Amungee NW-1H EMP review		M Kerne
2.3	25/08/2021	Minor update to content based on DEPWS feedback	M/Kerne	M Kerne
2.4	10/11/2021	Update to include 2021 weed survey	M Kerne	M Kerne
2.5	18/01/2022	Update to include revised RWMP		M Kerne
2.6	27/02/2022	Update to include DEPWS comments	L Pugh	M Kerne
2.7	30/08/2022	Update to reference the <i>Tennant Creek Weeds Strategy 2021-2026</i> and Gamba Grass eradication in Zone A	L Pugh	M Kerne
3.0	30/03/2023	Updates to Section 1, 2 and minor edits	L Pugh	L Pugh
3.1	14/04/2023	Edits to figures	L Pugh	L Pugh
3.2	13/03/2024	Addresses regulation 10 and regulation 11 feedback from DEPWS, 29-Feb-2024	L Pugh	L Pugh
3.3	10/07/2024	Buffel grass status revised to a declared weed	L Pugh	L Pugh
3.4	27/09/2024	Updates to section 5 and 9; addresses regulation 10 feedback from DEPWS, 26-Sept-2024	L Pugh	L Pugh
4.0	10/10/2024	Update for SS 3D Seismic EMP and update of regulators of the <i>Petroleum Act 1984</i> , Petroleum Regulations 2020 and Petroleum (Environment) Regulations 2016	A Court	L Pugh
5.0	30/04/2025	Update for the Shenandoah South Sand Wash Plant	A Court	L Pugh
6.0	03/10/2025	Updated to include seeding in Table 3	L Pugh	A Court

Review date: 01/02/2026

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1 Introduction

1.1 Objectives of the Weed Management Plan

This Weed Management Plan (WMP) has been developed to ensure that the risk of weed introduction and spread, resulting from activities associated with Tamboran's exploration activities are mitigated to protect the economic, community, industry and environmental interests of the Northern Territory (NT).

The plan provides an overview of:

- The project context (Section 2).
- Legal requirements in relation to weed management (Section 3).
- The appointment of a dedicated Weed Officer (Section 4).
- Identified risks and proposed mitigation measures and management objectives (Section 5 and 6).
- The weed species that are considered likely or known to occur within the permit area (Section 6 and 7).
- The annual action plan for those species that are known to occur within the permit area (Section 8).
- Control options for species known to occur within the permit area (Section 8).
- The monitoring, notification, recording and reporting requirements for the WMP (Sections 9 – 12).

This plan is supported by appendices that provide guidance on how to identify weed species in the field and collect the necessary data to support the monitoring and reporting requirements of this WMP.

The location of the proposed exploration activities are shown in Figure 1.

1.2 Intent of the WMP

Weed control is a significant land management issue in the NT. This WMP forms a core component of Tamboran's overarching environmental management strategy and supports the various project Environment Management Plans (EMPs).

The movement of rigs, vehicles, machinery and other materials to, from and within the exploration permit area may result in weeds being moved around the pastoral lease, into the lease from surrounding areas or interstate, depending on where the vehicles and materials are sourced from or returned to.

The focus of this WMP is therefore to ensure that infestations are eradicated, or at the very least that existing weed infestations are controlled such that no further weed species colonise the permit area as a result of Tamboran's activities.

This document is based on the [Weed Management Planning Guide - Onshore Shale Gas Development Projects](#) produced by the Department of Environment, Parks and Water Security (DEPWS 2019), now known as the Department of Lands, Planning and Environment (DLPE).

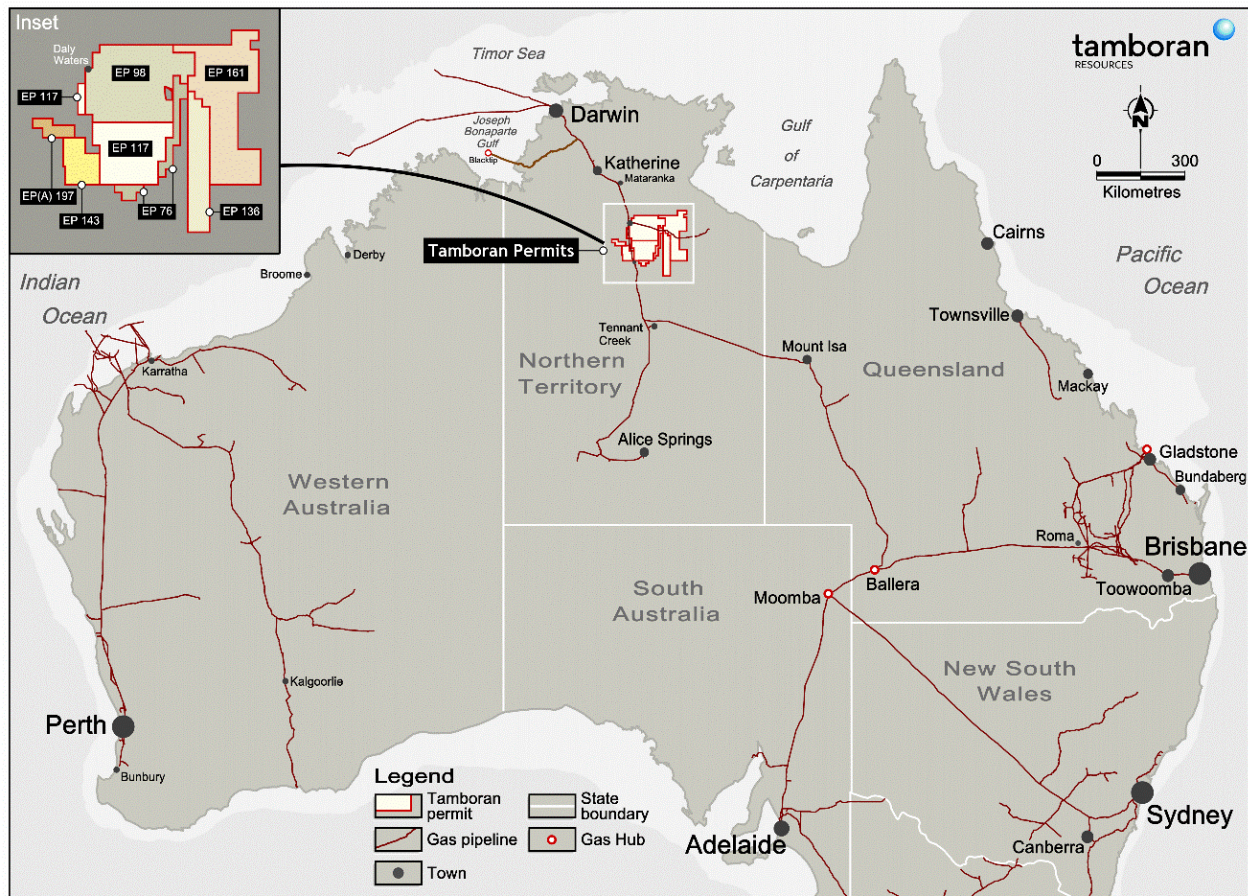


Figure 1 Location of Tamboran exploration permit areas (EPs)

2 Project Context

This plan covers all civil, seismic, drilling, stimulation, rehabilitation and routine maintenance/monitoring activities undertaken by Tamboran within its permit areas (Figure 1).

The primary activities subject to this WMP include but are not limited to:

- Access track construction, use and maintenance
- Gathering line construction, use and maintenance
- Seismic acquisition and line rehabilitation
- Clearing and grubbing for exploration infrastructure areas (i.e. well pad, camp pad, sand wash plant etc.)
- Use and maintenance of Tamboran's infrastructure areas
- Gravel pit construction and maintenance
- Drilling, stimulating, completing and maintaining petroleum exploration wells
- Routine access, maintenance and monitoring of all exploration areas subject to this plan.

3 Legal Requirements

The following section presents the relevant legislation and statutory obligations for the project.

3.1 Petroleum Act and subordinate legal instruments

Petroleum Act 1984, Petroleum (Environment) Regulations 2016 and Code of Practice for Petroleum Activities within the Northern Territory

The *Petroleum Act 1984* provides the legal framework within which persons are encouraged to undertake effective exploration for petroleum and to develop petroleum production so that the optimum value of the resource is returned to the NT. It regulates the exploration for, and production of petroleum, including environmental protection measures which should be employed during exploration and production activities, including protection of parks and reserves and rehabilitation.

In addition, the Act is supported by the Petroleum (Environment) Regulations 2016 (the Regulations). The Regulations require that regulated activities are carried out in a manner consistent with the principles of ecologically sustainable development, and by which the environmental impacts and environmental risks of the activities are identified and reduced to as low as reasonably practical (ALARP) and acceptable levels.

The *Code of Practice for Petroleum Activities in the Northern Territory* (the Code) is a mandatory code of practice for the petroleum industry to ensure that petroleum activities in the NT are managed according to minimum acceptable standards to ensure that risks to the environment can be managed to a level that is ALARP and acceptable.

Under this legal framework, Tamboran is required to submit an EMP prior to any petroleum exploration or production activity.

EMPs must include:

- potential environmental risks or impacts (in this instance relating to the introduction and spread of weeds)
- appropriate environmental outcomes, environmental performance standards and measurement criteria
- appropriate implementation strategy and monitoring, recording and reporting arrangements, and
- demonstrate that there has been an appropriate level of engagement with directly affected stakeholders in developing the plan.

This WMP is designed to support and implement the requirements of Tamboran's project specific environment management plans.

3.2 NT Weeds Management Act

The aim of the *Weeds Management Act 2001* is "to protect the Territory's economy, community, industry and environment from the adverse impact of weeds".

The purpose of the Act, as defined in section 3, is:

- To prevent the spread of weeds in, into and out of the Territory and to ensure that the management of weeds is an integral component of land management in accordance with the NT Weeds Management Strategy 1996 – 2005 or any other strategy adopted to control weeds in the Territory.
- To ensure there is community consultation in the creation of weed management plans.
- To ensure that there is community responsibility in implementing weed management plans.

As of the 8 July 2024, the Act¹ identifies declared weeds (those which must be controlled) and provides a framework for weed management. Weeds may be classified according to any of the following purposes:

Class A	it is necessary to eradicate the plant
Class B	it is necessary to prevent the growing and spreading of the plant
Class C	it is necessary to prevent the introduction of the plant into the Territory or a part of the Territory
Class D	it is necessary to prevent the plant being spread by the actions of persons.
Unclassified	Declared but not classified as A, B, C or D.

* All Class A and B weeds are also Class C.

The Act enables the relevant Minister to approve statutory weed management plans. Management obligations in these plans must be adhered to.

There are statutory management plans for 10 high priority weed species in the NT. The WMP must address weeds in accordance with their declaration status and the statutory requirements of any relevant weed management plans.

3.3 Regional Weed Management Strategies

Regional Weed Strategies (RWS) have been developed for areas of the NT, with the Tennant Creek regional weeds strategy 2021 – 2026 and the Katherine regional weeds strategy 2021 – 2026, overlapping Tamboran's Beetaloo exploration tenure. The aim of these regional plans is to assist in prioritising weed management by:

- identifying the region's priority weeds and associated pathways of spread to inform management priorities
- identifying landscapes that may need prioritised protection from weed impacts like river corridors or sacred Aboriginal sites
- containing information on alert weeds that are not yet found in the region, but could become major issues if they establish.

3.4 Commonwealth Environment Protection Biodiversity Conservation Act

The objectives of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are, among other things to:

- provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance; and
- promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources; and
- promote the conservation of biodiversity; and
- promote a co-operative approach to the protection and management of the environment involving governments, the community, land holders and indigenous peoples; and
- assist in the co-operative implementation of Australia's international environmental responsibilities.

¹ Refer Part 2, section 7(4).

The EPBC Act provides for the identification and listing of key threatening processes on matters of national environmental significance (MNES). A threatening process is defined as a key threatening process if it threatens or may threaten the survival, abundance or evolutionary development of a native species or ecological community. Key threatening processes include invasive species, such as weeds, which have a major impact on Australia's environment, threatening our unique biodiversity and reducing overall species abundance and diversity (DCCEEW, 2018).

Threat abatement plans (TAP) are developed to address key threatening processes. A TAP has been developed covering 5 listed grass species present within the Northern Territory ([DCCEEW, 2012](#)). The TAP covers grasses originally introduced to support pastoralism: gamba grass (*Andropogon gayanus*), para grass (*Urochloa mutica*), olive hymenachne (*Hymenachne amplexicaulis*), mission grass (*Pennisetum polystachion*) and annual mission grass (*Pennisetum pedicellatum*).

The controls in this WMP are designed to align with the Commonwealth TAP.

4 Dedicated Weed Officer

As per recommendation 8.3 of the Scientific Inquiry into Hydraulic Fracturing Stimulation there must be a dedicated Weed Officer for each gas field.

The Weed Officer must have relevant skills and experience and availability to successfully manage weed related issues for the project, including:

- Knowledge of the biology/ecology of local weeds.
- Knowledge of relevant weed management frameworks including NT legislation and plans, the EPBC Act.
- Understanding of existing weed management arrangements being undertaken by landholders.

The Weed Officer is responsible and accountable for delivery of all weed related requirements of the project in accordance with the WMP and the overarching EMP, including:

- Planning and execution of weed monitoring requirements, including baseline weed assessments and ongoing monitoring both during periods of gas related activities as well as during the target identification period of February to May.
- Facilitate training all workers (including contractors) in weed management requirements, with support from the NT Government Onshore Petroleum Weed Management Officer.
- Oversight of implementation of weed control mechanisms including but not limited to wash-downs and proactive weed control programs.
- Ensuring all reporting requirements are met.
- Act as the designated point of contact for and rapidly responding to any weed related complaints and incidents in accordance with the pre-determined strategies in this WMP and additional strategies as required developed in consultation with the Onshore Petroleum Weed Management Officer and affected landholders.
- Review and update of WMPs to remain effective in communication with relevant landholders and Onshore Petroleum Weed Management Officer in consideration of monitoring results and emerging weed issues for both gas and pastoral operations.

Tamboran has appointed the **Beetaloo Field Manager** as the dedicated Weed Officer of the Beetaloo exploration activities. This role is supported by Tamboran's Approvals and HSE personnel.

5 Baseline Weed Species Information

Baseline and annual weed surveys have been completed across the proposed and existing exploration areas. These surveys indicate the abundance of weeds within the proposed and existing project areas are low.

No weeds were detected within the Shenandoah South E&A program during the December 2022, April 2023 and May 2024 field survey. *Mesosphaerum suaveolens* (Hyptis),² has been identified at the Kalala S1 and Amungee NW site (access tracks, camp pad and lease pad). Hyptis has also recently been observed at the Velkerri 76 S2 site camp pad and irrigation area. Rubber Bush and *Parkinsonia aculeata* (Parkinsonia) have been previously identified along/in proximity to the Beetaloo W access track, with rubber bush also found along the Kyalla 117 N2 access track. Parkinsonia is considered a Weed of National Significance (WoNS), which are weed species that are the focus of national management programs for the purpose of restricting their spread and/or eradicating them from parts of Australia. These species are specifically presented in Table 1 and Section 9.

Gamba Grass (*Andropogon gayanus*) is a Declared Class A (to be eradicated) weed within the Beetaloo Sub-basin.³ Gamba Grass is grown within the Class A zone on two pastoral leases under strict permit conditions. These pastoral leases are subject to annual audits and regular inspections to ensure it is not spread outside the permitted areas. An active compliance program is in place to ensure eradication is being achieved in Zone A, as per the requirements of the statutory weed management plan for gamba grass (DEPWS 2020).

One incursion of Gamba Grass was treated at Amungee NW1 (EP 98) in 2023 and another (single plant not in seed) in May 2024 at Kyalla 117 N2 (EP 117). No other incursions of Gamba grass has been identified within the Tamboran's exploration permits (e.g. EP 117, EP 98 and EP 76). Tamboran is committed to preventing the spread of Gamba Grass into the project area from known Gamba locations. Gamba grass incursions will continue to be identified, recorded and treated in accordance with the Threat Abatement Advice released by the Commonwealth Government.

Figure 2 illustrates the weeds species confirmed in the region during field surveys, along with other weed species that are known to occur or likely to occur within the wider exploration permit areas. This information is based on.

- Tamboran exploration program weed survey data (2014 onwards – results).
- Mapping data provided by the Weed Management Branch, DLPE.
- Guidelines for the Management of the Weeds of Beetaloo 2018 (DLRM et al 2018).
- Tennant Creek weeds strategy 2021 – 2026 and Katherine weeds strategy 2021 – 2026.
- Department of Climate Change, Energy, the Environment and Water (DCCEEW) EPBC Act Protected Matters Report database.

Table 1 has been separated into priority weeds, which are broken down into 5 distinct categories:

- Category 1: These species are present in the region and are widely considered feasible to eradicate. They are typically evaluated as very high risk and have isolated and restricted distributions.
- Category 2: These species warrant strategic control across the landscape due to the high impact they have on land managers and on broader economic and environmental values. The key for these species is that outlier populations are practical to eradicate, but there are core infestations that are

² Formally *Hyptis suaveolens*.

³ The Beetaloo lies within the NT Statutory Weed Management Zone Class A (for eradication).

subject to control and containment. They are typically covered by a statutory weed management plan, the target of a specific program or similar; often they are Weeds of National Significance.

- Category 3: These species have been assessed by the weed risk management system as a medium to high risk (or have not been assessed) and have been identified by stakeholders as posing a threat to the values of the Region. The list is not comprehensive. There are no plans or strategies to manage any one of them as a species across the landscape. They are typically managed on a site basis and to prevent further spread. In some cases there may be local strategies to manage these weeds.
- Category 4: These species are typically evaluated as low risk; however, they do still have local impacts. There are no strategies in place for managing these species at a landscape scale. However, it is important for landholders to implement weed hygiene and other biosecurity measures to prevent the spread of weeds into clean areas, and to control these species where the opportunity arises. Typically, these weeds may become problems around infrastructure, drains and other disturbed areas.
- Category 5: The Weed Management Branch uses a working definition of an 'alert' weed as a species:
 - not yet naturalised in a region
 - with the potential to have a high level of impact should it become established
 - having a reasonable likelihood of arriving in the Region (or of being present undetected).

It is noted that *Parthenium* (*Parthenium hysterophorus*) is a major problem in rangelands and cropping areas of Queensland and is estimated to cost farmers and graziers more than \$22 million a year in reduced production and increased management costs. Vehicle, machinery and material movements from Queensland into the project area present a risk of spread of *Parthenium* if not managed correctly (Department of Primary Industry and Resources 2016).

Additional mapped locations of weeds within the Tennant Creek and Katherine RWMS are provided in Figure 3, Figure 4 and Figure 5.

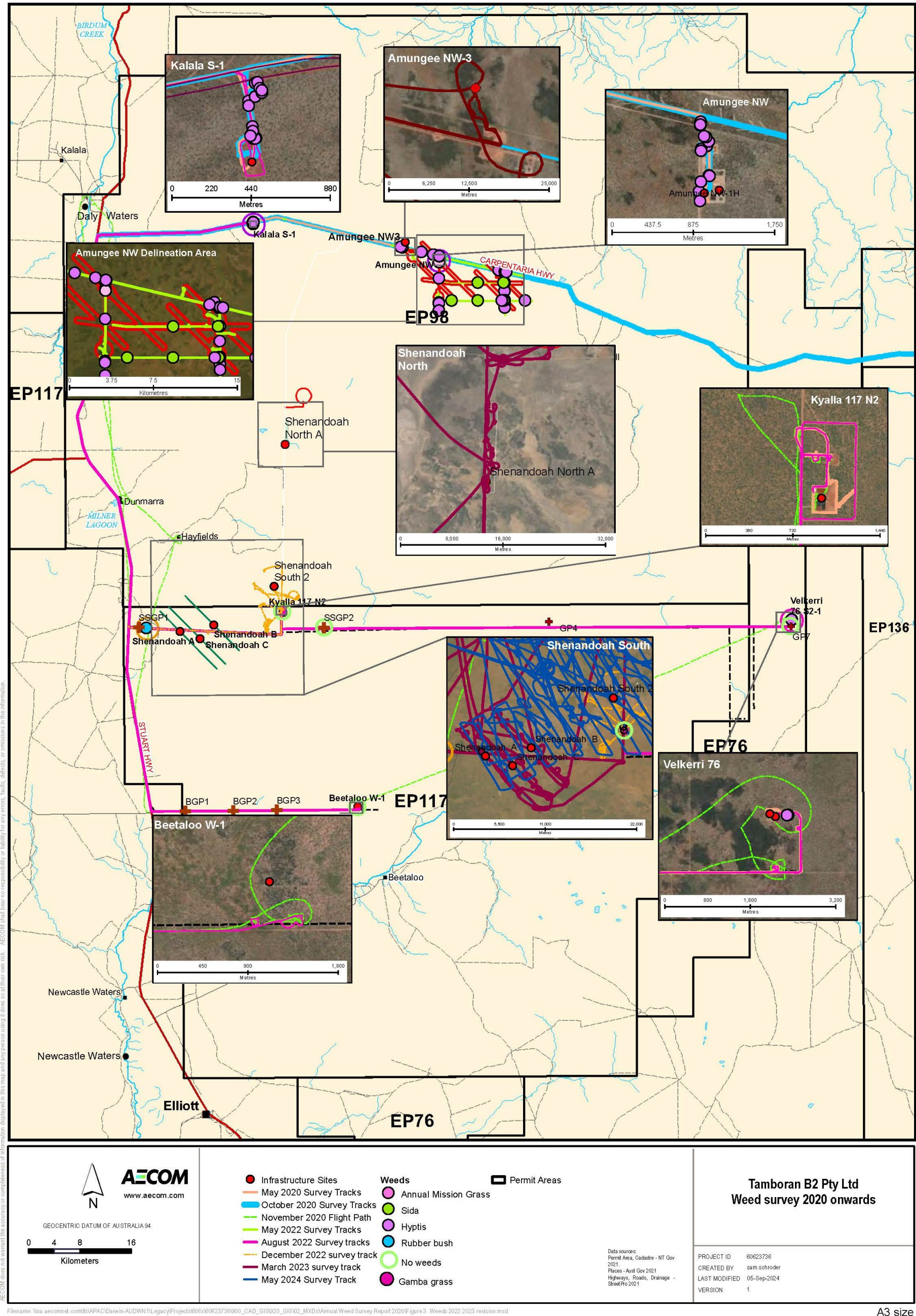


Figure 2 Location of weeds species in EPs

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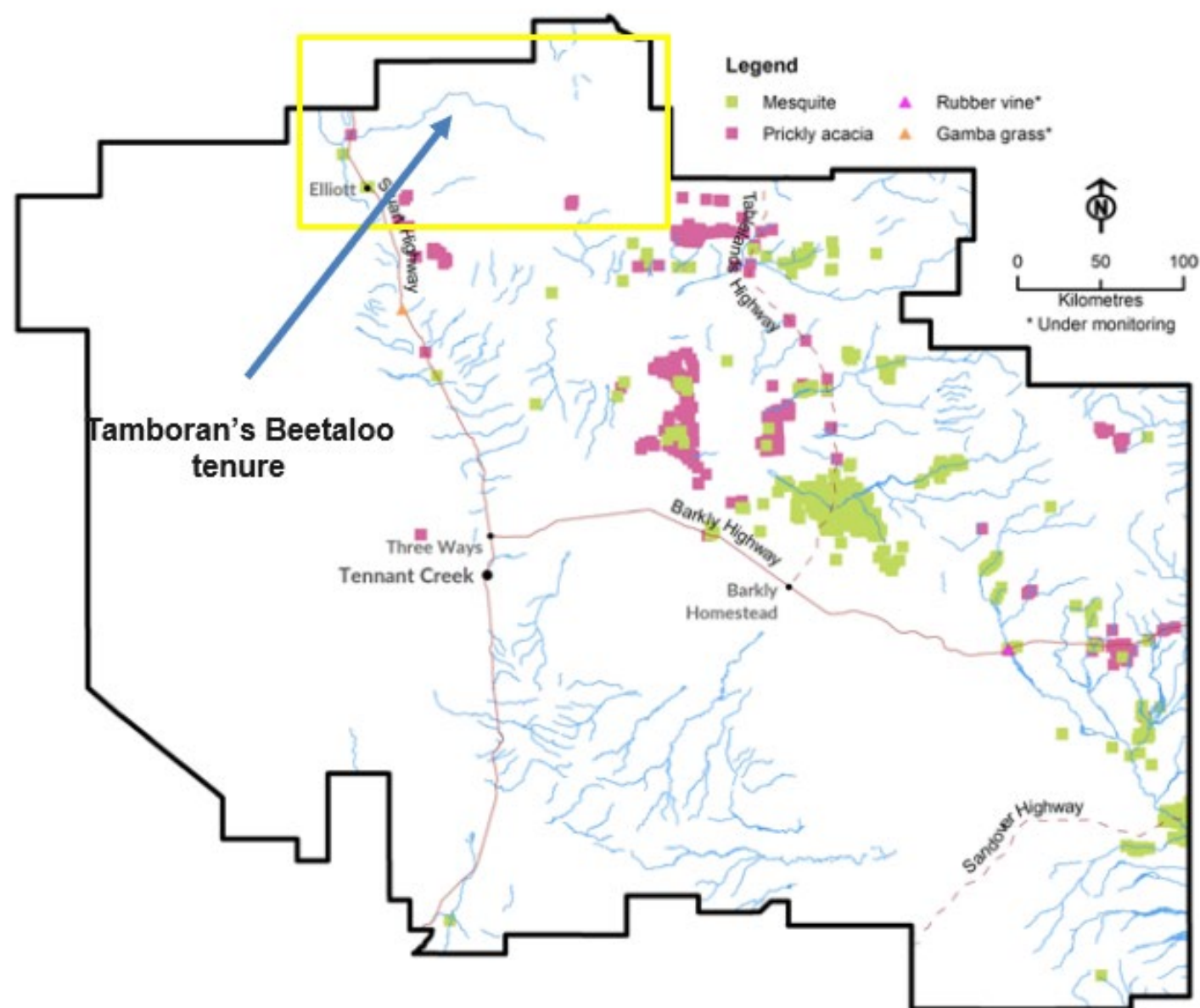


Figure 3 Tennant Creek RWS mapped priority weed for eradication locations (DEPWS 2021)

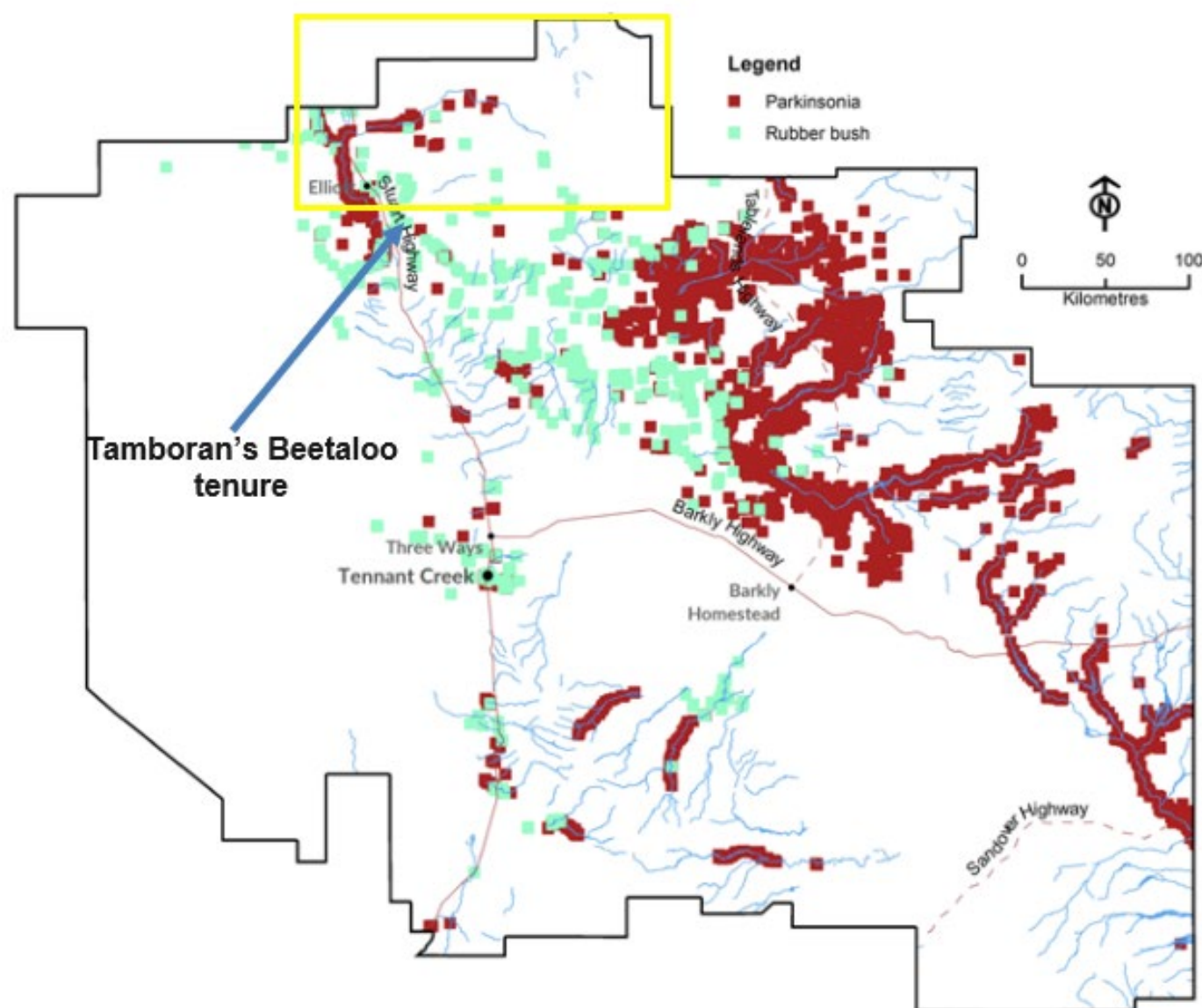


Figure 4 Tennant Creek RWS priority weeds for strategic control (DEPWS 2021)

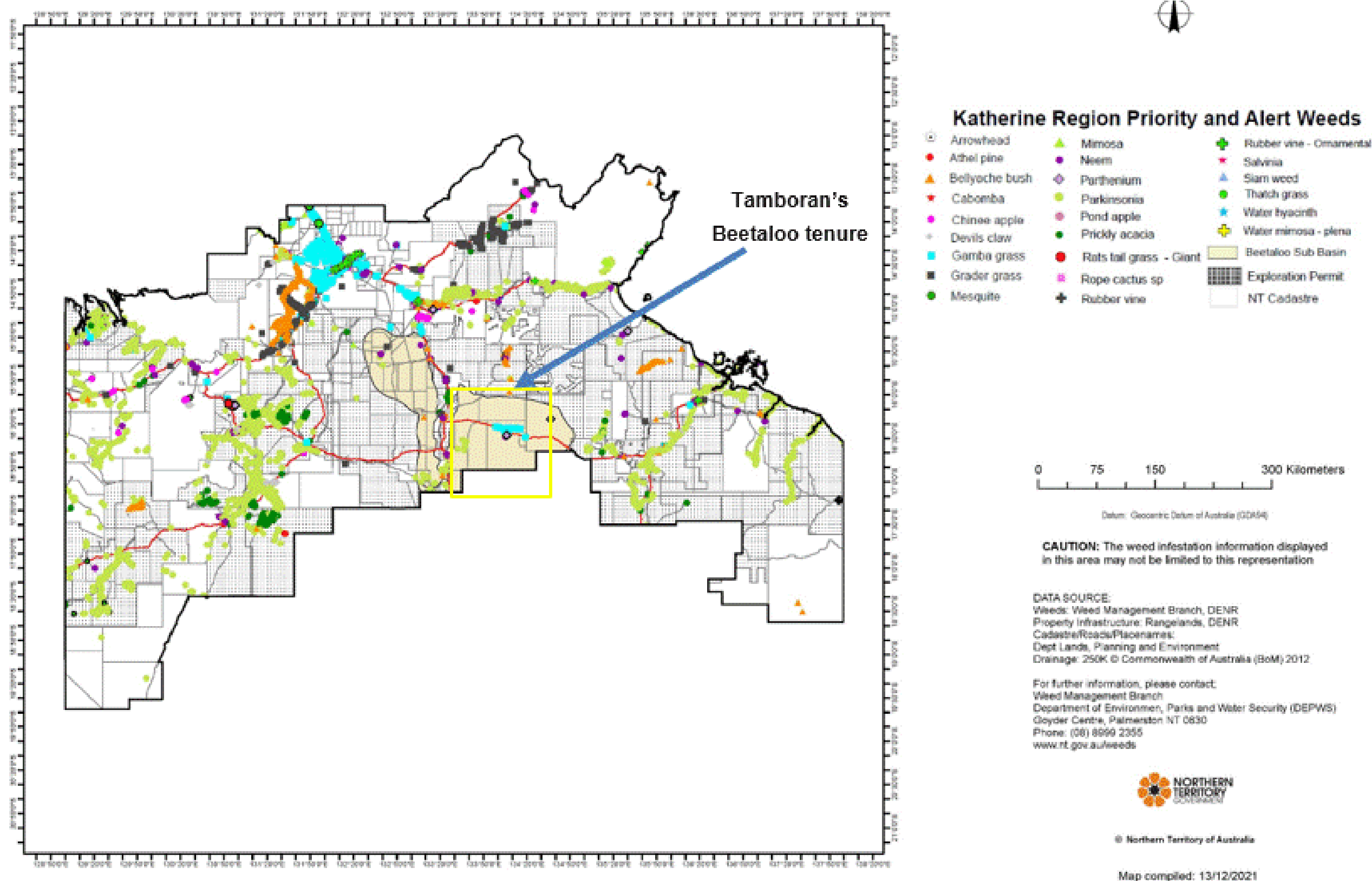


Figure 5 Katherine RWS mapped priority and alert weeds

Table 1 NT listed weeds known or likely to occur within the EPs

Scientific name	Common name	Declaration Status*	Category	Data source
<i>Alternanthera pungens</i>	Khaki Weed	Class B & C	4	DCCEEW Protected Matters Report
<i>Andropogon gayanus</i>	Gamba Grass	Class A/B & C WoNS	1	Confirmed within exploration lease. High potential introduction through sourcing of equipment from Katherine and Darwin area.
<i>Calotropis procera</i>	Rubber Bush	Class B & C (south of 16°30' S latitude)	2	Mapped in the exploration lease within the Tennant RWS.
<i>Cryptostegia grandiflora</i>	Rubber Vine	Class A & C	1	Mapped in the exploration lease within the Katherine RWS.
<i>Mesosphaerum suaveolens</i>	Hyptis	Class B & C	4	Confirmed within exploration lease during previous Tamboran weed surveys.
<i>Jatropha gossypifolia</i>	Bellyache Bush	Class A/B & C WoNS	1	Mapped in the exploration lease within the Katherine RWS. Potential introduction through sourcing of equipment from Katherine area.
<i>Parkinsonia aculeata</i>	Parkinsonia	Class B & C, WoNS	2	Confirmed within exploration lease during previous weed Tamboran surveys and Mapped in the exploration lease within the Katherine RWS. Potential introduction through sourcing of equipment from Katherine area.
<i>Prosopis pallida</i>	Mesquite	Class A & C, WoNS	1	Mapped in the area surrounding exploration lease within the Katherine and Tennant Creek RWS.
<i>Themeda quadrivalvis</i>	Grader Grass	Class B & C, WoNs	5	Confirmed within the exploration lease and mapped in the area within the Katherine RWS. High potential introduction through sourcing of equipment from Katherine area.
<i>Parthenium hysterophorus</i>	Parthenium	Class A & C, WoNS	1/ 5	Confirmed by DLPE to occur within the exploration lease. Potential introduction through equipment sourced from QLD.
<i>Cryptostegia grandiflora</i>	Rubber vine	Class A & C, WoNS	1	Alert Species within the Tennant Creek and Katherine RWS.
<i>Chromolaena odorata</i>	Siam Weed	Class A & C	5	Alert Species Katherine RWS.
<i>Azadirachta indica</i>	Neem	Class B & C	2	Weed Management Branch – Mapping data
<i>Cenchrus ciliaris</i>	Buffel Grass	Declared, Unclassified	3	DCCEEW Protected Matters Report
<i>Cenchrus echinatus</i>	Mossman River Grass	Class B & C	3	DLRM databases (DLRM <i>et al</i> 2018)
<i>Datura ferox</i>	Fierce Thornapple	Class A & C	3	DLRM databases (DLRM <i>et al</i> 2018)
<i>Sida acuta</i>	Spinyhead sida	Class B & C	4	Weed Management Branch – Mapping data

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Scientific name	Common name	Declaration Status*	Category	Data source
<i>Sida cordifolia</i>	Flannel Weed	Class B & C	4	Weed Management Branch – Mapping data DLRM databases (DLRM <i>et al</i> 2018)
<i>Sida rhombifolia</i>	Paddy's Lucerne	Class B & C	4	DLRM databases (DLRM <i>et al</i> 2018)
<i>Vachillia nilotica</i>	Prickly Acacia	Class A & C, WoNS	1	Mapped in the exploration lease within the Katherine RWS.
<i>Xanthium strumarium</i>	Noogoora Burr	Class B	3	Weed Management Branch – Mapping data DLRM databases (DLRM <i>et al</i> 2018)
*All Class A and B weeds are also Class C weeds.				

6 Weed Management Mandatory Requirements

6.1 Weed hygiene declarations for vehicles and equipment

- a) All vehicles, equipment and loads are to be clean (free of plant matter, seeds, dirt and mud) and have a valid weed hygiene declaration form prior to accessing any pastoralist property
- b) Weed hygiene certificates are only to be issued by an authorised inspector that is satisfied that the vehicle is free of plant matter, seeds, dirt, mud animal wastes and any other time that could potentially represent a biosecurity or weeds risk.
- c) An authorised inspector is someone who has successfully completed the nationally recognised "AHC BIO201- Inspect and clean machinery for plan, animal and soil material" training course
- d) Weed hygiene declarations shall contain:
 - a. The identification details of the vehicle or thing inspected.
 - b. Odometer reading (where applicable)
 - c. Date and location inspected
 - d. Name and signature of the authorised inspector issuing the declaration
 - e. The organisation with which the inspector issuing the declaration is affiliated
 - f. Name and signature of the driver (where applicable)
- e) A biosecurity hygiene declaration for a vehicle/equipment remains valid when the vehicle/equipment:
 - a. does not travel off sealed/formed roads, or
 - b. clean (i.e. free of biosecurity matter including weeds, pests and diseases, and biosecurity carriers) or
 - c. is located on the same or adjacent property and has not encountered any areas with weeds. Areas where it is reasonably expected to encounter weeds include the unsealed shoulders of road corridors and known infestation areas as provided in Figure 2.
- f) A biosecurity declaration becomes invalid when:
 - a. The vehicle or equipment has encountered known areas of weed infestations.
 - b. The vehicle or equipment has come from a property that is not adjacent to the property to be accessed.

- c. It is not known where the vehicle/ equipment has been previously used.
- g) Where a vehicle or piece of equipment arrives at site dirty, they shall be refused entry. The vehicle/ equipment must be directed to the closest washdown facility (Tennant Creek or Katherine), recertified and inspected prior to accessing the site.

6.2 Weed Hygiene Declarations for Loads and Material

1. Weed hygiene declarations are to be utilised to satisfy that a load of materials (including hay, seed, sand, gravel, topsoil) is free of or containing a biosecurity matter and carriers. Anyone who is either the seller, supplier or the driver may issue a Weed Hygiene Declaration for a load providing they have direct knowledge of the product and the status as weed free or containing a biosecurity matter.
2. Weed declarations are not required for loads moved within areas within the same or adjacent properties that have been determined through baseline weed studies as being weed free.
3. Where loads of material cannot be determined to be weed free, they shall be returned to the supplier and an alternative clean source utilised.

6.3 Weed Washdown Facility Requirements

1. Cleaning activities should be undertaken at facilities with effective environmental controls to prevent the spread of biosecurity matter.
2. Wash water, mud/ silt, weed material and other contaminants must be bagged and disposed of at a licenced landfill.
3. Where possible, high pressure water spray should be used. This is the preferred method. If this is impractical, (such as at a site location) the minimum requirement is to use a suitable bar or shovel, brooms/ brushes and compressed air to remove contaminants (dry cleaning).

6.4 Equipment Sourcing and Selection

- h) Equipment shall be sourced based on the following prioritisation:
 - a. Local equipment, particularly civil construction equipment, shall be sourced as a priority.
 - b. Regional equipment (NT) shall be sourced where no local equipment supplier exists
 - c. Interstate equipment should be sourced only where local/regional equipment is not available (due to availability or cost constraints). In such cases, additional inspections may be required to ensure vehicles/ equipment are free of weed containing material prior to accessing site.

6.5 Interstate Transport

All vehicles, equipment and loads moved interstate/territory shall be free of weeds and weed containing material (vegetation, seed, grass, soil, mud etc.) prior to entry into the NT.

All vehicles, equipment and loads travelling from interstate shall have a further inspection prior to access to any pastoral property. If required, additional cleaning shall be undertaken to remove any weeds or weed carrying material.

Where a load/equipment/ vehicle is unclean and is suspected of not being washed prior to entry into the NT, a load must be refused entry into a pastoralist property. The vehicle will require a washdown at an appropriate facility within the state/territory the equipment/vehicle/load originated from.

6.6 Weed Management Awareness

All staff and contractors shall be made aware of their weed management obligations. This shall be undertaken through:

- Building weed prevention and management requirements into contracts and assessed as a part of work readiness reviews and ongoing assurance activities.
- Inclusion of weed management requirements within site inductions and toolbox talks.

7 Weed Introduction and Spread Risk Assessments

As part of the development of their EMP's, Tamboran undertakes an assessment of the risk of introducing or spreading weeds in the project area. This assessment and the corresponding proposed mitigation measures and management objectives are presented in Table 2. Due to the low abundance of weeds within the EPs, management controls will primarily focus on preventing the introduction of weed species through appropriate equipment sourcing cleaning and inspection.

Table 2 Risk of weed introductions and spread, including management controls

Environmental Values	Maintain the integrity of significant ecosystems and agricultural productivity		
Management Objectives	Avoid the introduction of weeds Avoid the spread of existing weeds		
Measures Criteria	No introduction or spread of <i>weed of national significance species, any weed species declared under the NT Weed Management Act or environmental weed that are known to threaten native vegetation communities</i> resulting from Tamboran's activities.		
Activity	Potential risks		Management controls
	Introduction of new weeds	Spread of existing weeds	
Vehicle and equipment movements	Vehicles and equipment sourced from other locations infested with weed species not found in or around Project Area	Traversing of weed infested areas with machinery	• Code of Practice for Petroleum Activities in the NT, Part A Surface Activities. • Activities will adhere to the guidelines within the NT Weed Management Handbook. • Weed management and control measures to be implemented in alignment with existing landholder biosecurity requirements. • All equipment will have certified equipment wash-down completed prior to entry to the field. Wash-down would occur at Contractors depot or a commercial wash facility prior to mobilisation in a manner that prevents pollution of the surrounding environment. • Machinery to be preferentially sourced locally, with machinery sourced from surrounding areas or Queensland being the 2nd and 3rd preferred option respectively. • Weeds will be actively controlled in cleared/hardstand areas.

			- Major equipment moves will be planned from weed-free areas to infested areas and not the other way around. - Ensuring all material imported to or between sites is free of weeds.
Construction of access tracks, monitoring bore pads and seismic lines	Importing materials from areas where weeds are present and creating opportunities for weed species to colonise disturbed areas	Traversing of weed infested areas and creating opportunities for weed species to colonise disturbed areas	- Code of Practice for Petroleum Activities in the NT, Part A Surface Activities. - Activities will adhere to the guidelines within the NT Weed Management Handbook. - Weed management and control measures to be implemented in alignment with existing landholder biosecurity requirements. - All equipment will have certified equipment wash-down completed prior to entry to the field. - Ensure field staff, contractors and machinery operators are familiar with hygiene protocols and weed identification. - Machinery to be preferentially sourced locally, with machinery sourced from surrounding areas or Queensland being the 2nd and 3rd preferred option respectively. - Weeds will be actively controlled in cleared/hardstand areas. - Stabilise disturbed areas.
Drilling, stimulation and well testing	Introduction of weed species not found in or around EP area.	Traversing of weed infested areas with machinery	- Code of Practice for Petroleum Activities in the NT, Part A Surface Activities. - Activities will adhere to the guidelines within the NT Weed Management Handbook. - Weed management and control measures to be implemented in alignment with existing landholder biosecurity requirements. - All equipment will have certified equipment wash-down completed prior to entry to the field. Wash-down would occur at Contractors depot or a commercial wash facility prior to mobilisation in a manner that prevents pollution of the surrounding environment. - Ensure field staff, contractors and machinery operators are familiar with hygiene protocols and weed identification. - Weeds will be actively controlled in cleared/hardstand areas.

			- Major equipment moves will be planned from weed-free areas to infested areas and not the other way around. - Drilling and stimulation equipment will be restricted to cleared lease areas. - Ensuring all material imported to or between sites is free of weeds.
Operational / site management	Personnel unable to identify weeds or unaware of weed species present in areas where machinery and equipment is sourced from	Existing weed distribution not known due to insufficient survey effort, surveys conducted at wrong time of year, surveyors not familiar with / unable to identify declared weed species	- Code of Practice for Petroleum Activities in the NT, Part A Surface Activities. - Staff members responsible for preventing, identifying and managing weeds to be appropriately trained. - Weed desktop and field-based surveys to be provided to identify existing weed areas. - Pre-and post-wet (February to May) inspections and periodic audits will be conducted to identify and report weed outbreaks.
	Insufficient management control to prevent the introduction of weeds	Insufficient management control to prevent the spread of weeds	- Staff members responsible for preventing, identifying and managing weeds to be appropriately trained. - Ensure field staff, contractors and machinery operators are familiar with hygiene protocols and weed identification (Weed identification posters and the NTG Weed Deck will be made available) - Weeds will be actively controlled in cleared/ hardstand areas. - Weed management and control measures to be implemented in alignment with existing landholder biosecurity requirements. - New activities will be planned to address prevention of weed or non-indigenous plant spread.

8 Statutory Weed Management Plans

No statutory weeds have been identified during surveys of the EPs, however the following plans apply to species that have been found / could be potential found in the broader region:

- Weed Management Plan for Athel pine (*Tamarix aphylla*)
- Weed Management Plan for Mesquite (*Prosopis* spp.)
- Weed Management Plan for Prickly Acacia (*Vachella nilotica*)
- Weed Management Plan for Bellyache Bush (*Jatropha gossypifolia*)
- Weed Management Plan for Neem (*Azadirachta indica*)

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- Weed Management Plan for Gamba Grass (*Andropogon gayanus*)
- Weed Management Plan for Grader Grass (*Themeda quadrivalvis*).

The weed management plans establish the legal requirements and management actions to be undertaken by all owners and occupiers of the land on which the declared weed is present in the NT. The aim of each plan is to mitigate the damage caused by the each weed species within specific management areas and zones, through eradication and avoidance of further spread. Conducting land management practices in accordance with the weed management plans will secure compliance with the requirements of the Act.

9 Annual Action Plan

An action plan for each of the weed species identified in the Project Area is presented in Table 3. Treatment options as contained in the NT Weed Management Handbook are presented in Section 9.1 to 9.5.

This section will be undated if new weed species are discovered over the life of the program to ensure that statutory requirements with relation to declaration status and relevant weed management plans are addressed (refer to section 8).

As part of the Annual Weed Management Action Plan, Tamboran also commits to undertaking finer detailed weed mapping of all permit areas, lease pads, access tracks, seismic lines and gravel pits, as well as any other areas disturbed as part of the activity.

Table 3 Annual weed management action plan

Management objective	Avoid the introduction of weeds Avoid the spread of existing weeds				
Weed species	Seeding	Survey time(s)	Treatment time(s)	Control options	Where located
Hyptis <i>Mesosphaerum suaveolens</i>	Seeds typically germinate in October and November after the opening rains at the end of the dry season.	6 monthly: pre and post-wet season	Preferred Dec – Mar Also Nov and April	Refer to section 9.1.	Beetaloo access track Access track to Amungee NW Kalala S1 site Velkerri 76 S2 camp pad
Parkinsonia <i>Parkinsonia aculeata</i>	Typically germination occurs from December – March.	6 monthly: pre and post wet season	Preferred Mar – May Also all year round	Refer to section 9.2.	Beetaloo access track
Rubber Bush <i>Calotropis procera</i>	Typically germination occurs from October – December.	6 monthly: pre and post wet season	Preferred October – March Also April - July	Refer to section 9.3.	Proximity to the Beetaloo access track Kyalla 117 N2 access track and Stuart Highway intersection
Gamba grass <i>Andropogon gayanus</i>	Typically germination occurs May – June.	6 monthly: pre and post wet season	Preferred December – March Also April and November	Refer to section 9.4	Amungee NW1 well site Kyalla 117 N2 well site
Annual Mission grass <i>Cenchrus pedicellatus</i>	Typically germination occurs April – July.	6 monthly: pre and post wet season	Preferred December – March Also April and November	Refer to section 9.5	Amungee NW1 well site Kyalla 117 N2 well site

9.1 Hyptis (*Mesosphaerum suaveolens*) Treatment Options

Table 4 includes herbicide and non-chemical treatment options for Hyptis (*Mesosphaerum suaveolens*) (NT Government 2015).

Table 4 Hyptis (*Mesosphaerum suaveolens*) treatment options

Weed Species	Hyptis (<i>Mesosphaerum suaveolens</i>)		
Control Methods	Chemical and concentration	Rates	Weed growth stage, method and comments
Herbicides	2, 4-D amine 625 g/L Various trade names	320 mL / 100 L	Seedling or adult (individuals or infestation): Foliar spray – apply when actively growing.
	Glyphosate 360 g/L Various trade names and formulations	15 mL / 1 L	Seedling or adult (individuals or infestation): Foliar spray – apply when actively growing.
Non-chemical applications	Manually remove all plant material; slash to encourage competition from desirable species.		

Source: [Northern Territory Weed Management Handbook](#) (NT Government 2021)

9.2 Parkinsonia (*Parkinsonia aculeata*) Treatment Options

Table 5 includes herbicide and non-chemical treatment options for Parkinsonia (*Parkinsonia aculeata*) (NT Government 2015).

Table 5 Parkinsonia (*Parkinsonia aculeata*) treatment options

Weed Species	Parkinsonia (<i>Parkinsonia aculeata</i>)		
Control Methods	Chemical and concentration	Rate	Weed growth stage, method and comments
Herbicides	Aminopyralid 8 g/L + Triclopyr 300 g/L + Picloram 100 g/L Grazon™ Extra	350 mL / 100 L or 3 L / ha	Seedling (individuals and infestation) Foliar spray – avoid spraying if plants are stressed or bearing pods – Uptake Spraying Oil required Foliar spray – plants up to 2 m or 2 years old - Uptake Spraying Oil required.
	Triclopyr 240 g/L + Picloram 120 g/L Access™	1 L / 60 L (diesel) 1 L / 60 L (diesel)	Seedling or adult (individuals or infestation) Basal bark < 5 cm stem diameter Cut stump > 5 cm stem diameter
	Tebuthiuron 200 g/kg	1.5 g / m ²	Seedling or adult (individuals or infestation) Granulated herbicide - ground applied Do not use within 30 m of desirable trees or apply to continuous area > 0.5 ha. Do not use if fire is eminent. Apply when there is soil moisture or prior to rain.
Non-chemical applications	• Blade-ploughing, stick-raking, bulldozing and chaining can be effective if the root layer is removed from the soil. • Cultivation of pasture or native vegetation after mechanical control will help to prevent re-sprouting and seedling establishment. • Fire destroys seed in the soil surface and can be used as a follow-up to remove seedlings after other control efforts. • Fire may also be used to manage mature trees. Hand grubbing for single plants or small outbreaks, ensure removal of the root system. • Biocontrol options are available with establishing slowly in some areas.		

Source: [Northern Territory Weed Management Handbook](#) (Northern Territory Government 2021).

9.3 Rubber bush (*Calotropis procera*) Treatment Options

Table 6 includes herbicide and non-chemical treatment options for rubber bush (*Calotropis procera*) (NT Government, 2015).

Table 6 Rubber bush (*Calotropis procera*) treatment options

Weed Species	Rubber bush (<i>Calotropis procera</i>)		
Control Methods	Chemical and concentration	Rate	Weed growth stage, method and comments
Herbicides	Triclopyr 300 g/L + Picloram 100 g/L Conqueror®	750 mL / 100 L (water)	Seedling (individuals or infestation): Foliar spray. Check label for recommended adjuvant product. More effective on plants <2m as thorough coverage on all leaves is required
	+ Aminopyralid 8 g/L Grazon™ Extra	500-750mL / 100 L (water)	
	Triclopyr 240 g/L + Picloram 120 g/L Access™	1 L / 60 L (diesel) 1 L / 10 L (diesel) 1 L / 60 L (diesel)	Adult (individuals and infestation): Basal bark < 5cm stem diameter. Spray all stems. Spray to point of runoff. Thin Line up to 5cm stem diameter. Cut stump > 5cm stem diameter.
	Tebuthiuron (200g/kg) Graslan Pending registration. Please check with Weed Management Branch for status confirmation.	1.5 – 2 g/m ²	Seedling or adult: Application to black clay soils in conjunction with seasonal rainfall. Spread granules according to density of the infestation.
	Fluroxypyr (333g/L) Starane™ Advanced	3 L / 100 L (diesel)	Adult: Cut stump method for plants up to 10cm diameter and 3m high.
Non-chemical applications	This plant is difficult to eradicate as the deep roots survive almost any treatment. Maintenance of a dense pasture sward will assist in preventing invasion.		
Source: Northern Territory Weed Management Handbook (NT Government, 2021)			

9.4 Gamba grass (*Andropogon gayanus*) Treatment Options

Table 7 includes herbicide and non-chemical treatment options for Gamba grass (*Andropogon gayanus*) (NT Government, 2021).

Table 7 Gamba grass (*Andropogon gayanus*) treatment options

Weed species	Gamba grass (<i>Andropogon gayanus</i>)		
Control methods	Chemical and concentration	Rate	Weed growth stage, method and comments
Herbicides	Glyso phate 360 g/L Various trade names and formulations	10 mL / 1 L (water)	Seedling or adult (individuals or infestation): Foliar spray – apply when actively growing. Effective chemical control relies on spraying entire plant. For optimal uptake and high mortality rates gamba grass should be sprayed when actively growing and young (leaves should be at least 40 cm long). Spraying plants prior to reaching full height will reduce time and herbicide requirements. Gamba grass is still sensitive to herbicide when flowering. Once gamba grass is seeding and the leaves are drying out herbicide will not be effective.
Non-chemical applications	Physical: Individual plants can be removed by hand or by using a mattock. Ensure the entire root mat is removed. Excess soil should be shaken or kicked off root system to ensure regrowth does not occur from the root mat. Burning: Burning will not kill gamba grass, low intensity fires, undertaken in the Wet season, can remove rank growth improving access for slashing or spraying. Plants may need to be treated with herbicide prior to burning to create enough dry matter to carry a fire. Avoid using fire as a control method while plants are seeding. Bushfires NT permit would be required to light fire. Slashing: Slashing will not eradicate gamba grass, but can reduce the biomass, prevent seeding, create an opportunity for more desirable species to establish and provide improved access to control by other means. Slash young plants prior to seed production from January to March. Ensure equipment and machinery is cleaned prior to moving to new sites.		
Source: Northern Territory Weed Management Handbook (NT Government, 2021)			

9.5 Annual Mission grass (*Cenchrus pedicellatus*) Treatment Options

Table 8 includes herbicide and non-chemical treatment options for Annual Mission grass (*Cenchrus pedicellatus*) (NT Government, 2021).

Table 8 Annual Mission grass (*Cenchrus pedicellatus*) treatment options

Weed species	Annual Mission grass (<i>Cenchrus pedicellatus</i>)		
Control methods	Chemical and concentration	Rate	Weed growth stage, method and comments
Herbicides	Glysophate 360 g/L Various trade names and formulations	10 mL / 1 L (water)	Seedling or adult (individuals or infestation): Foliar spray – apply when actively growing.
Non-chemical applications	Annual mission grass can be controlled by slashing prior to seeding (repeated slashing may be required). Adult plants will not persist to the following year.		
Source: Northern Territory Weed Management Handbook (NT Government, 2021)			

10 Notification Procedure

The Onshore Petroleum Weed Management Officer at the Weeds Unit of DLPE should be notified within 48 hours of the discovery of a new weed species in the EP.

Initial notification may be verbal, with follow-up written notification provided within seven working days. The notification should include a preliminary species identification and location information. The Regional Weed Officer will advise what further action is required.

It is noted that some species spread rapidly so immediate action may be required to control spread. For example, as stated above Parthenium (*Parthenium hysterophorus*) is a Class A (to be eradicated) and Class C (not to be introduced) weed in the Northern Territory as well as being classified as a Weed of National Significance. Early detection is crucial in not allowing this species to spread in the Northern Territory (Department of Primary Industry and Resources 2016).

In addition, it is noted that under the Weeds Management Act that:

'The owner and occupier of land must... within 14 days after becoming aware of a declared weed that has not previously been, or known to have been, present on the land, notify an officer of the presence of the declared weed'.

All weed outbreak incidents will be reported in Tamboran's incident reporting system and corrective action initiated.

11 Recording

Records of weed inspections will be maintained by Tamboran.

Data on weed distribution will be maintained within Tamboran's GIS and provided to the Weeds Officer at Weeds Unit at DLPE as part of the annual report on performance against the Weed Management Plan, or as requested. Data will be collected as per the requirements of the NT *Weed Data Collection Manual - Section One Technical Data Description* (Weed Management Branch, 2015). Data will be recorded as per the guidelines provided in Appendix A, using the data sheet provided in Appendix B (Weed Management Branch, 2015).

The NT *Weed ID Deck* (NT Government, 2021) will be referenced to assist with identification of species that have been identified as likely or known to occur in the EP.

Field data will be submitted directly to the Weeds Unit at DLPE in a shapefile format or as an Excel spreadsheet, including incidental identification of weeds and following completion of field surveys.

12 Reporting

All weed outbreak incidents will be reported in Tamboran's incident reporting system and corrective action initiated.

A report on the performance against this Weed Management Plan will be submitted to DLPE on an annual basis. At a minimum, this should include:

- a. Details of activities implemented to address weed spread and introduction risks (e.g. vehicle wash down/ blow down locations, examples of track construction from working from weed free areas into weed infested areas to reduce spread).
- b. Details of survey and monitoring events, including dates, personnel, maps and track data.
- c. Submission of all weed data collected.

- d. Overview of weed control events and success rates (weed control should be captured in detail through the data collection process and submitted as a component of (a)).

13 References

- Department of Climate Change, Energy, the Environment and Water. 2018. *Key threatening processes under the EPBC Act*. <http://www.environment.gov.au/biodiversity/threatened/key-threatening-processes>, accessed 14 September 2018.
- Department of Environment, Parks and Water Security. 2020. Weed Management Plan. Gamba Grass 2020-2030. https://nt.gov.au/_data/assets/pdf_file/0006/954789/weed-management-plan-for-gamba-grass-2020-2030.PDF.
- Department of Environment, Parks and Water Security. 2021. Katherine regional weeds strategy 2021 – 2026. https://depws.nt.gov.au/_data/assets/pdf_file/0006/269286/Katherine-Regional-Weeds-Strategy-2021-2026.pdf.
- Department of Environment, Parks and Water Security. 2021. Tennant Creek Regional Weeds Strategy 2021-2026. https://depws.nt.gov.au/_data/assets/pdf_file/0006/258099/tennant-creek-regional-weeds-strategy.pdf, accessed 18 January 2022.
- Department of Environment, Parks and Water Security. 2021. Weed Management Act: Compliance Policy, December 2021. https://nt.gov.au/_data/assets/pdf_file/0011/668387/weeds-management-act-compliance-policy.pdf, accessed 30 August 2022.
- Department of Land Resource Management and Charles Darwin University. 2018, Guidelines for the Management of the Weeds of Beetaloo 2018.
- Department of Natural Resources and Environment. 2019. Weed Management Planning Guide - Onshore Petroleum Projects, June 2019. https://denr.nt.gov.au/_data/assets/pdf_file/0006/708558/weed-management-planning-guide-onshore-petroleum-projects.pdf.
- Department of Primary Industry and Resources. 2016. Parthenium found in the NT. <https://dpir.nt.gov.au/news/2016/december/parthenium-found-in-the-nt> accessed 14 September 2018.
- Northern Territory Government. 2000. Information Sheet Gamba Grass. http://www.drytropics.org.au/weeds_gamba_control.htm, accessed 29 March 2019.
- Northern Territory Government. 2021. Northern Territory Weed Management Handbook. https://nt.gov.au/_data/assets/pdf_file/0004/233833/nt-weed-management-handbook.pdf.
- Northern Territory of Australia. 2021. Northern Territory Weed ID Deck. https://depws.nt.gov.au/_data/assets/pdf_file/0012/257988/2021-weed-id-deck.pdf.
- Northern Territory Government. 2018. A – Z List of Weeds in the Northern Territory. <https://nt.gov.au/environment/weeds/weeds-in-the-nt/A-Z-list-of-weeds-in-the-NT>, accessed 13 September 2018.
- Scientific Inquiry into Hydraulic Fracturing in the Northern Territory. 2018. Scientific Inquiry into Hydraulic Fracturing in the Northern Territory – Final Report.
- Weed Management Branch, Northern Territory Government. 2015. Northern Territory Weed Data Collection Manual - Section One Technical Data Description. https://nt.gov.au/_data/assets/pdf_file/0007/233854/nt-weed-data-collection-manual-section-1.pdf.

APPENDIX A Weed Data Collection Methodology

Field data collection for weed infestations: The following is a guide to efficiently evaluating and recording a weed site in the field. Each record must identify the person or organisation taking the record, as well as the details explained below.

How to record weed area as a point record

1. Record the species

When a weed is sighted, move to the area and confirm identification of the weed. If you cannot positively identify the weed record it as “Unknown weed” and take a sample or photograph, do not try to guess. If more than one weed species is present, then repeat the process with separate records for each species.

2. Assess the size of the weed patch

Look across the area of weeds to the furthest weed plant and decide the diameter. Decide if the area is best fits in a circle of either 20, 50 or 100 m. If it is a single plant or small patch you would choose 20 m. The size 100 m extends about as far as you can see on the ground, if the weeds extend out of sight you will need to make another point further on. You may place overlapping circle areas to reflect different densities.

3. Assess the density of weeds within the circle

Decide how much of the area is covered by weeds. Assign a score from 2 to 5 based on the percentage table below. It will be useful (if possible) to move into the centre of the weed circle. Consider the whole circle size chosen in step 2 deciding on the density score. Area covered should be determined by a ‘projected canopy’ method.

Density categories

1 = Absent, no weeds of this species in this area.

2 = < 1%, Very few, not many weeds – e.g. single plant, perhaps with seedlings.

3 = 1 -10%, More than one or two isolated plants but not a lot – e.g. a few small plants.

4 = 11-50%, A lot, up to half the area covered – e.g. a tree, dense patches of weeds.

5 = > 50%, Dominant cover is weed, more than half covered – e.g. thickets, monocultures.

4. Record the location

Take the GPS location (ideally) from the centre of the circle. If weed seeds may be spread or it is difficult to access the centre, it is acceptable to take the reading from the location as close to the centre as practical.

5. Record the treatment

Record the method you apply as a treatment to the weeds, or record ‘No Treatment’. Choose from the list of treatment methods – e.g. no treatment, unknown, treated, foliar spray etc.

How to record weed area as a line (polyline) record

1. Record the species

When a weed is sighted, move to the area and confirm identification of the weed. If you cannot positively identify the weed record it as “Unknown weed” and take a sample or photograph, do not try to guess. If more than one weed species is present, then repeat the process with separate records for each species.

2. Assess the ‘best fit’ width in metres of the linear weed area

Look along the area of weeds to the furthest weed plant and decide a width that best sums up the width of the infestation from values of 5, 20, 50 or 100 m. If the width is too variable, you may need to make more than one line or consider recording as points or as a polygon.

3. Assess the density of weeds within the line

For the area of the line, being from start to finish at the designated width, decide the area covered by weeds. Assign a score from 2 to 5 based on the percentage table below. Consider the whole line area when deciding on the density score. Area covered should be determined by a ‘projected canopy’ method.

Density categories

1 = Absent, no weeds of this species in this area.

2 = < 1%, Very few, not many weeds – e.g. single plant, perhaps with seedlings.

3 = 1 -10%, More than one or two isolated plants but not a lot – e.g. a few small plants.

4 = 11-50%, A lot, up to half the area covered – e.g. a tree, dense patches of weeds.

5 = > 50%, Dominant cover is weed, more than half covered – e.g. thickets, monocultures.

4. Record the location

Start the GPS track, or line sketch from one end of the linear weed area. Walk or sketch a line as best fit through the middle of the linear weed area and finish at the end point.

5. Record the treatment

Record the method you apply as a treatment to the weeds, or record ‘No Treatment’. Choose from the list of treatment methods – e.g. no treatment, unknown, treated, foliar spray.

How to record weed area as a polygon record

1. Record the species

When a weed is sighted, move to the area and confirm identification of the weed. If you cannot positively identify the weed record it as “Unknown weed” and take a sample or photograph, do not try to guess. If more than one weed species is present, then repeat the process with separate records for each species.

2. Assess the extent of the weed area and ensure it can be practically enclosed

Polygons are good for clearly delineated areas of weeds; you should be able to walk around the edge of the weed area with confidence. Ensure the defined area of weed at a similar density can be delineated before attempting to create the area, you may need more than one polygon. If the area is poorly defined, then the point method may be a more useful.

3. Assess the density of weeds within the polygon

Assess the area covered by weeds for density, you may need to move to several vantage points to get a clear picture. Assign a score from 2 to 5 based on the percentage table below. Consider the whole area within the polygon when deciding on the density score. Area covered should be determined by a ‘projected canopy’ method.

Density categories

1 = Absent, no weeds of this species in this area.

2 = < 1%, Very few, not many weeds – e.g. single plant, perhaps with seedlings.

3 = 1 -10%, More than one or two isolated plants but not a lot – e.g. a few small plants.

4 = 11-50%, A lot, up to half the area covered – e.g. a tree, dense patches of weeds.

5 = > 50%, Dominant cover is weed, more than half covered – e.g. thickets, monocultures.

4. Record the location

Start the GPS track, or polygon sketch from one point of the polygon weed area. It is useful to start from a landmark or flagging tape. Create the polygon edge line by walk a path or sketching along the outer edge of the weed area until you return to the start point. If using a GPS track to create the polygon, ensure that you cross your start point so as to close the polygon.

5. Record the treatment

Record the method you apply as a treatment to the weeds in the area, or record ‘No Treatment’. Choose from the list of treatment methods– e.g. no treatment, unknown, treated, foliar spray.

Appendix B Example Weed Data Collection Sheet

RECORDER:				PROJECT:				LOCALITY:						
ORG_NAME:				GPS NAME/MODEL:				RECORDING METHOD:						
SITE_ID	DATE_REC	LAT_G94	LONG_G94	WEED_NAME	SIZE_DIA_M	DENS_CAT	SEEDLINGS	JUVENILES	ADULTS	SEED_PRES	PAST_TREAT	TREATMENT	HERBICIDE	COMMENTS

Notes:

Treatment method Control method applied today as per below. If none, record 'No treatment' - Foliar spray - Residual application - Basal bark - Cut stump - Stem injection - Aerial spray - Slashed or cut - Hand pull Herbicide The active ingredient(s) of the herbicide applied today (if any) GPS waypoint Waypoint ID as entered in the GPS Weed name Common name or scientific name for the weed recorded S (y/n) Seedlings: Are seedlings visible? J (y/n) Juveniles: Are juvenile plants visible? A (y/n) Adults: Are there adult plants, or seeds, or evidence of past seeding present? Seed (y/n) Seeds: Are seeds visible today? Or plants with seeds or pods? Treat (y/n) Treatment: Did you apply treatment to this site? Comment Record any notes for yourself here.	Size dia m Size/diameter of the area you are recording information about (in metres). Use 20m, 50m or 100m. Example of size/diameter compared to a football oval. (Sizes 20m, 50m, 100m)	Dens cat Density of weeds in the assessed area using categories described below <table border="1"> <tr> <td>1 = No weeds (absent)</td> <td>2 = Single plant or very few (<1%)</td> <td>3 = A few plants (1-10%)</td> </tr> <tr> <td>4 = Many weeds, up to half (11 - 50%)</td> <td>5 = Mostly weeds, more than 50%</td> <td>6 = Density not assessed</td> </tr> </table> Density category (Dens cat) examples Absent (None) Less than 1% Little bit 1-10% Bit more, not big mob 11-50% Big mob More than 50% Biggest mobs	1 = No weeds (absent)	2 = Single plant or very few (<1%)	3 = A few plants (1-10%)	4 = Many weeds, up to half (11 - 50%)	5 = Mostly weeds, more than 50%	6 = Density not assessed
1 = No weeds (absent)	2 = Single plant or very few (<1%)	3 = A few plants (1-10%)						
4 = Many weeds, up to half (11 - 50%)	5 = Mostly weeds, more than 50%	6 = Density not assessed						

(Source: Northern Territory Weed Data Collection Manual - Section One Technical Data Description)