Dante Project

Native Vegetation Clearing Permit – Supporting Document

97992001 Pty Ltd

Reference: P525967

Revision: A

27-June-2025

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Document control record

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Executive summary

97992001 Pty Ltd (“the Proponent”) holds 100% of exploration licences E 69/3401 and E 69/3552 within the Shire of Ngaanyatjarraku, Western Australia (WA). As these tenements are located within an environnmentally sensitive area (ESA), Regulation 5 item 20 of Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (WA) does not apply and a clearing permit is required for mineral exploration activities.

The Proponent has been previously approved for native vegetation clearance of up to 14 ha within a permitted area of 10,432 ha (CPS 10508/1). The proponent is seeking approval for a new Native Vegetation Clearing permit (NVCP), adjacent to CPS 10508/1, in tenement E 69/3401, to clear 27 ha of native vegetation, in a Permit Area of 2,403 ha for exploration activities. This document supports this application.

Ecological considerations

Flora and fauna studies undertaken to information avoidance and mitigation measures for the proposed exploration works identified the following:

- 17 vegetation units,dominated by 3 associations which are highly representative of the regional landscape. Vegetation condition was very good to excellent across the tenements.
- No Threatened or Priority Ecological Communities were identified.
- No Threatened flora listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or WA *Biodiversity Conservation Act 2016* (BC Act). Two Priority 1 (P1) species, *Euphorbia parvicaruncula* and *Menkea lutea* were recorded within Claypan Grassland (CPNG) vegetation associations. Disturbance to P1 species should be avoided or minimized when designing and developing access tracks and drill pads by avoiding CPNG associations, particularly as *Menkea lutea* is a colonizer species.
- 5 weed species were observed across the tenements. Although none are listed as Weeds of National Significance (WoNS) or Declared Plants, it should be noted that 2 species, *Cenchrus ciliaris* (Buffel Grass) and *Rumex vesicarius* (Ruby Dock), are considered to be highly invasive.
- No conservation signficant fauna were recorded (and are unlikely to occur as the available habitat is unsuitable). Fauna assemblages observed in the areas surrounding the tenements were considered present and abundant.

An assessment of the ten clearing Principles is provided in Section 6 and indicates that proposed clearing of 27 ha for mineral exploration purposes is unlikely to be at variance with any of the clearing principles.

Tenure and social considerations

The Project is located within the Aboriginal Lands Trust Estate of the Ngaanyatjarra Central Reserve (Reserve ID 17614) and within the Ngaanyatjarra Indigenous Protected Area.

The Proponent has a signed Native Title Agreement with the Ngaanyatjarra Land Council. Initial heritage surveys have been completed for the Project. The Proponent is bound by their heritage agreement to only undertake works in areas with heritage clearance from the Ngaanyatjarra Land Council. The Permit Area has excluded registered Aboriginal heritage sites.

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Abbreviations

ACHIS	Aboriginal Cultural Heritage Inquiry System (DPLH database)
Aurecon	Aurecon Australasia Pty Ltd
BoM	Bureau of Meteorology
BC Act	Biodiversity Conservation Act
CPNG	Claypan Grassland vegetation association
CPP	Claypan Playa vegetation association
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety
DER	Department of Environmental Regulation (superseded by DWER)
DPLH	Department of Planning, Land and Heritage
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
EP Act	Environmental Protection Act 1986
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ESA	Environmentally Sensitive Area
GDE	Groundwater Dependent Ecosystems
ha	hectares
IBRA	Interim Biogeographic Regionalisation of Australia
ILUA	Indigenous Land Use Agreements
IPA	Indigenous Protected Area
km	kilometres
km^2	square kilometres
LGA	Local Government Area
m	metres
mbgl	metres below ground level
mg/L	milligrams per litre
mm	millimetres
NVCP	Native Vegetation Clearing Permit
PEC	Priority Ecological Community
PFC	Projected Foliage Cover
PGE	platinum-group elements
RNTBC	Registered Native Title Body Corporate
SRE	Short-range endemic (invertebrate)
TDS	Total dissolved solids
TEC	Threatened Ecological Community
WA	Western Australia
WMCNP	West Musgrave Copper and Nickel Project

1 Introduction

1.1 Purpose and scope

97992001 Pty Ltd ("the Proponent") proposes to undertake mineral exploration within its exploration licence tenements E 69/3401, located approximately 600 kilometres (km) northwest of Laverton, Western Australia (WA). The tenement is approximately 100 km west of the junction between WA, South Australia and the Northern Territory (Figure 1-1).

The proposed Stage 2 exploration work comprises the following:

- 370 drill holes (each with a 20 metre (m) x 10 m pad, and a 5 m x 3 m x 2 m sump).
- 21 km of access tracks (approximately 3 m wide).

A Native Vegetation Clearing Permit (NVCP) under the *Environmental Protection Act 1986* (EP Act) is being sought for clearing up to 27 ha within a Permit Area of 2,403 ha (Figure 1-2) to provide for the proposed exploration works. Aurecon Australasia Pty Ltd ("Aurecon") has been engaged by the Proponent to prepare this supporting document for the NVCP application.

The Proponent has been previously approved for native vegetation clearance of up to 14 ha within a permitted area of 10,432 ha (CPS 10508/1) across tenements E 69/3401 and E 69/3552). This new NVCP application represents a continuation of the same drilling program (Stage 2) and is directly adjacent to the area approved under CPS 10508/1 .

1.2 Legislative framework

Under Section 51C of the EP Act, clearing of native vegetation is an offence unless the clearing is done in accordance with a NVCP or there is an exemption. Exemptions include:

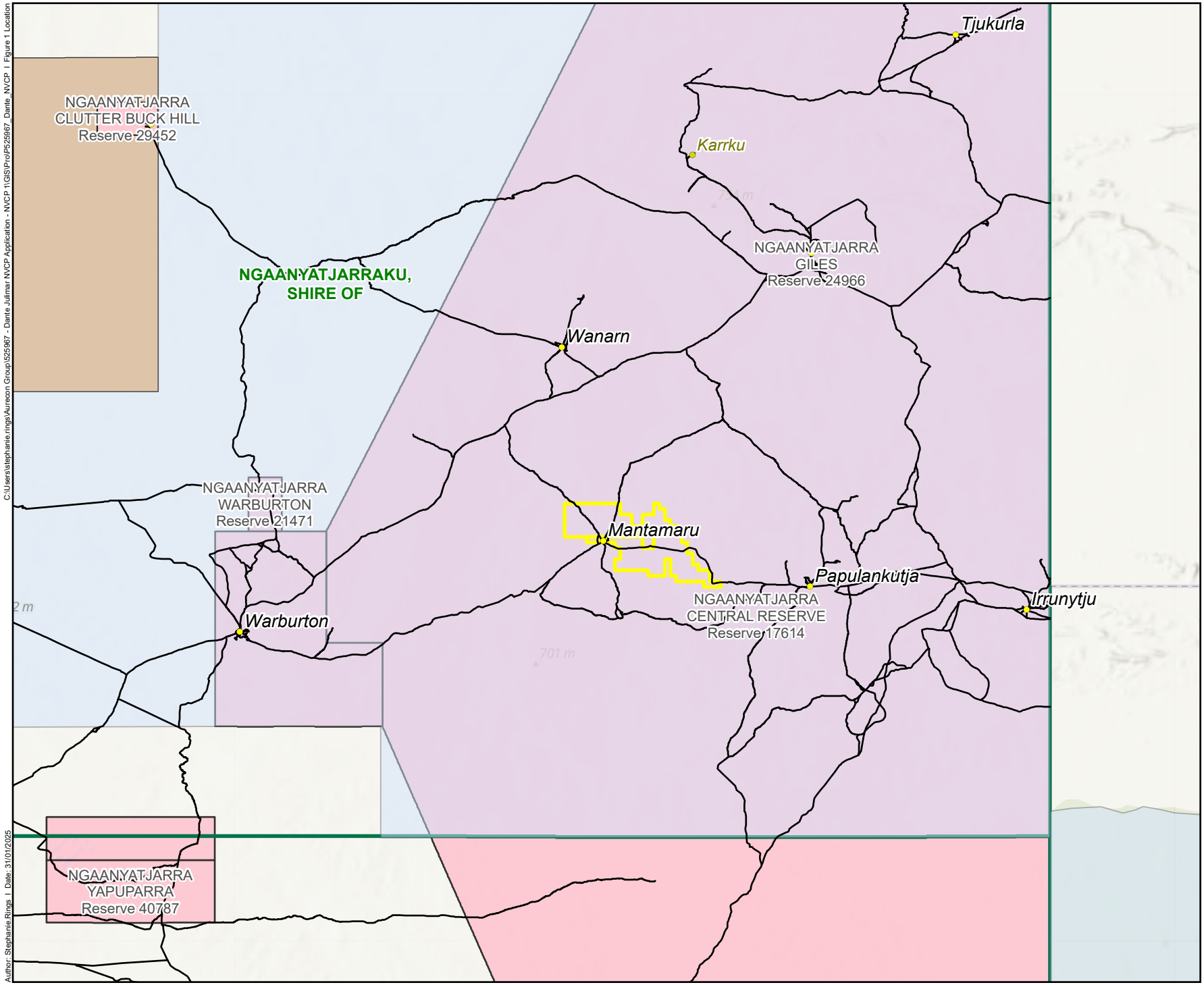
- Schedule 6 exemptions: exemptions provided in Schedule 6 of the EP Act. These exemptions mainly refer to clearing required (or provided for) under other laws. For example, clearing carried out in the implementation of a proposal that has been assessed by the EPA under s.38 of the EP Act. Clearing native vegetation is not usually assessed as part of an application for a works approval or licence. This means a clearing permit is still required unless a works approval or licence is issued with specific approvals relating to clearing native vegetation (DWER, 2019).
- Exemptions under Regulations: exemptions for 'prescribed clearing' are provided under Regulation 5 of the Environmental Protection (Clearing of Native Vegetation) Regulations 2004. These exemptions do not apply within an environmentally sensitive area (ESA). The exploration tenement E 69/3401 is within an ESA (DWER, 2021) corresponding to ALT estate Ngaanyatjarra Central Reserve (ID 17614) (see Section 3.8) and is therefore not exempt.

In accordance with s.20 of the EP Act, the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) has been delegated authority for the administration, assessment and approval of NVCP applications relating to mineral activities regulated under the *Mining Act 1978*. Initial discussions with DEMIRS confirmed that a NVCP is required for the proposed mineral exploration work.

There are two types of NVCPs that can be applied for under s.51E of the EP Act. These are the Area Permit and the Purpose Permit. Only the Purpose Permit is applicable for exploration licences (DEMIRS, n.d.). A Purpose Permit is therefore being applied for the clearing for the proposed exploration works.

This NVCP application supporting document has been prepared with consideration of the following:

- *Information on How to Apply for a Clearing Permit* (DEMIRS, n.d.a)
- *Application for new permit or referral to clear native vegetation* (DWER, 2024)
- *A guide to the assessment of applications to clear native vegetation: Under Part V Division 2 of the* Environmental Protection Act 1986 (DER, 2014)



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Legend

- Live Mining Tenement
- Current Roads

Aboriginal Communities and Town Reserves

- Remote Aboriginal Community - Permanent
- Remote Aboriginal Community - Seasonal
- LGA Boundary

CAPAD

- Indigenous Protected Area

DBCA - Legislated Lands and Waters

- Nature Reserve

ALT Estate

- Reserve

Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community.

0 16 32 48 64
Kilometres

C:\Users\stephanie.rings\Aurecon Group\525967 - Dante Julimar NVCP Application - NVCP 1\GIS\Prod\P525967_Dante_NVCP_I_Figure 1 Location

Author: Stephanie.Rings_I_Date: 31/01/2025

Dante Project NVCP Supporting Document

Figure 1-1: Project Location

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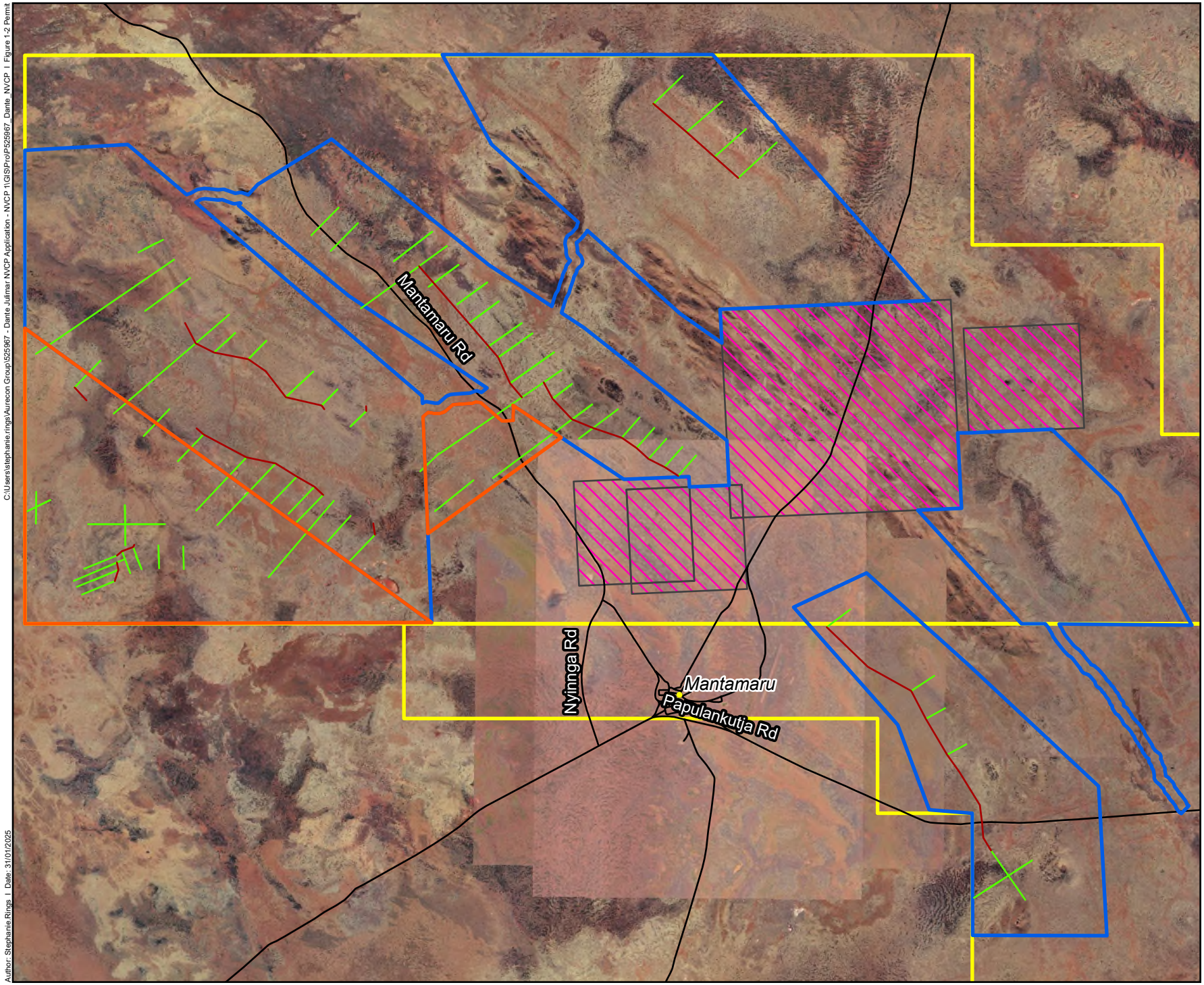

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Legend

- Indicative Drill Lines
- Indicative Tracks
- Existing Roads
- New Permit Area
- Approved Permit Area (CPA 10508-1)
- Live Mining Tenement
- Aboriginal Heritage Places

Aboriginal Communities and Town Reserves

- Remote Aboriginal Community - Permanent

Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community.

Dante Project NVCP Supporting Document

Figure 1-2: Permit Area

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1.3 Proponent and land details

GCX Metals Ltd ("GCX") acquired Dante Resources Pty Ltd and its 100% owned and a subsidiary of 97992001 Pty Ltd ("the Proponent"). Proponent and contact details for the Project are provided in Table 1-1.

Table 1-1 Proponent and contact information

Proponent	Contact
97992001 Pty Ltd ACN: 624 169 455 *Postal Address:* PO Box Z5083 Perth WA 6000	**Julia Bonome** Senior Environmental Consultant, Aurecon Australasia Pty Ltd *Telephone:* (08) 6145 9300 *Email:* julia.Bonome@aurecongroup.com.au *Business address:* 5/863 Hay St Perth WA 6000

Exploration licence E 69/3401 is 100% held by the Proponent as summarised in Table 1-2. A copy of the tenement report showing holder information is provided in Appendix A. The tenement is located within the local government area (LGA) of the Shire of Ngaanyatjarraku, within an area subject to exclusive Native Title rights. The tenements are also within an Aboriginal Reserve and an Indigenous Protected Area (IPA), as detailed in Section 3.8.

Table 1-2 Dante tenements

Tenement ID	Type	Holder	Grant date	End date	Area
E 69/3401	Exploration licence	97992001 Pty Ltd	11/02/2019	10/02/2029	70 BL (~216 km^2)

1.4 Environmental Assessments

Various environmental studies were commissioned by specialist consultants to inform the design of the exploration program and preparation of the NVCP. The environmental studies included desktop assessments as well as site surveys, which are detailed in the following reports:

- Desktop Assessment Flora and Vegetation: Jameson Project (Western Botanical, 2023) (previously submitted for CPS 10508/1).
- Basic and Targeted Vertebrate Fauna Survey, West Musgrave Project Area (Terrestrial Ecosystems, 2023) (previously submitted for CPS 10508/1).
- Dante Project Targeted Flora and Vegetation Assessment, (Western Botanical, 2024) (Appendix B).
- Basic and Targeted Vertebrate Fauna Survey, Dante Project (Terrestrial Ecosystems, 2024) (Appendix C).

2 Proposed clearing and rehabilitation

The Proponent proposes to clear up to 27 ha within a 2,403 ha Permit Area, as shown in Figure 1-2. Clearing will be undertaken progressively in a series of mineral exploration campaigns. Clearing is required for the following purposes:

- Drill lines, inclusive of associated drill pads and sumps.
- Access tracks.
- Supporting infrastructure, including laydown areas, parking areas, bag farms and core yards.

Clearing will typically be undertaken using a small excavator, bulldozer, loader or grader. Where practicable, raised blade clearing will be used. Where this is not practicable, topsoil will be stripped and temporarily stockpiled to the sides of the access tracks and drill pads (within the proposed Permit Area) for use in post-exploration rehabilitation works. Sumps for water storage will be required.

Clearing will be kept to the minimum required for safe exploration. Clearing areas will be rehabilitated within six months if no longer required, in accordance with DEMIRS rehabilitation requirements. Rehabilitation will typically consist of:

- Removal of all equipment and wastes.
- Drill collars will be cut no less than 400 mm below the surface then securely capped and backfilled to form a water-shedding mound above the natural ground level.
- Backfilling of excavations (including sumps).
- Stockpiled topsoil and vegetation will be respread over cleared areas.
- Windrows will be back-bladed onto tracks.
- Ripping of compacted areas as required.

A summary of clearing activities proposed as part of this project has been provided in Table 2-1.

Table 2-1 Proposed clearing details

Item	Description
Permit Application Area	2,403 ha
Area of native vegetation to be cleared	27 ha
Purpose of clearing	Mineral exploration
Method of clearing	Cutting / Mechanical
Timeframe of clearing	Upon approval of NVCP Start date: Upon approval of NVCP End date: Within five (5) years of NVCP approval
Post operational land use	Same as pre-operational (i.e. remains part of Ngaanyatjarra Central Reserve (Reserve ID 17614)) (*note: there is no local planning strategy or local planning scheme for the Shire of Ngaanyatjarraku* (DPLH, 2021))

3 Existing environment

3.1 Regional setting

The Project is located within the Mann-Musgrave Block Interim Biogeographic Regionalisation of Australia (IBRA) subregion of the Central Ranges bioregion. The IBRA framework classifies Australia's landscapes into geographically distinct bioregions based on climate, geology, landform, native vegetation and species, with more localised info provided as a subregion level. The WA section of the Mann-Musgrave Block subregion is characterised by volcanic and quartzite soil plains interspersed with sandplains that support low open woodlands of either Desert Oak or Mulga over *Triodia basedowii* hummock grasslands (Graham & Cowan, 2001). Ranges support mixed wattle scrub or *Callitris glaucophylla* woodlands over hummock and tussock grasslands; they are often fringed by low open woodlands of Ironwood (*Acacia estrophiolata*) and Corkwoods (*Hakea* spp.) over tussock and hummock grasses. The WA section is almost entirely Aboriginal Reserve (94.33% of area) (see Section 3.8), with other dominant land uses including Crown land and Crown reserves (4.28%), grazing – leasehold (1.36%), and grazing – freehold (0.03%) (Graham & Cowan, 2001).

The nearest DBCA legislated land to the Project is the A-class Pila Nature Reserve (Gibson Desert) (R 34606) approximately 130 km north-west of the Dante tenements. The nearest wetland of national or international significance is the Gibson Desert Gnamma Holes, approximately 170 km north-west of the Dante tenement.

A large nickel-copper mine (West Musgrave Copper and Nickel Project (WMCNP)) is in early stages of development to the south of the Project.

3.2 Climate

The regional climate of the Project is arid. The nearest Bureau of Meteorology (BOM) weather station is 'Giles Meteorological Office', (BOM ID 013017), approximately 90 km northwest. Between 1991 and 2020, the station recorded an average annual rainfall of 326.5 mm; however, the average rainfall across all available years (1956-2024) was recorded at 289.1 mm (BOM, 2024). Rainfall is highest over the summer months (November to March) and is typically associated with tropical lows and ex-tropical cyclones moving southward (Western Botanical, 2024). The lowest average annual rainfall usually coincides with lowest mean temperatures around July, while the highest average temperatures coincide with greatest rainfall (i.e. November to March) (Terrestrial Ecosystems, 2024). Monthly averages for rainfall, maximum temperature, and minimum temperature are presented in Figure 3-1.

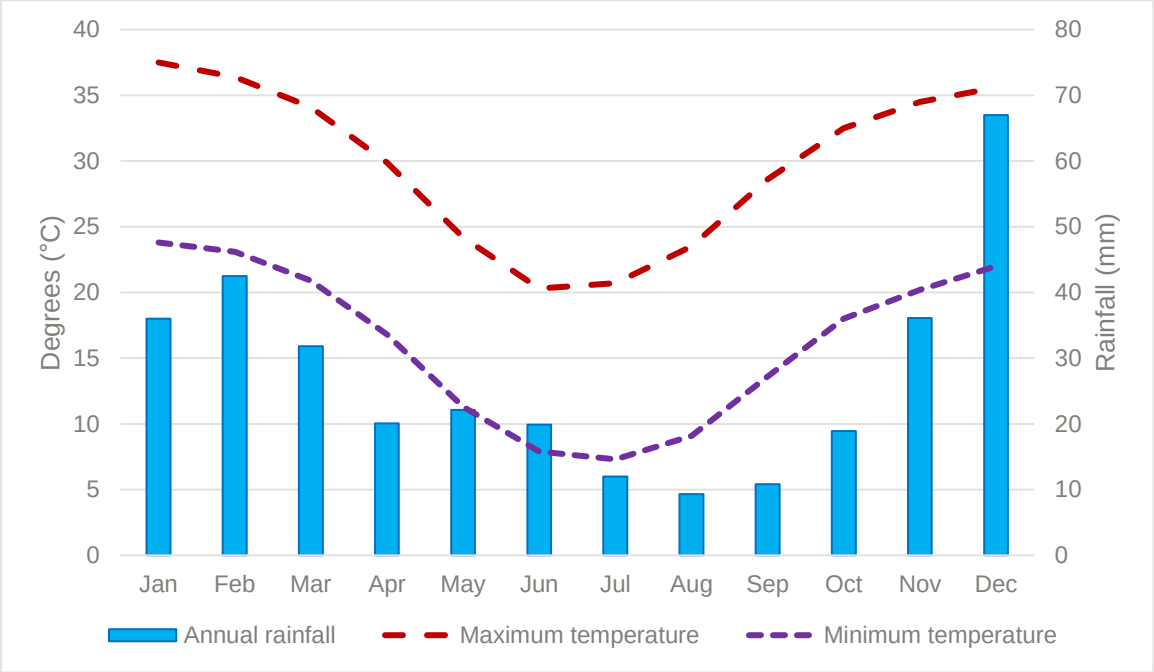

Figure 3-1 Climate monthly averages for Giles Meteorological Office (013017) from 1991 to 2020 (BOM, 2023)

3.3 Topography, landforms and soils

The Project area is located within the Western Desert Ranges Province, which is regionally characterised by sandplains and dunes over volcanic and sedimentary rocks (Tille, 2006, cited in Western Botanical, 2024). Typically, soil profiles present deep red sandy earth and red loamy earth, with some stony soils (Western Botanical, 2024). The Project vicinity is predominantly of low relief with an extensive cover of aeolian sand (Rockwater Pty Ltd, 2010, cited in Western Botanical, 2024). Landforms include:

- Extensive gently inclined hardpan plains with red-brown silty sand to clayey sand soils and discontinuous pizolitic lag gravel mantle (Western Botanical, 2023).
- Subdued low hills with red-brown silty sand to clayey sand soils and minor banded ironstone formation (magnetite) and/or gabbro outcrops (Western Botanical, 2023).

3.3.1 Geology

The Project is located within an east-west trending orogenic belt of the Mesoproterozoic Musgrave Block, which comprises a variety of high grade (amphibolite to granulite facies) basement lithologies overprinted by several major tectonic episodes (GCX Metals, 2023, cited in (Western Botanical, 2024). The tenements are dominated by the Jameson Range Intrusion of the Giles Complex, which consists of olivine-bearing gabbroic lithologies. The tenements are considered highly prospective for magmatic nickel (Ni), copper (Cu) and platinum-group elements (PGE) deposits (GCX Metals, 2023, cited in (Western Botanical, 2024).

Detail on surface geology is provided in Section 2.4.3 (Figure 6) of the *Targeted Flora and Vegetation Survey of the Dante Project* (Western Botanical, 2024) (Appendix B).

3.3.2 Soils

Soil landscape mapping (DPIRD, 2022) indicates that the Permit Area intersects four soil landscape units as shown in Table 3-1. These soil landscapes are not restricted to the Dante tenement.

Table 3-1 Soil landscapes intersecting Dante tenements (DPIRD, 2022)

Soil unit	Description	Intersects Dante tenements	Intersects Permit Area
BA21	Steep hills and ranges on sedimentary and some metamorphic, volcanic, and granitic rocks; bare rock outcrop; some gorges	**Yes**	**Yes**
Fa34	Steep hills and ranges on basic rocks; rock outcrop common; some gorges; small pediments and plains	Yes	No
My109	Outwash plains, dissected fan and terrace formations flanking ranges of sedimentary, metamorphic, volcanic, and granitic rocks	**Yes**	**Yes**
My112	Extensive plains with numerous dunes which are often short and of irregular shape and orientation	**Yes**	**No**

Acid sulfate soil risk mapping shows no known occurrences of acid sulfate soils in the vicinity (DWER, 2017).

3.4 Hydrology

The tenement is located within the northern part of the Warburton Basin hydrographic catchment. There are no significant creeks or water bodies in the vicinity and surface water flows are intermittent and occur after large rainfall events (Western Botanical, 2024).

3.5 Hydrogeology

The tenement is located within the East Murchison Groundwater Area proclaimed under the *Rights in Water and Irrigation Act 1914* (RiWI Act). Proclaimed areas provide for the use of water for commercial activity under a licence. The Proponent does not currently propose to abstract groundwater, and any water brought to site for drilling will be retained in sumps. Should groundwater abstraction be required in the future, the following licences from Department of Water and Environmental Regulation (DWER) will be sought:

- take water (s.5C groundwater or surface water licence). Licences to take water define how much and when water may be taken and specify any obligations the licence holder must meet when using the water.
- construct wells, including bores and soaks (s.26D licence).

Groundwater resources in the area have been broadly mapped with a total dissolved solids (TDS) content of 1,000 - 3,000 milligrams per litre (mg/L) (DWER, 2018), which is considered brackish. A hydrogeological baseline survey undertaken for the WMCNP found salinity is typically less than 2,000 mg/L TDS and falls within the potable to slightly brackish range (CDM Smith, 2020a, cited in Western Botanical, 2024). The WMCNP survey indicated relatively shallow groundwater, ranging in depth from 3 - 8 metres below ground level (mbgl) with the occasional increase to 14 to 20 mbgl.

3.6 Flora and vegetation

This section has been primarily informed by a *Targeted Flora and Vegetation Assessment* (Western Botanical, 2024) (Appendix B) for the Project (Figure 3-2). The assessment included a desktop literature and database review, and a field survey conducted from the 4th -11th of August 2024 across sections of the proposed Permit Area within exploration tenements E 69/3401 and E69/3552. Additional information was derived from a previous *Targeted Flora and Vegetation Assessment* (Western Botanical, 2023) undertaken for the Stage 1 exploration works of the same tenements.

C:\Users\stephanie.rings\Aurecon Group\525967 - Dante Julimar NVCP Application - NVCP 1\GIS\Prol\P525967_Dante_NVCP I Figure 3 Flora and

Author: Stephanie.Rings I Date: 31/01/2025

Mantamaru

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Legend

- Approved Permit Area (CPA 10508-1)
- New Permit Area
- Indicative Tracks
- Indicative Drill Lines
- Current Roads

Conservation Significant Flora

- Euphorbia parvicaruncula (P1)

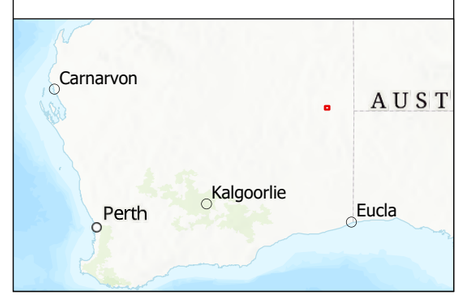
Aboriginal Communities and Town Reserves

- Remote Aboriginal Community - Permanent

Vegetation Units

- AkS: Acacia kempeana Shrubland
- AmmS: Aluta maisonneuvei subsp. maisonneuvei Shrubland
- COG: Calcrete Open Grassland
- CPNG: Claypan Grassland
- CPP: Claypan Playa
- GRMU: Mulga Grove on Hardpan Plain
- HPMW / CPNG: Mosaic of Hardpan Mulga Woodland and Claypan Grassland
- HPMW: Hardpan Mulga Woodland
- HPMWD: Hardpan Mulga Woodland Drainage
- MUWA: Mulga Wanderrie Grassy Shrubland
- MpS: Maireana pyramidata Shrubland
- SAMU: Sandplain Mulga Woodland
- SAWS: Sandplains with Wattles other than Mulga over Spinifex
- SDAGS: Sand Dune Acacia - Grevillea Shrubland
- SIMS: Stony Mulga Shrubland
- SMS: Stony Mulga Shrubland
- SS: Senna Shrubland
- TIS: Triodia longiceps Shrubland

Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community.



Dante Project NVCP Supporting Document

Figure 3-2: Flora and Vegetation

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3.6.1 Vegetation communities

There are five pre-European vegetation systems mapped across the Project tenement (WALGA, 2020, cited in (Western Botanical, 2024), two of which intersect the Permit Area as follows:

- Central Ranges_18: Low woodland, open low woodland or sparse woodland of Mulga (*Acacia aneura*) and associated species
- Central Ranges_39: Scrub, open scrub or sparse scrub of Wattle, Teatree and other species (*Acacia* spp., *Melaleuca* spp).

Both vegetation systems are widely represented in the surrounding area and remain intact at a bioregional level with greater than 99% of its pre-European extent remaining (Western Botanical, 2024). The Shire of Ngaanyatjarraku is predominantly undisturbed with 99% of its pre-European vegetation extent intact (DWER, 2023c, cited in Western Botanical, 2024).

Vegetation mapping for the proposed exploration works (Western Botanical, 2024) described 18 vegetation units on five landform systems within the survey area (Table 3-2, Figure 3-2). All were noted to be locally widespread in the Jameson area and the Central Ranges bioregion (Western Botanical, 2024).

Table 3-2 Predominant vegetation associations of the Dante Project (Western Botanical, 2024).

Vegetation association	Vegetation description
Claypan Grassland (CPNG)	Large, extensive low lying internally drained areas with medium - heavy cracking red sandy clay soil. Uniform vegetation across the areas consists of a perennial grassland dominated by *Aristida latifolia* 1.2 m tall, *Eragrostis xerophila* 0.3 m, *Eragrostis setifolia* 0.4 m, *Iseilema eremaea* 0.2 m with forbs dominated by *Rhynchosia minima* 0.4 as well as priority species *Menkea lutea* (P1) and *Euphorbia parvicaruncula* (P1). Projected foliage cover (PFC) is approximately 50-65%.
Hardpan Mulga Woodland (HPMW) and associated landscapes:	HPMW is characterised by an upper stratum woodland dominated by *Acacia ayersiana* (narrow phyllode variant) 5 - 10 m, *Acacia incurvaneura* 5-10 m, *Acacia aptaneura* 5-10 m, *Hakea lorea* 6-8 m and the occasional *Acacia tetragonophylla* 4 m, with a combined PFC 10-25%. Mid-stratum characterised by juvenile *Acacia* spp. and *Senna* spp. PFC 2-5%. The ground stratum is a composite of sparse low chenopod shrubland and sparse tussock grassland with a combined PFC of 5-20%. Notably, *Amaranthus centralis* (P3) is also found in HPMW associations.
Claypan Playa (CPP)	CPP associations are found within HPMW and represent the lowest part of the landscape. They are very open hardpan areas with a lag gravel mantle which are seasonally inundated for periods following rainfall. Vegetation is sparse in the central parts of the CPP, characteristic fringing vegetation includes *Hakea lorea* to 8 m and *Acacia spp.* 2-4 m, with a combined PFC 5 - 10%, and an open grassland lower stratum with a PFC of 10-15%.
Hardpan Mulga Woodland Drainage (HPMWD)	HPMWD associations are characterised by a woodland upper stratum dominated by various *Acacia* species ranging from 4-7 m, with a PFC of 15 - 20% - mid stratum PFC is 5-10% and ground stratum (characterised by open forbland) PFC is 20-30%.
Mulga Grove on Hardpan Plain (GRMU)	Mulga Groves are localised, internally drained sites receiving run-on from adjacent HPMW and HPMWD communities. They consist largely of the same species but are significantly more dense than the surrounding hardpan plains. A woodland upper stratum is dominated by *Acacia aptaneura* 8 – 10 m with a PFC of 20- 25%. The ground stratum is characterised by an open Forbland dominated by *Ptilotus polystachyus* 0.3 - 0.5 m with a PFC of 20%, *Ptilotus helipteroides* to 0.2 m with a PFC of 5%. Occasional occurrences of *Cenchrus ciliaris* (Buffel Grass) to 0.5 m with a PFC of 2% were noted. These areas have significantly denser vegetation than surrounding hardpan plains, and consist largely of the same species

Stony Ironstone Mulga Shrubland (SIMS)	Open shrubland on the upper slopes of Ironstone hills with an upper stratum of *Acacia spp.* to 5 m with a PFC of 10-15%, and a mid stratum dominated by *Eremophila spp*. to 0.7m, with a PFC of 2-5%. The ground stratum comprised many scattered species with a PFC of 5-10% (previously classified Magnetite Hill Mulga Shrubland (MHMS) (Western Botanical, 2023))
Acacia kampeana Shrubland (AkS)	Open woodland of scattered *Acacia aptaneura* and *Haken lorea*, PFC of >1%. Mid stratum dominated by *Senna spp.* and *Acacia kampeana* with a PFC of 5 – 10%. Soil is a red silty sand with a continuous lag gravel mantle composed of angular cellular calcrete fragments (0.5 - 8 cm) and subrounded ironstone gravel (0.5 - 1.5 cm).

Vegetation within the Permit Area was generally in excellent to very good condition, with minimal evidence of disturbance from human activities (Western Botanical, 2024). The main sources of disturbance were camel and horse grazing, exploration mining tracks and drilling alignments, presence of some non-aggressive weeds, and occasional access tracks used by Traditional Owners to reach sites of significance. While some signs of fire were observed, it was not considered to have significantly impacted the quality of the vegetation (Western Botanical, 2024).

3.6.2 Groundwater dependent ecosystems

Review of the Groundwater Dependent Ecosystems (GDE) Atlas (BOM, 2023) indicates that parts of the Project tenement and Permit Area intersect areas mapped as having low and medium terrestrial GDE potential. Terrestrial GDEs rely on the subsurface presence of groundwater. The area of medium terrestrial potential is within a soil land system draining towards a Salt Lake/clay pan located approximately 10 km to the north-west of the Project tenement (Western Botanical, 2023).

An assessment of potential terrestrial GDEs undertaken for the WMCNP identified seven probable facultative GDEs (ecosystem utilises groundwater when available but will persist without) and one probable obligate GDE (ecosystem is dependent on groundwater) (Western Botanical, 2023).

3.6.3 Ecological communities

No known Threatened or Priority Ecological Communities have been identified within 10 km of the Project tenements (Western Botanical, 2024).

3.6.4 Environmentally sensitive areas

The Project tenement is located within an ESA, as it lies within an area known as the Ranges of the Western Desert, which is listed on the Register of the National Estate as having Indigenous values of National Estate significance (Western Botanical, 2024). The ESA boundaries align with the Ngaanyatjarra Central Reserve (Reserve ID 17614) (see Section 3.8).

3.6.5 Flora

The desktop flora assessment (Western Botanical, 2024) identified 30 flora taxa of conservation significance as having been recorded within a 100 km buffer of the Project tenements. Of those species, 9 have been recorded in the region in closer proximity to the Project tenements, and an additional 5 flora taxa of conservation significance were found within the literature review as having been recorded in the region. No threatened flora have been recorded as occurring within or near the Project tenements, and none were identified during the flora field survey (Western Botanical, 2024).The field survey (Western Botanical, 2024) identified a total of 198 species within the Project tenements, the majority of which are well represented in the Central Ranges IBRA region. 6 Priority Flora species were identified, including 2 Priority One (P1) species, 4 Priority Three (P3) species, and a further 4 Species of Interest.

Recorded P1 species included *Euphorbia parvicaruncula,* which had been previously identified by flora reconnaissance surveys (Western Botanical, 2023) of the Mantamaru townsite and surrounding country.

Euphorbia parvicaruncula is described as an erect annual or possibly short-lived perennial herb, growing to 0.5 m in height in hard, crusty soils. Additionally, *Menkea lutea* (P1) was recorded by Western Botanical (2024) as occurring within the Project tenements. This species is described as an erect to prostrate annual glabrous herb that grows to 0.15 m in height in red loam soils, with vibrant yellow flowers blooming in July following favourable rainfall. *Menkea lutea* is considered localised to the Central Ranges IBRA region.

Western Botanical (2024) found that both identified P1 species, *Euphorbia parvicaruncula* and *Menkea lutea,* were strongly associated with one another within the Project area, being primarily found within low-lying clay-based ephemeral playa lakes such as those within CPNG vegetation units, as well as in some smaller hardpan patches within the HPMW vegetation associations. Disturbance to these Priority Flora species could therefore be avoided by developing drill pads and access tracks outside of CPNG vegetation associations wherever possible.

It should also be noted that two of the four Species of Interest identified by Western Botanical (2024), *Leiocarpa leptolepis* and *Senna cardiosperma* subsp. *microphylla*, are not currently recognised on the WA Plant Census (DBCA) as occurring in Western Australia. Western Botanical (2024) have noted that these species may acquire Priority Flora status pending taxonomic review, which may trigger the need for further field surveys across the Permit Area.

3.6.6 Weeds

During the survey, five weed species were recorded. None were listed as Weeds of National Significance or Declared Plants. However, *Cenchrus ciliaris* (Buffel Grass) and *Rumex vesicarius* (Ruby Dock) are highly invasive species.

Buffel Grass was considered widespread within the survey area. *Citrullus colocynthis* (Bitter Melon) and *Eragrostis minor* (Smaller Stinkgrass) were recorded in one location. *Malvastrum americanum* (Spiked Malvastrum) was recorded in ten locations, and populations of the weed were spread sporadically throughout the Hardpan Mulga Woodland (HPMW) and Calcrete Open Grasslands (COG). Ruby Dock was recorded in two locations, with more individuals noted to be growing within the township of Mantamaru.

3.7 Fauna and habitat

This section has been informed by the *Basic and Targeted Vertebrate Fauna Survey* completed by Terrestrial Ecosystems (2024) (Appendix C). The survey was completed broadly in line with *Technical Guidance for Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA, 2020). The field survey was undertaken from 12 – 13 October 2023 and 2 – 4 October 2024 and included the proposed clearing areas for this NVCP application. The survey was informed by a desktop assessment, and recorded fauna habitat types and conditions in the proposed clearing area, with searches for vertebrate fauna evidence and species of conservation significance. The searches focussed for evidence of the *Liopholis kintorei* (Great Desert Skink), *Leipoa ocellata* (Malleefowl), *Macrotis lagotis* (Greater Bilby) and *Pezoporus occidentalis* (Night Parrot) in particular. All sections of the survey area were assessed using a utility all-terrain vehicle (Figure 3-3).

3.7.1 Fauna habitats

The site survey included 603 habitat assessments and identified eight fauna habitats. These include mixed shrubs over grass plains, mixed shrubs over spinifex on dunes, mixed shrubs on spinifex on rock, acacia shrub thicket, clay pan, grass plain, low stoney ridge and rocky ridge. Disturbed areas from tracks and exploration areas were also identified, however these habitats typically had no or very few vertebrate fauna other than those crossing from one habitat to another (Terrestrial Ecosystems, 2024).

Fauna habitat within the survey area was described as undisturbed, but abundant and in similar condition within adjacent areas. The survey area was depleted of trees, sparsely vegetated with shrubs and drying grasses, and contained substantial bare ground with small patches of spinifex hummocks. Overall, the survey area was considered to have minimal ecological functional value, but undisturbed and in mostly good condition. The survey area was not considered to support an ecological linkage or pathway that is not already available in the region.

3.7.2 Fauna species

No conservation significant vertebrate fauna species were recorded during the survey. The fauna habitats present in the survey area were considered unsuitable for conservation significant fauna that may potentially occur in the locality. As a result, no conservation significant species were considered likely to be significantly impacted by the proposed drilling program. Terrestrial Ecosystems identified that a referral under the EPBC Act was not recommended for the Project (Terrestrial Ecosystems, 2024).

The fauna assemblage present within the survey area was considered present and abundant in the surrounding, and the survey area was considered to have low biodiversity value (Terrestrial Ecosystems, 2024). Evidence of four feral and pest fauna species (camels, feral cats, wild dogs and rabbits) were recorded during the site survey.

3.7.3 Short-range endemic species

A Level 2 short-range endemic (SRE) invertebrate survey for the WMCNP (Alacran Environmental Science, 2020) identified SRE category invertebrates from eight of the nine mapped habitats. Of the 55 potential SRE taxa identified, 50 were potential SREs owing to data deficiency and the remining five were widespread. None of the habitats identified within the survey areas were considered distinctly unique or containing any obvious barriers to local dispersal. It was concluded that SREs found in the identified habitats would be found outside of the survey areas.

Terrestrial Ecosystems (2024) determined that the Project works present a low risk of habitat fragmentation, however the fauna habitats in the project area are abundant and similar to those in adjacent areas and the wider bioregion, indicating that fauna assemblages, including potential SRE species, are not confined to the project area. The project area does not support any ecological linkages that are not already available in the region.

3.7.4 Subterranean Fauna

Exploration activities are not anticipated to have a significant impact on subterranean fauna (if present). No subterranean fauna assessments have been undertaken.

C:\Users\stephanie.rings\Aurecon Group\525967 - Dante Julimar NVCP Application - NVCP 1\GIS\Proj\P525967_Dante_NVCP_1_Figure 4 fauna habitat

Author: Stephanie.Rings | Date: 31/01/2025

Mantamaru

aurecon

Legend

- Approved Permit Area (CPA 10508-1)
- New Permit Area
- Current Roads

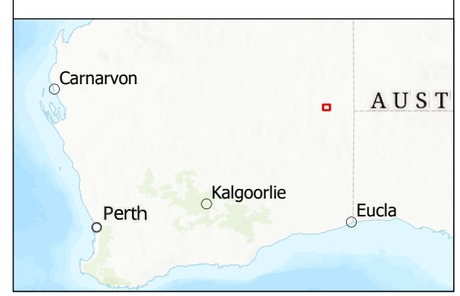
Aboriginal Communities and Town Reserves

- Remote Aboriginal Community - Permanent
- Fauna Single Site Assessments

Fauna Habitat

- Disturbed area
- Grass Plain
- Low shrubs over grass on plains
- Low stoney ridges
- Shrubs over spinifex
- Shrubs over spinifex on dunes
- Acacia shrub thicket
- Clay pan
- Disturbance
- Grass plain
- Low stoney ridge
- Rock ridge
- Shrubs over grass

Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community.



0 1.6 3.2 4.8 6.4

Kilometres

Dante Project NVCP Supporting Document

Figure 3-3: Fauna Habitat

Version: 1

Job No: | A3 Scale:

3.8 Land use and social setting

The tenement is located within the Shire of Ngaanyatjarraku. The Shire comprises approximately 160,000 square kilometres (km^2) within the traditional lands of the Ngaanyatjarra people of the Central Desert (Shire of Ngaanyatjarraku, 2024). The Shire's main township is the Aboriginal community of Warburton, approximately 100 km west south-west of the Project. The Project is located within the Aboriginal Lands Trust estate of the Ngaanyatjarra Central Reserve (Reserve ID 17614) (DPLH, 2024) and within the Ngaanyatjarra IPA (DCCEEW, 2022). The tenement conditions for E 69/3401 include:

- Consent to Mine on Use and Benefit of Aboriginal Inhabitants Reserve 17614 granted.
- Entry on Use & Benefit of Aboriginal Inhabitants Reserve 17614 and activities undertaken on the Licence by any non-Aboriginal lessee, licensee, employee, contractor or agent being authorised by an entry permit issued under the provisions of the Aboriginal Affairs Planning Authority Act 1972.

The Project is within an area subject to exclusive native title rights under the Ngaanyatjarraku Lands Determination (NNTT: WCD2005/002, Federal Court: WAD6004/2004). The Registered Native Title Body Corporate (RNTBC) is the Yarnangu Ngaanyatjarraku Parna (Aboriginal Corporation) RNTBC. There are four registered Indigenous Land Use Agreements (ILUA) currently in place over the Project.

The Proponent has a signed Native Title Agreement with the Ngaanyatjarra Land Council.

Table 3-3 Existing ILUAs over Project area

NNTT #	Name	Applicant party	Other parties	Subject
WI2004/005	Ngaanyatjarra Lands Indigenous Land Use Agreement (Body Corporate Agreement) No.1	WMC Resources Limited	Ngaanyatjarra Land Council (Aboriginal Corporation) Yarnangu Ngaanyatjarraku Parna (Aboriginal Corporation) State of Western Australia	Mining; exploration
WI2004/006	Telstra Ngaanyatjarra ILUA	Telstra	Ngaanyatjarra Land Council (Aboriginal Corporation) Yarnangu Ngaanyatjarraku Parna (Aboriginal Corporation)	Access; communication; infrastructure
WI2005/002	Airservices Australia - Ngaanyatjarra Indigenous Land Use Agreement	Airservices Australia	Ngaanyatjarra Land Council (Aboriginal Corporation) Yarnangu Ngaanyatjarraku Parna (Aboriginal Corporation)	Access; communication; infrastructure
WI2022/002	Ngaanyatjarraku Roads and Shire Works	Shire of Ngaanyatjarraku	Ngaanyatjarra Council (Aboriginal Corporation) (ICN 101) Ngaanyatjarra Land Council (Aboriginal Corporation) (ICN 715) Yarnangu Ngaanyatjarraku Parna (Aboriginal Corporation) RNTBC (ICN 4527)	Infrastructure

3.9 Heritage

Initial heritage surveys have been completed for the Project. The details of the heritage survey outcomes are confidential to the Ngaanyatjarra Land Council; however, the Proponent is bound by their heritage agreement to only undertake works in areas with heritage clearance from the Ngaanyatjarra Land Council.

Searches of the Aboriginal Heritage Places dataset (DPLH, 2024) and the Aboriginal Cultural Heritage Inquiry System (ACHIS) (Appendix D) on 16 December 2024 returned five Registered or Lodged Aboriginal Cultural

Heritage Sites located within 10 km of the Dante tenements; four of these occur within E 69/3401 (Table 3-4). The Permit Area has been designed to avoid heritage areas as shown in Figure 1-2.

Table 3-4 Aboriginal heritage places with 10 km of the Dante tenements (DPLH, 2024)

Place ID	Name	Status	Type	Proximity
2998	Ilintji	Registered Site	Creation / Dreaming Narrative	Within E 69/3401
2999	Kiri-Tjitji	Registered Site	Creation / Dreaming Narrative	Within E 69/3401
3000	Waranju	Registered Site	Creation / Dreaming Narrative	Within E 69/3401
3001	Punkula-Uku-Wani	Registered Site	Creation / Dreaming Narrative	Within E 69/3401

No areas or items of non-Aboriginal heritage have been identified in the Project vicinity. An inHerit database search on 16 December 2024 showed there are three heritage places within the Shire of Ngaanyatjarraku: Giles Meteorological Station Group (Place No. 18645), Warakurna Multi-Function Police Facility (Warakurna) (Place No. 19003), and Warburton Multi-Function Police Facility (Place No. 19004). All three are over 90 km from the Dante tenement and are not listed as State Heritage (DPLH, 2021).

4 Stakeholder engagement

A summary of stakeholder consultation conducted in relation to the Project is provided in Table 4-1.

Table 4-1 Summary of stakeholder engagement for proposed exploration works

Stakeholder	Format and timing	Subject	Outcome
DEMIRS	Three emails between 9 - 16 May 2023 *Contact:* Paul Power (Senior Compliance Manager)	Organising preliminary meeting to discuss the regulatory approval process for exploration works (drilling).	Setting of meeting date
	Meeting on 26 May 2023 ■ DEMIRS attendees: – Hailey Packer (General Manager, Titles Compliance) – Rebecca Adam (Team leader, Compliance) – David Hamdorf (Senior Geologist) – Scott Montgomery (Regional Mining Registrar) – Paul Power (Senior Compliance Officer).	Meeting with all regulators to: ■ Introduce the Project and team ■ Meet relevant regulators ■ Discuss the regulatory approval processes and responsibilities for exploration works.	Requirements include: ■ Program of works (PoW) ■ Flora and fauna surveys ■ NVCP
	Emails and phone calls between 20 September 2023 and 4 January 2024 *Contact:* Ivy Lynch (Environmental Officer)	Approval requirements for the PoW, including: ■ Flora and fauna surveys ■ NVCP.	Submitted a PoW with the following environmental considerations: ■ Amendments to pad sizes ■ Adjusted a planned drill line which intersected a mapped occurrence of Priority 1-listed *Eurphorbia parvicaruncula*.
	Emails between 27 November 2023 and 18 January 2024 *Contact:* Kye Johnson, Environmental Officer	Approval requirements for the Program of Works (PoW), including: ■ Flora and Fauna surveys ■ NVCP.	
Ngaanyatjarra Council and Traditional Custodians	Historical engagement (through previous tenement holders) over previous ten years	Extensive exploration activities across the current Project area.	Ancillary Agreement for mineral exploration on Ngaanyatjarra Lands (see Section 3.8), entered into October 2016.
	Community engagement and land survey between 26 - 31 July 2023, including: ■ Consultation sessions with: – Representatives from the Ngaanyatjarra Council's Land and Culture team – Elders – Senior Knowledge Holders	The introductory session was followed by a detailed Project overview of proposed activities that 97992001 Pty Ltd would like to undertake across the tenement area. The sessions were two-way conversations with a high level of engagement. Topics arising from engagement included:	■ Evident that previous engagement had been a positive experience and that many had some knowledge of the Project and the type of activities being proposed ■ 97992001 Pty Ltd is committed to: – Effective and ongoing engagement with Traditional Custodians

Stakeholder	Format and timing	Subject	Outcome
	– Wider community of Traditional Custodians from the Ngaanyatjarra Lands ■ Detailed helicopter survey over the proposed Project area. Participants included: – Elders – Senior Knowledge Holders – Ngaanyatjarra Council's Anthropologist. ■ On-ground archaeological survey, with participation from: – Elders – Senior Knowledge Holders – Ngaanyatjarra Council's Land and Culture team (including anthropologists and archaeologists) ■ Community BBQ and football game with broader community of Mantamaru (Jameson Community) and Papulankutja (Blackstone community) ■ Dinners with senior Traditional Custodians	■ Light pollution from potential future mining operations ■ The lack of effective engagement with other mining companies working in the area (to which) ■ Potential business engagement and employment opportunities with the Project ■ Naming of any future discoveries made on Ngaanyatjarra Lands ■ Opportunities to engage with other Traditional Custodians and Aboriginal business owners from the Pilbara to learn how they have navigated the business development space to find the right balance between caring for country and economic development opportunities.	– Providing opportunities relative to the pace and scale of the activities required at each stage of the development of the Project ■ Helicopter survey of Project area ■ On-ground archaeological survey of Project priority areas and sample pegging of drill lines/ drill pads ■ Details of heritage survey outcomes are confidential to the Ngaanyatjarra Land Council ■ 97992001 Pty Ltd is bound by their heritage agreement to only undertake works in areas with heritage clearance from the Ngaanyatjarra Land Council.
	Community engagement and land survey between 5 - 8 September 2023, including: ■ Reconnaissance and archaeology clearance. Attended by: – Senior Knowledge Holders – Traditional Custodians survey team ■ Presentation and engagement at Jameson School with students and teachers ■ Meeting with Ngaanyatjarra Council's archaeologist ■ Dinners with senior Traditional Custodians	■ Project area reconnaissance and archaeology clearance survey work of key drill lines and access tracks. ■ Discussion of Project and provision of sports equipment and art resources to the Jameson School.	Archaeology clearances of key drill lines and access tracks.

Stakeholder	Format and timing	Subject	Outcome
	Phone calls and emails between 7 September - 15 October with Ngaanyatjarra Council Culture and Heritage Manager	Topics included: ■ Fauna survey. ■ Heritage survey report ■ Rock chip and mapping ■ Airborne magnetics survey ■ Helicopter Versatile Time Domain Electromagnetic (VTEM) Survey.	Furthering of scopes, planning and logistics
	Rock chip sampling and drill line pegging from 16 – 20 October 2023, including meeting with: ■ Liaison Officer ■ Senior Knowledge Holders	■ General Project update ■ Schedule of works ■ Drilling program planned for first half of 2024, including Project maps indicating the proposed work areas to confirm access approval.	Confirmation of access approvals for proposed exploration works in 2024.

5 Environmental mitigation and management

Exploration activities will be undertaken in accordance with the Exploration Environmental Management Plan, and subject to the Schedule of Conditions as part of exploration licence E 69/3401. Environmental management measures that will be undertaken during and after the completion of the Project are summarised in Table 5-1.

Table 5-1 Environmental mitigation measures

Aspect	Potential impact	Mitigation measure
Clearing and earth disturbance	Unnecessary or unauthorised disturbance	▪ Disturbance areas will be kept to the minimum required and existing disturbance used where possible ▪ Where practicable, recorded locations for Priority 1-listed *Eurphorbia parvicaruncula* will be avoided when developing an exploration management plan for the Project ▪ All areas proposed to be cleared will be subject to pre-clearance flora survey by a suitably qualified and experienced botanist ▪ Clearing areas will be clearly demarcated prior to clearing or machines will be led by a spotter with a GPS ▪ When clearing tracks and drill lines, the path of least resistance through the vegetation will be chosen to minimise disturbance ▪ Cutting of branches will be favoured over removing entire trees ▪ Designated access routes to clearing areas will be used ▪ Raised-blade clearing will be used wherever practicable ▪ Vegetation will be cleared and stockpiled for use in rehabilitation ▪ Where raised-blade clearing is not practicable, topsoil will be removed and stockpiled for future rehabilitation within the proposed clearing area ▪ A toolbox meeting will be held between the supervising geologist/field assistant and the clearing contractor to ensure that the operator is aware of the approved clearing areas, traffic management measures and any areas that need to be avoided ▪ All topsoil removed will be separately stockpiled for replacement after backfilling. Locations of stockpiles will be recorded using GPS, and saved within the EMS system ▪ Service logs to be maintained. All vehicles coming to site be checked for hydrocarbon leaks ▪ . As per exploration licence conditions, all disturbed areas will be backfilled and rehabilitated within 6 months after excavation to the satisfaction of the Environmental Officer at DEMIRS, unless otherwise approved in writing.
Weeds, pests and pathogens	Introduction and/or spread of weeds, pests and/or pathogens	▪ All vehicles and equipment arriving on site will be free of soil, weeds, seeds, and vegetative matter ▪ Vehicles to provide weed hygiene certificates prior coming to site. ▪ Weed infestations will be treated.
Fauna (general)	Altered fauna behaviour Injury, entrapment and/or mortality of fauna	▪ Personnel will be required to adhere to speed limits and drive to road / weather conditions to minimise risks of fauna injuries or death due to traffic ▪ Care in handling and disposal of organic matter comprising declared weeds to minimize risk of seed dispersal in the area. ▪ Any death or injury of fauna will be recorded ▪ Waste management measures will be implemented

Aspect	Potential impact	Mitigation measure
	Increased mortality of fauna due to construction or upgrade of roads/tracks	■ Feeding and unnecessary handing of fauna will be banned ■ All drill holes will be plugged immediately after completion of the hole ■ At least one side of each sump will be ramped to allow fauna egress ■ A suitable experienced fauna spotter / handler will be present during exploration works to relocate fauna if deemed necessary.
Air quality and noise	Disturbance to surrounding receivers	■ Disturbance areas will be kept to the minimum required and existing disturbance used where possible ■ Clearing activities would occur progressively to minimise exposure of cleared surfaces to wind erosion ■ Disturbed areas will be rehabilitated within six months after excavation ■ Topsoil stripping and spreading activities will be restricted if dust cannot be adequately controlled during high winds ■ Vehicles and mobile plant will be maintained as per manufacturer specifications to ensure noise and air emissions are minimised.
Heritage	Harm to heritage items or places (known or unknown)	■ All proposed mineral exploration will be carried out in accordance with the provisions of the *Aboriginal Heritage Act 1972* ■ An Unexpected Finds Protocol will be implemented on site, to ensure any newly discovered sites are reported to the Ngaanyatjarra Land Council and DPLH ■ Site inductions will be conducted with all contractors and site personnel to ensure they are aware of chance-finds procedures and provisions for encountering archaeological sites under the *Aboriginal Heritage Act 1972* ■ The Proponent will ensure that all areas have been surveyed for heritage prior to clearing ■ Registered Aboriginal heritage sites have been excluded from the Permit Area and the Proponent is bound by their heritage agreement to only undertake works in areas with heritage clearance from the Ngaanyatjarra Land Council ■ If required, Aboriginal heritage monitors will be invited to be present during ground disturbance

6 Assessment against the 10 Clearing Principles

When assessing clearing permit applications, DWER has regard to the ten clearing principles contained in Schedule 5 of the EP Act. An assessment against the ten clearing principles is presented in Table 6-1 and uses the following assessment categories:

- Not at variance – there is enough data to provide certainty
- Not likely to be at variance – there is an element of uncertainty
- May be at variance – there is insufficient data available to fully assess the impacts
- At variance – there are known impacts or significant risk of impact.

All Clearing Principles were assessed as “Not at Variance” (Table 6-1).

Table 6-1 Assessment Against the 10 Clearing Principles

Principle	Commentary		Assessment
	Flora (Western Botanical, 2024)	**Fauna (Terrestrial Ecosystems, 2024)**	
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity.	The Study Area is comprised of 198 endemic species, including six Priority flora species. The floristic composition and biodiversity of the Study Area corresponds to what is known in the surrounding Central Ranges, Great Victoria Desert, and Gibson Desert IBRA regions and is not considered to be comprised of a high level of biological diversity.	Clearing vegetation will not comprise a high level of biodiversity. It is improbable that any conservation significant vertebrate fauna are in the project area and will be significantly impacted by exploration activity.	Not at variance
Principle (b) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to WA.	Whilst the survey conducted wasn’t focused on fauna habitats, the habitats encountered within the Study Area are well represented in the surrounding region and are not restricted to the Study Area. No known significant habitats for known significant fauna of the region (*Liopholis kintorei* and *Macrotis lagotis*) are present within the Study Area.	Exploration activity in the project area will not result in the loss of significant habitat for indigenous fauna.	Not at variance
Principle (c) – Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	No threatened species gazetted as Declared Rare Flora under the BC Act 2016 (WA) or the EPBC Act 1999 (Cth) were recorded in the Study Area. However, the Study Area supports 6 Priority taxa, including 2 Priority One taxa, *Menkea lutea* and *Euphorbia parvicaruncula*. Impacts to populations of Priority taxa should be avoided or minimized where possible. *Euphorbia parvicaruncula* (P1) is regionally restricted but is locally	N/A	Not at variance

Principle	Commentary		Assessment
	Flora (Western Botanical, 2024)	**Fauna (Terrestrial Ecosystems, 2024)**	
	common and has a broad distribution across Australia. *Menkea lutea* (P1) is also locally common, but is restricted regionally and nationally. Within the Study Area there is evidence of *Menkea lutea* being a colonizer species, with populations coming back strongly in disturbed sites (i.e. cleared tracks). Both P1 species are strongly associated with the Claypan Grassland (CPNG) vegetation association. Impacts to this vegetation association should be limited for the Project to align with Principle (c).		
Principle (d) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.	There are no known TECs or PECs recorded within the Study Area or in the surrounding area. While the Study Area lies within an Environmentally Sensitive Area (Ranges of the Western Desert), it is listed due to Aboriginal Heritage, with its indigenous values considered of National Estate significance.	The area does not contain a threatened ecological fauna community.	Not at variance
Principle (e) – Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	The vegetation of the Study Area is not considered remnant in either a local or bioregional context. There are 5 vegetation system associations across the Study Area, with all associations having 99% of the bioregional vegetation remaining in pre-European colonization condition. The Study Area is not considered significant as a remnant of native vegetation in either a local or bioregional context.	The area is not a remnant.	Not at variance
Principle (f) – Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	Small ephemeral claypans (CPNG and CPP vegetation associations) are known within and nearby the Study Area. While these claypans collect water and are likely important for fauna utilization on an occasional basis, the wetlands are small and would only serve as water sources for short periods of time following rainfall. These are not considered	The area does not contain a natural wetland.	Not at variance

Principle	Commentary		Assessment
	Flora (Western Botanical, 2024)	**Fauna (Terrestrial Ecosystems, 2024)**	
	significant wetlands in either a local or regional context.		
Principle (g) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	Areas of cleared native vegetation from Traditional Owner and historic mining activities are present within the Study Area. Other than the direct impacts of mining, clearing of native vegetation for proposed exploration activity of the Dante Project will not cause significant land degradation.	N/A	Not at variance
Principle (h) – Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	There are no Conservation Areas noted in close proximity to the Study Area, with the closest being the Pila Nature Reserve, 128 km north-west of the Study Area. There will be no direct or indirect impacts on the environmental values of this conservation area.	Exploration activity in the project area is unlikely to impact on conservation areas in the region.	Not at variance
Principle (i) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	While the survey conducted was not focused on water quality, the proposed works are not expected and are unlikely to cause any significant deterioration of surface or underground water	N/A	Not at variance
Principle (j) – Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.	The development of the proposed Dante Project is not considered likely to cause or exacerbate the incidence of flooding in the local area.	N/A	Not at variance

7 Conclusion

The clearing required for this proposal will result in the removal of up to 27 ha of native vegetation considered to be in good to excellent condition. The impacted vegetation units are considered representative of vegetation within the region and are not considered suitable habitat for known conservation significant fauna species within the region. Moreover, appropriate environmental management controls will be in place to mitigate potential environmental impacts during clearing, exploration, and rehabilitation. The Project has been assessed as not at variance to the ten clearing principles listed in Schedule 5 of the EP Act.

The Proponent has a signed Native Title Agreement with the Ngaanyatjarra Land Council. Initial heritage surveys have been completed for the Project. The Proponent is bound by their heritage agreement to only undertake works in areas with heritage clearance from the Ngaanyatjarra Land Council. The Permit Area has excluded registered Aboriginal heritage sites

With implementation of the proposed environmental mitigation and management measures, the Project is considered unlikely to have a significant impact on the environment.

8 References

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Appendix B Targeted Flora and Vegetation Assessment (Western Botanical, 2024)

Western Botanical

Dante Project Targeted Flora and Vegetation Assessment
November 2024

Prepared for: Terra Metals Limited

Report Ref: WB1046

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Report No: WB1046

Client Name: Terra Metals Limited

Client Address: Level 9, 28 The Esplanade, Perth WA 6000

Version	Prepared By	Approved for Issue	Issue Date
1	F. Keet J. Warden	J. Warden	13th November 2024

This report has been designed for double-sided printing

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1. Executive Summary

Terra Metals Ltd plan to develop the Dante Project which is in the West Musgraves region of Western Australia, approximately 1,300 km north-east of Perth and 100 km west of the Surveyor General's Corner. The Dante Project is located within the Ranges of the Western Desert, an area recognised as having Indigenous values of National Estate significance, with the Mantamaru Aboriginal community situated in tenement E69/3401. The Dante Project consists of six prospects: Crius, Cronus, Hyperion, Leto, Oceanus, and Pytho.

Western Botanical undertook a Reconnaissance and Targeted Flora and Vegetation Survey of tenements E69/3401 and E69/3552 in spring 2023 (WB1022) for assessment of proposed access tracks and drilling alignments for early-stage exploration. Terra Metals plan to undertake further exploration activities at several sites in the region outside their current approved Native Vegetation Clearing Permit (NVCP) for the Dante Project, and contracted Western Botanical to undertake further Targeted Flora and Vegetation assessments of these tenements.

Western Botanical botanists Jonathan Warden and Felicity Keet conducted a Targeted Flora and Vegetation Survey from the 4th to the 11th of August 2024. The Study Area was traversed by four-wheel ATVs and foot in some areas. During the survey the vegetation was mapped and described to NVIS Level V (association level), and all priority flora, species of interest, and weed species were counted and recorded with a way-point.

A total of 30 flora taxa of conservation significance were identified by the DBCA database searches as having been recorded within approximately 100 km of the Study Area, of which nine have been recorded in the region in closer proximity to the Study Area. An additional five flora taxa of conservation significance were found within the literature review as having been recorded in the region. No Threatened Flora was identified as occurring within or near the Study Area.

The survey identified 198 species from 104 genera and 38 families within the Study Area. The majority of the species recorded are widespread and well represented in the Central Ranges IBRA region. No Threatened Flora listed under the *Biodiversity Conservation Act 2016 (WA)* or the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* were recorded.

During the survey, six Priority flora species were identified. Including two Priority One species and four Priority Three species:

- *Euphorbia parvicaruncula* P1;
- *Menkea lutea* P1;
- *Amaranthus centralis* P3;
- *Euphorbia inappendiculata* var. *queenslandica* P3;

- *Stackhousia clementii* P3; and
- *Tephrosia* sp. Central (P.K. Latz 17037).

Euphorbia inappendiculata var. *queenslandica* (P3) was only recognised during the identification process post-field survey. As it was not recognised in the field the counts and distribution of this species across the Study Area are not accurate.

Ten species within the Study Area represent range extensions of between 100 to 340 km beyond their known range within Western Australia, three of which are considered major range extension (>200 km).

Four species identified during the survey are considered Species of Interest. Most notably, *Leiocarpa leptolepis* and *Senna cardiosperma* subsp. *microphylla*, which are not listed on the WA Plant Census as they are not recognised as occurring in Western Australia by the Department of Biodiversity, Conservation and Attractions (DBCA). These species have been lodged at the Western Australian Herbarium for taxonomic review and may acquire Priority Flora status in W.A.

Five weed species were recorded within the Study Area. None of these weeds are listed as Weeds of National Significance (WoNS), or as Declared Organisms under the *Biosecurity and Agriculture Management Act 2007 (WA),* and Biosecurity and Agriculture Management Regulations 2013. However, two of these species, *Cenchrus ciliaris* and *Rumex vesicarius*, are highly invasive species.

Seventeen vegetation associations on five landform systems were identified within the proposed Dante Project. Sixteen of these associations have been observed to be regionally widespread by Western Botanical. *Triodia longiceps* was collected from a population occurring on a proposed drilling alignment of the Oceanus Prospect within the *Triodia longiceps* Shrubland (TlS) vegetation association. This collection represents a 340 km range extension to the east of the current known distribution of *Triodia longiceps*, and is the first known occurrence within the Central Ranges IBRA region of Western Australia. Within the Study Area, the Claypan Grasslands (CPNG) vegetation association is strongly associated with the occurrence of two Priority One species; *Menkea lutea* and *Euphorbia parvicaruncula*.

The majority of the Study Area was in Very Good to Excellent condition with little evidence of damage caused by human activities since European settlement. The main issues impacting vegetation across the Study Area are grazing by feral animals, access tracks, exploration drilling alignments, and weeds.

2. Introduction

2.1. Project Background

Terra Metals Ltd plan to develop the Dante Project which is in the West Musgraves region of Western Australia. The Project is located approximately 1,300 km north-east of Perth and 100 km west of the Surveyor General's Corner (Figure 1). The Dante Project is made up of six prospects: Crius, Cronus, Hyperion, Leto, Oceanus, and Pytho.

Terra Metals Ltd contracted Western Botanical to undertake further Targeted Flora and Vegetation assessments of their exploration tenements E69/3401 and E69/3552 near the Jameson townsite (Mantamaru Aboriginal Community) in 2024. Terra Metals plan to undertake further exploration activities at several sites in the region outside their current approved Native Vegetation Clearing Permit (NVCP) for the Dante Project. The botanical assessment was designed to provide sufficient information for a Clearing Permit to be provided under delegated authority by the Department of Energy, Mines, Industry Regulation and Safety (DMIRS).

2.2. Previous Surveys

Several botanical surveys have been conducted in the West Musgrave region. Of greatest relevance is a Detailed (Level 2) Flora and Vegetation Survey of West Musgrave Copper and Nickel Project for Oz Minerals Limited (WB905) (Western Botanical, 2019). This assessment reported 11 Priority Flora within the Study Area:

- *Aenictophyton anomalum* (P1);
- *Indigofera warburtonensis* (P1);
- *Acacia eremophila* var. Numerous-nerved variant (A.S. George 11924) (P3);
- *Amaranthus centralis* (P3);
- *Aristida jerichoensis* var. *subspinulifera* (P3);
- *Goodenia asteriscus* (P3);
- *Stackhousia clementii* (P3);
- *Tephrosia* sp. Central (P.K. Latz 17037) (P3);
- *Chrysocephalum apiculatum* subsp. *ramosum* (P3);
- *Eragrostis* sp. Erect spikelets (P.K. Latz 2122) (P3); and
- *Eragrostis* sp. Limestone (P.K. Latz 5921) (P3).

Several Targeted (Level 1) Flora and Vegetation Assessments have also been conducted in the greater surrounding area of Mantamaru. One assessment 45 km south-west of Jameson conducted by Western Botanical in late 2022 reported three additional Priority Flora, *Isotropis winneckei* (P1), *Thryptomene* sp. Warburton (M. Henson & M. Hannart 32433) (P1), and *Daviesia arthropoda*. While these surveys are located outside tenements E69/3401 and E69/3552, the landforms and vegetation communities reported provide excellent local context and remain representative of those within the Dante Project Study Area.

A Reconnaissance and Targeted Flora and Vegetation Survey of tenements E69/3401 and E69/3552 was undertaken by Western Botanical in spring 2023 (WB1022). This survey assessed proposed access tracks and drill lines in a dry season for early-stage exploration by Terra Metals (previously Julimar Resources Pty Ltd). Priority Flora *Euphorbia parvicaruncula* (P1) was reported within the grassy claypans (CPNG vegetation association) of the Study Area (Western Botanical, 2024).

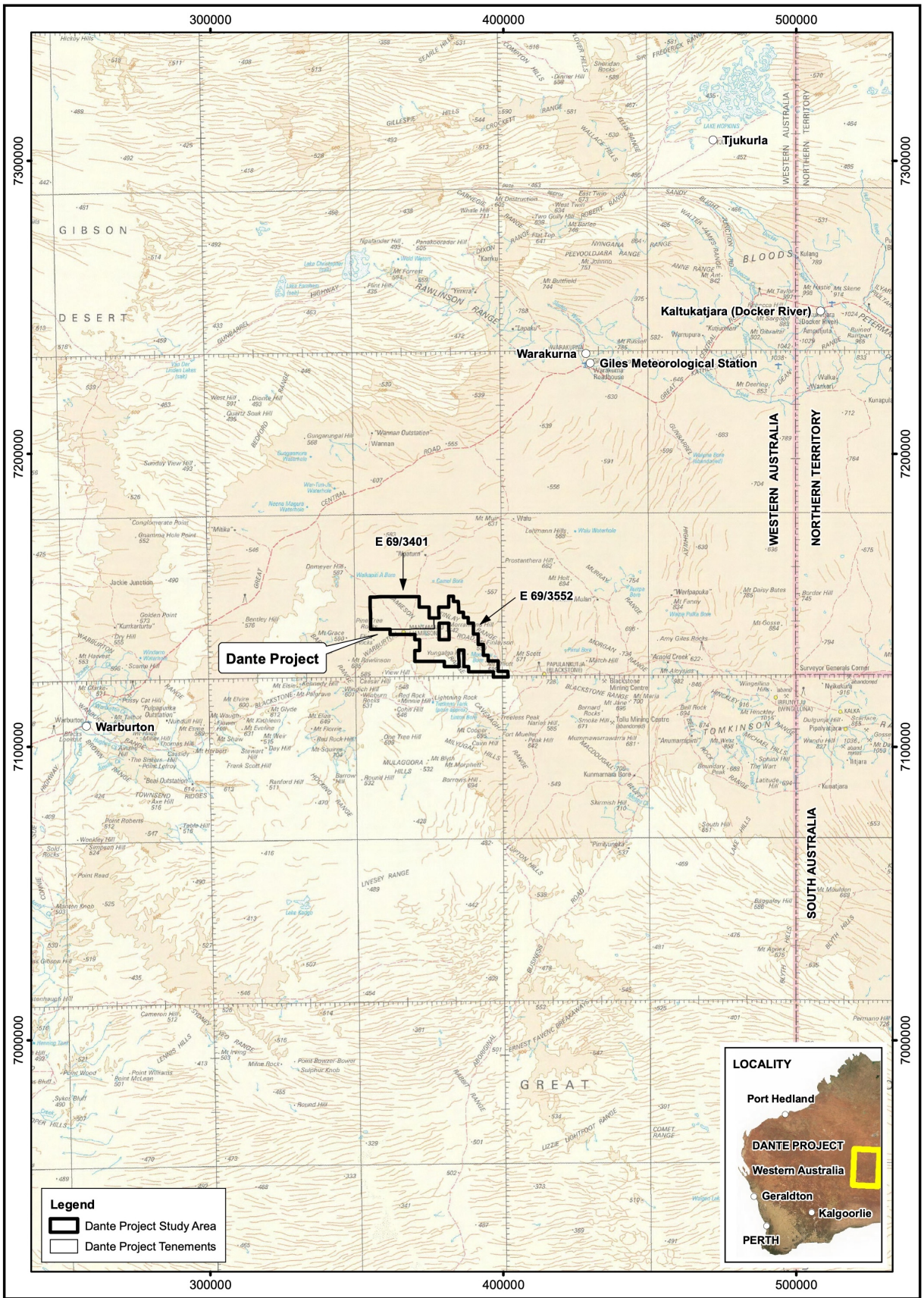
2.3. Current Survey

Terra Metals is looking to further explore and develop potential targets within their Dante Project tenements E69/3401 and E69/3552. As part of these exploration activities, they require a NVCP. Terra Metals commissioned Western Botanical to conduct a Targeted Flora and Vegetation Survey over the Project area (hereafter referred to as the Study Area). The Study Area encompasses 37 proposed drilling alignments totalling 29.43 km and a further 8.97 km of access tracks across the six prospects of the Dante Project (Figure 2).

The purpose of the Targeted Flora and Vegetation Survey was to:

1. Prepare an inventory of vascular flora of the Study Area;
2. Identify and locate Declared Rare, Priority, regionally restricted or otherwise conservation-significant flora;
3. Map the vegetation associations within the Study Area; and
4. Identify any Priority or Threatened Ecological Communities within the tenements.

Figure 1. Regional location of the Study Area.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400000
500000
7300000
7200000
7100000
7000000
Tjukurla
Kaltukatjara (Docker River)
Warakurna
Giles Meteorological Station
Warburton
E 69/3401
E 69/3552
Dante Project
GIBSON
DESERT
GREAT
WESTERN AUSTRALIA
NORTHERN TERRITORY
SOUTH AUSTRALIA
Legend
Dante Project Study Area
Dante Project Tenements
LOCALITY
Port Hedland
DANTE PROJECT
Western Australia
Geraldton
Kalgoorlie
PERTH
Imagery: Geoscience Australia
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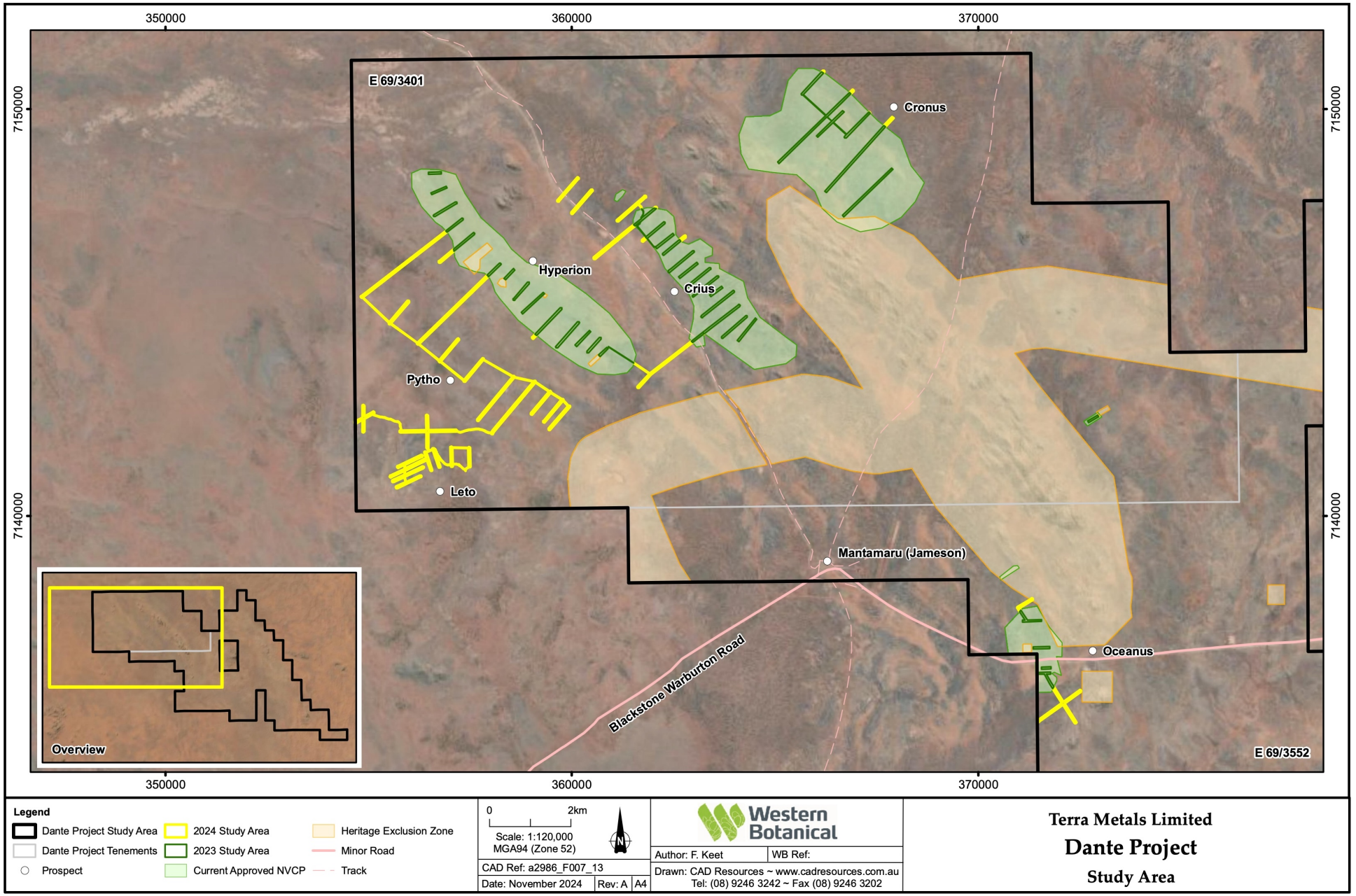
Scale: 1:1,750,000
MGA94 (Zone 52)
CAD Ref: a2986_F007_01
Date: November 2024
Rev: A
A4
Western Botanical
Author: F. Keet
WB Ref:
Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202
Terra Metals Limited
Dante Project
Location

Figure 2. Dante Project Study Area.



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2.4. Physical Environment

2.4.1. Climate

The Study Area is in an arid climate with the region receiving both summer and winter rainfall patterns (Graham and Cowan, 2001). Located midway between Warburton and Giles, the nearest Bureau of Meteorology (BoM) weather station is located at Giles, approximately 93 km north-west of the Study Area (Warburton Airfield weather station is approximately 102 km south-west of the Study Area). The average annual rainfall for Giles is 289.1 mm. Average monthly rainfall peaks from late spring to early autumn, with the highest average rainfall occurring in December (47.1 mm). Rainfall during these months is generally associated with the southward movement of tropical lows and ex-tropical cyclones. Mean maximum daily temperatures range from 20.3°C in July to 37.3°C in January with mean minimum temperatures ranging from 6.9°C in July to 23.6°C in January (Figure 3) (BoM, 2024a).

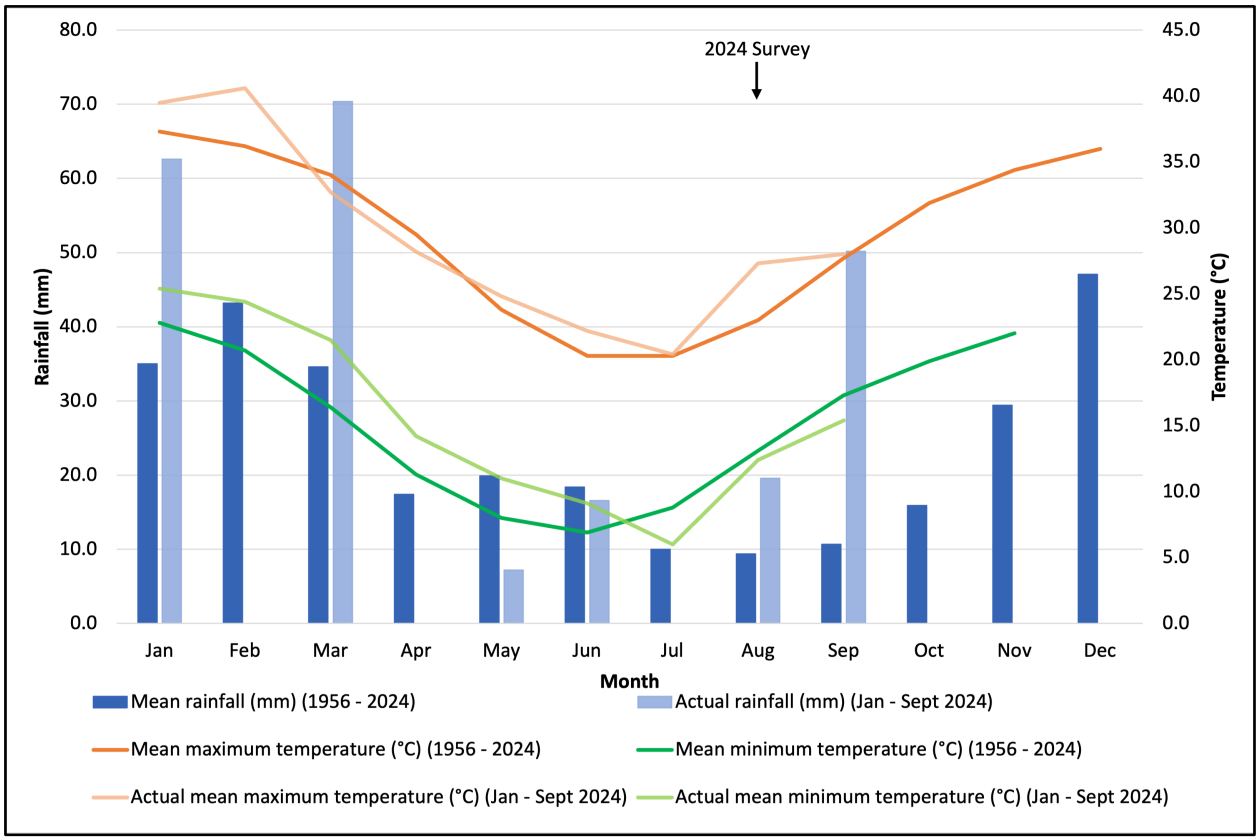


Figure 3. Long-term average climate data for Giles (weather station 013017) (1956 – 2024) (BoM, 2024a)

2.4.2. Landforms and Soils

The Dante Project is located within the Western Desert Ranges Province soil-landscape region, as classified by the Western Australian Department of Industries and Regional Development

(DPIRD). The Desert Ranges Province has been described at the regional level as sandplains and dunes (with hills and ranges surrounded by wash plains) on granitic and volcanic rocks of the Musgrave Complex and sedimentary rocks of the Amadeus Basin (Tille, 2006). Soils typically present include red sandy earths, red deep sands, and red loamy earths, with some stony soils. The province is located in the central-eastern Arid Interior, extending from Warburton to the South Australian border and Lake McDonald.

The Western Desert Ranges Province has been divided into four soil-landscape zones with the Study Area located at the junction of the Paterson Sandplain, Musgrave Range, and Warburton Range zones, with majority of the Study Area within the Musgrave Range Zone (Figure 4). The Musgrave Range Zone extends from Barrow Range to the South Australia border and has been described as sandplain and dunes with hills, ranges, plains and some wash plains on granite and gneiss (with some volcanic and sedimentary rocks) of the Musgrave Complex (Tille, 2006). Soils typically present include red sandy earths with red deep sands, red loamy earths, and some stony soils and self-mulching cracking clays. The groundcover is predominantly Mulga (and other *Acacia*) woodlands and spinifex grasslands.

The Study Area overlies four land system units (BA21, Fa34, My109, and My112) (Figure 5) of which the following two cover the majority of the Survey Area:

- My109 (74.4% of the Study Area): Outwash plains and dissected fan and terrace formations flanking ranges of sedimentary and some metamorphic, volcanic, and granitic rocks; some stony hills; some lateritic conglomerates; some calcrete. The soil pattern is variable with the main soil types to be expected are neutral red earths and red earthy sands. Other soils include loamy red earths, calcareous red earths; stony varieties of red siliceous sands and red earthy sands; shallow calcareous loams and calcareous earths on calcretes; and shallow dense loamy soils on stony rises.

- BA21 (12.2% of the Study Area): Steep hills and ranges on sedimentary and some metamorphic, volcanic, and granitic rocks; bare rock outcrop is common; some gorges. The main soils are shallow and often stony sandy loams and sandy clay loams, and shallow dense loamy soils on the hill slopes. Other soils including deeper forms of stony sandy loams, sandy clay loams, red earthy sands, and neutral red earths occur on the pediments and narrow valley plains.

Figure 4. Soil Landscape Zones of the Study Area.

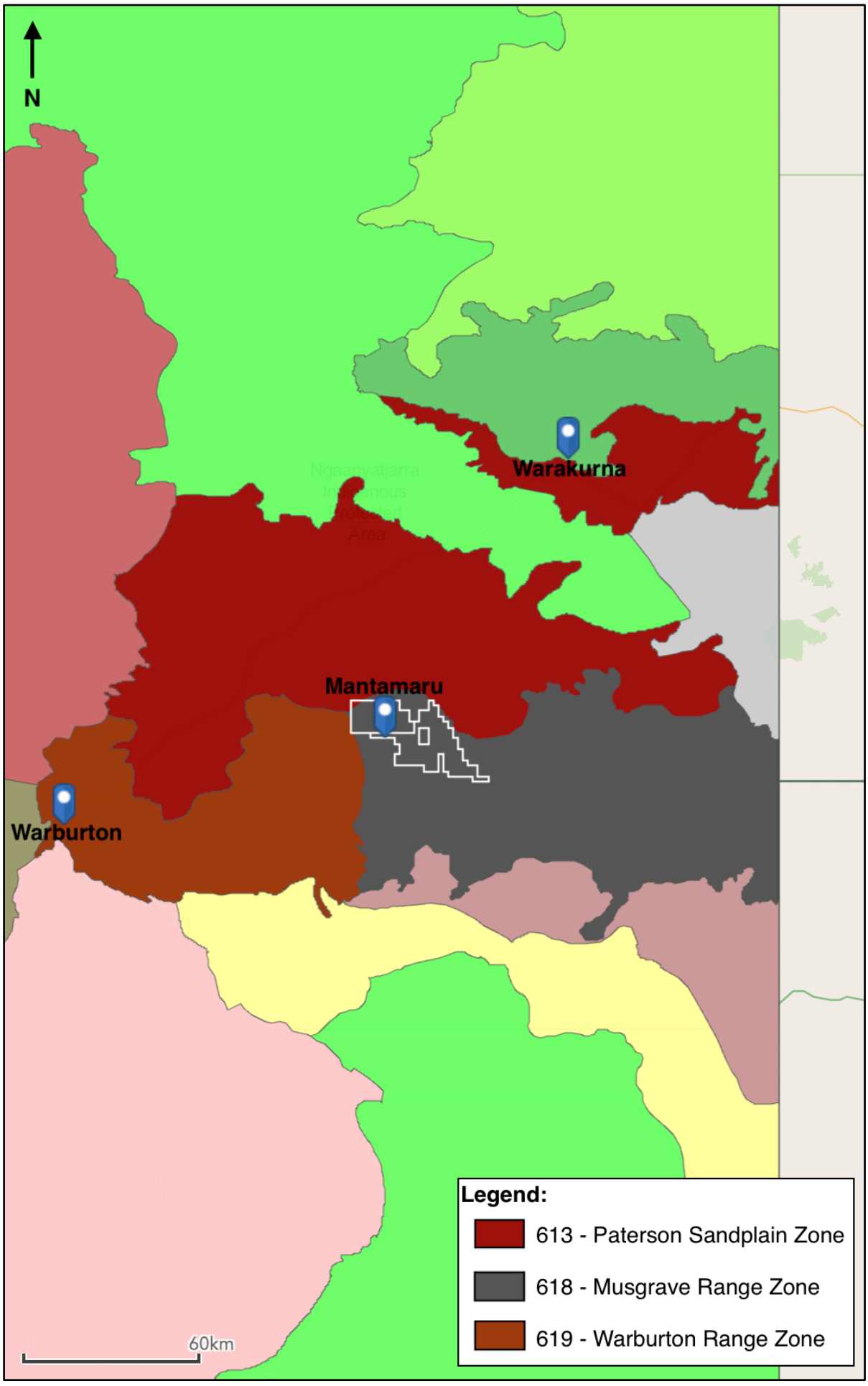
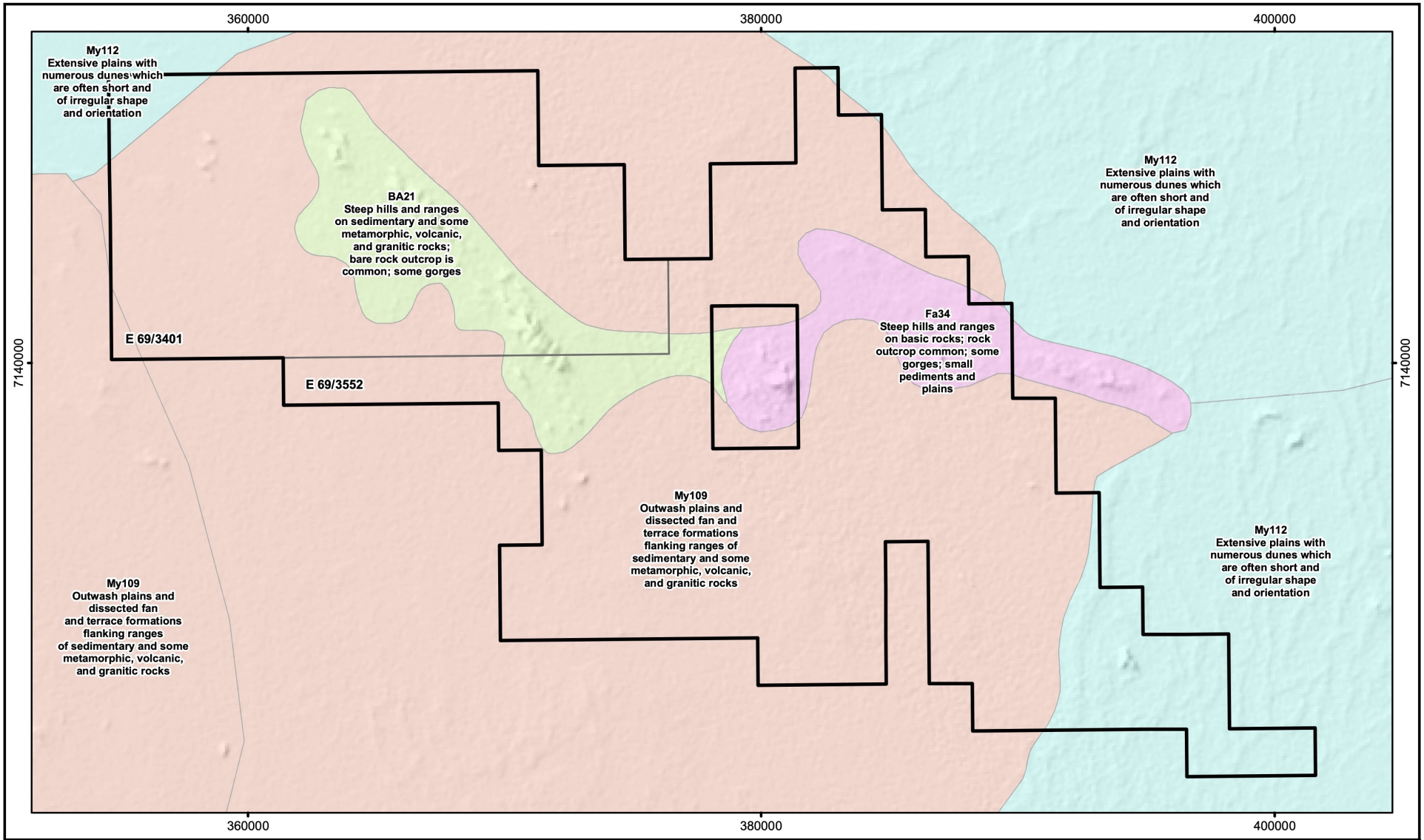

N
Warakurna
Mantamaru
Warburton
Legend:
613 - Paterson Sandplain Zone
618 - Musgrave Range Zone
619 - Warburton Range Zone
60km

Figure 5. Soil Landscape Systems of the Study Area.



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2.4.3. Geology

The Study Area lies within the Mesoproterozoic Musgrave Block in central Australia. Approximately 500 km long and 140, 000 km^2 in size, the Musgrave Block is an east-west trending orogenic belt and comprises a variety of high grade (amphibolite to granulite facies) basement lithologies overprinted by several major tectonic episodes. (GCX Metals, 2023).

The western portion of the Musgrave Block (the West Musgrave region) hosts the economically significant Giles Complex which is one of the world's largest layered intrusions. The Mesoproterozoic Jameson Range intrusion forms part of the Giles Complex. The Study Area is dominated by the Jameson Intrusion which is predominantly mafic in composition and consists of olivine-bearing gabbroic lithologies. The Study Area contains large-scale magmatic Ni-Cu-PGE targets, including outcropping PGE-Au reefs and is considered highly prospective for magmatic Ni-Cu-PGE deposits (GCX Metals, 2023).

The Study Area traverses eight surface geological units (Table 1; Figure 6). Dominant units include Qrc (colluvium, sheetwash, talus) which comprised ~ 51 % of the Study Area, Mdgc (layered mafic-ultramafic intrusions) ~ 18 % and Czk (calcrete) ~ 11 %.

Table 1. Surface geology of the Study Area (Raymond, et al, 2012).

Geology Unit	Description	Area (ha)	% of Study Area
Czk	Pisolitic, nodular or massive calcrete; ferruginous inclusions; calcareous cementing of bedrock and transported materials; locally with intercalated chalcedony; as low mounds, in playa lakes, or as valley calcrete; locally dissected and karstified	6,622.97	11.2
Czl	Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite	3,728.86	6.3
Mdgc	Layered mafic-ultramafic intrusions: gabbro, gabbronorite, norite, troctolite, pyroxenite, melagabbro, anorthosite.	10,964.88	18.5
Mgnw	Granite, granophyre, marginal porphyritic granophyre and aplite also forms apophyses into Palgrave Volcanic Association rocks and into the Pussy Cat Group.	0.08	<0.1
Mnmu	Granulite grade felsic gneiss, mafic granulite, intermediate granulite, pelitic gneiss, staurolite-bearing felsic gneiss, and metagranite.	2,808.22	4.7
Mugc	Pyroxenite, peridotite, websterite, ultramafic rock.	562.16	0.9
Qd	Dunes, sandplain with dunes and swales; may include numerous interdune claypans; residual and aeolian sand with minor silt and clay; aeolian red quartz sand, clay and silt, in places gypsiferous; yellow hummocky sand	4,125.46	7.0
Qrc	Colluvium, sheetwash, talus; gravel piedmonts and aprons over and around bedrock; clay-silt-sand with sheet and nodular kankar;	30,387.79	51.3

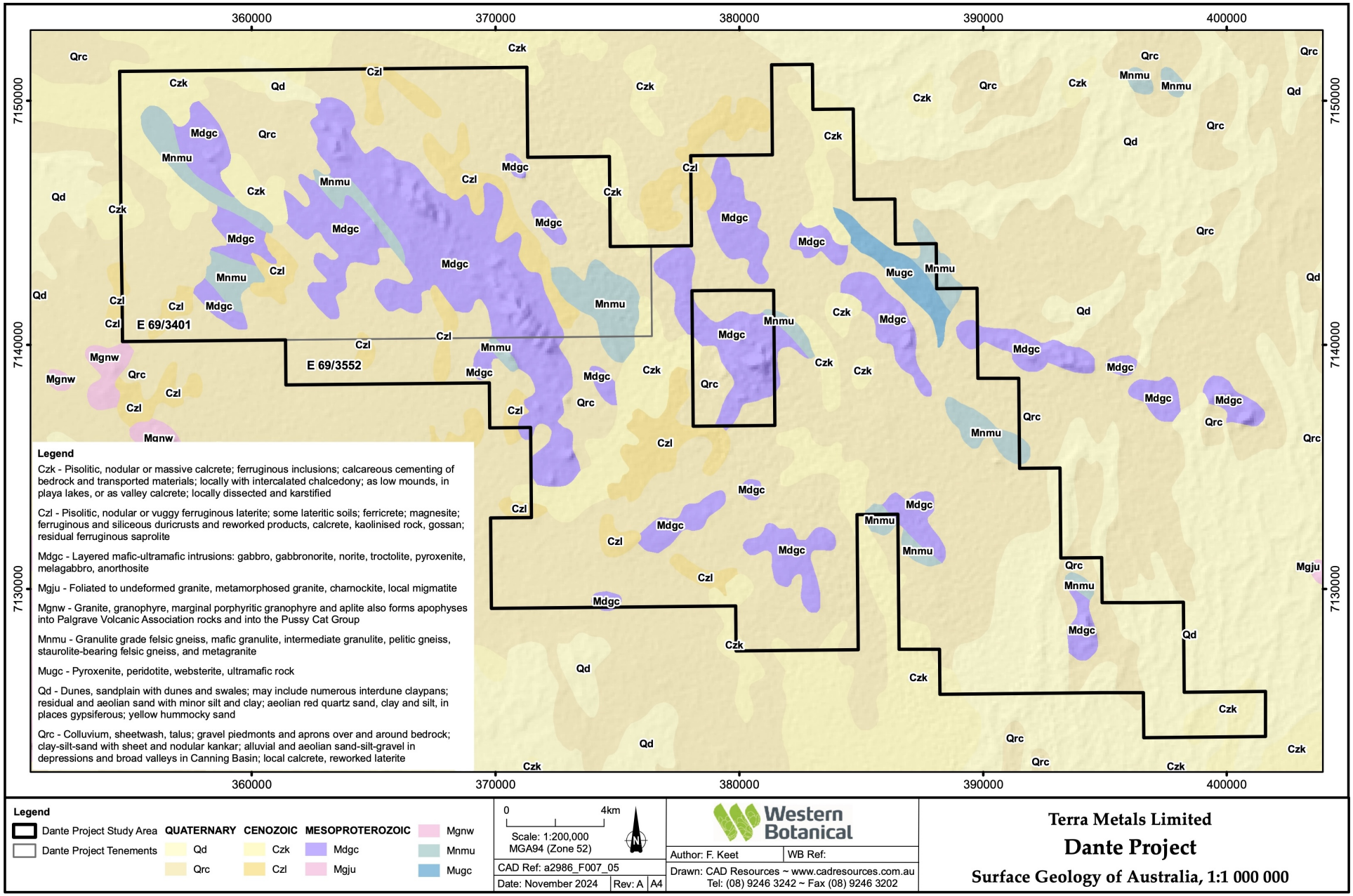
Geology Unit	Description	Area (ha)	% of Study Area
	alluvial and aeolian sand-silt-gravel in depressions and broad valleys in Canning Basin; local calcrete, reworked laterite.		
	TOTAL	59,200.42	100

2.4.4. Hydrology and Hydrogeology

The Study Area is located within the northern part of the Warburton Basin hydrographic catchment. The Warburton Basin encompasses the southern Gibson Desert and northern Great Victoria Desert. Surface water flow occurs only intermittently after large rainfall events, limited by the arid environment, predominantly low relief and extensive cover of aeolian sand (Rockwater Pty Ltd, 2010). Inspection of aerial imagery indicates there are no significant creeks or water bodies within the Study Area.

The Study Area is located within the East Murchison Groundwater Area proclaimed under the *Rights in Water and Irrigation Act 1947* (DWER, 2019). Groundwater resources in the area have been broadly mapped at a total dissolved solids (TDS) content of 1,000 - 3,000 milligrams per litre (mg/L) (DWER, 2023a) which is considered brackish. The Mantamaru (Jameson) community (located within the Study Area) is supplied water from two bores located approximately 3.7 km north-north-east of the town site (DoP, 2013). Hosted within fractured rock aquifers, the bores supply water that is treated via reverse osmosis to remove naturally occurring nitrates (OZ Minerals, 2021). Approximately 11 km south of the Study Area, a hydrogeological baseline survey conducted for the WMCNP indicated groundwater is relatively shallow throughout the WMCNP area, typically ranging between depths of 3 to 8 metres below ground level (mbgl) (although elevated areas where depth to groundwater was 14 to more than 22 m were recorded). Groundwater quality for the WMCNP is typically less than 2,000 mg/L TDS and falls within the potable to slightly brackish range (CDM Smith, 2020a).

Figure 6. Surface Geology of the Study Area.



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2.5. Biological Environment

2.5.1. Interim Biogeographic Regionalisation of Australia

The Study Area is located within the Central Ranges IBRA bioregion which surrounds the W.A., N.T., and S.A. borders (46% of bioregion in WA, 26% in the NT and 28% in SA) and comprises three subregions. The Study Area is situated entirely within the Mann-Musgrave Block subregion (CER01) (Figure 7).

The Mann-Musgrave Block subregion extends across WA, NT and SA, however the following information reported here pertains to WA only. The CER01 subregion, with an area of 4,701,519.37 ha is characterised by a high proportion of Proterozoic ranges including both volcanic and quartzites and derived soil plains, interspersed with red Quaternary sandplains with some Permian exposure (Graham and Cowan, 2001).

The vegetation in this region is dominated by low open woodlands of Desert Oak or Mulga over *Triodia basedowii* hummock grasslands on sandplains; low open woodlands of Ironwood (*Acacia estrophiolata*) and Corkwoods (*Hakea* sp.) over tussock and hummock grasses fringing the ranges; and mixed wattle scrub or *Callitris columellaris* woodlands over hummock and tussock grasslands on the ranges. The climate is Arid, with a mean rainfall of 200mm comprising summer and winter rain (Graham and Cowan, 2001).

The dominant land use within the Mann-Musgrave Block is Aboriginal Reserves which occupies 94.33% of the subregion area. Other land uses within the bioregion include Unallocated Crown Land (UCL) and Crown Reserves (4.28%), leasehold grazing (1.36%), and freehold grazing (0.03%) (Graham and Cowan, 2001). Approximately 99.97% of pre-European vegetation currently remains within the Mann-Musgrave Block, none of which is protected (reserved) for conservation (DBCA, 2018).

Figure 7. Location of Study Area within IBRA.


Legend
Avon Wheatbelt (AVW)
Carnarvon (CAR)
Central Kimberley (CEK)
Central Ranges (CER)
Coolgardie (COO)
Dampierland (DAL)
Esperance Plains (ESP)
Gascoyne (GAS)
Geraldton Sandplains (GES)
Gibson Desert (GID)
Great Sandy Desert (GSD)
Great Victoria Desert (GVD)
Hampton (HAM)
Indian Tropical Islands (ITI)
Jarrah Forest (JAF)
Little Sandy Desert (LSD)
Mallee (MAL)
Murchison (MUR)
Northern Kimberley (NOK)
Nullarbor (NUL)
Ord Victoria Plain (OVP)
Pilbara (PIL)
Swan Coastal Plain (SWA)
Tanami (TAN)
Victoria Bonaparte (VIB)
Warren (WAR)
Yalgoo (YAL)
KALUMBURU
NOK02 Berkeley
VIB01 Keep
NOK01 Mitchell
KUNUNURRA
CEK03 Mount Eliza
CEK01 Pentecost
DAL01 Fitzroy Trough
OVP01 Purnululu
BROOME
FITZROY CROSSING
CEK02 Hart
HALLS CREEK
DAL02 Pindanland
OVP02 South Kimberley Interzone
TAN01 Tanami Desert
GSD01 McLarty
PIL04 Roebourne
PORT HEDLAND
KARRATHA
PIL01 Chichester
GSD02 Mackay
EXMOUTH
PIL03 Hamersley
PIL02 Fortescue
LSD01 Rudall
CAR01 Cape Range
GAS01 Ashburton
NEWMAN
LSD02 Trainor
GID02 Dune Field
WESTERN AUSTRALIA
GID01 Lateritic Plain
CER01 Mann-Musgrave Block
CAR02 Wooramel
GAS03 Augustus
SURVEY AREA
GAS02 Carnegie
WARBURTON
DENHAM
MEEKATHARRA
WILUNA
MUR02 Western Murchison
MUR01 Eastern Murchison
YAL01 Edel
GVD04 Kintore
LEINSTER
GVD02 Central
GVD03 Maralinga
GES01 Geraldton Hills
LAVERTON
YAL02 Tallering
LEONORA
GERALDTON
NUL01 Carlisle
GES02 Lesueur Sandplain
GVD01 Shield
COO02 Southern Cross
KALGOORLIE-BOULDER
SWA01 Dandaragan Plateau
AVW01 Merredin
COO03 Eastern Goldfield
NUL02 Nullarbor Plain
SWA02 - Perth
PERTH
AVW02 Katanning
HAM01 Hampton
COO01 Mardabilla
JAF01 Northern Jarrah Forest
MAL02 Western Mallee
MAL01 Eastern Mallee
BUNBURY
JAF02 Southern Jarrah Forest
ESPERANCE
ESP01 Fitzgerald
ESP02 Recherche
WAR01 Warren
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MGA94 (Zone 51)
CAD Ref: a2986_F007_02_01
Date: November 2024
Rev: A
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Western Botanical
Author: F. Keet
WB Ref:
Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202
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Dante Project
Interim Biogeographic Regionalisation for Australia (IBRA)
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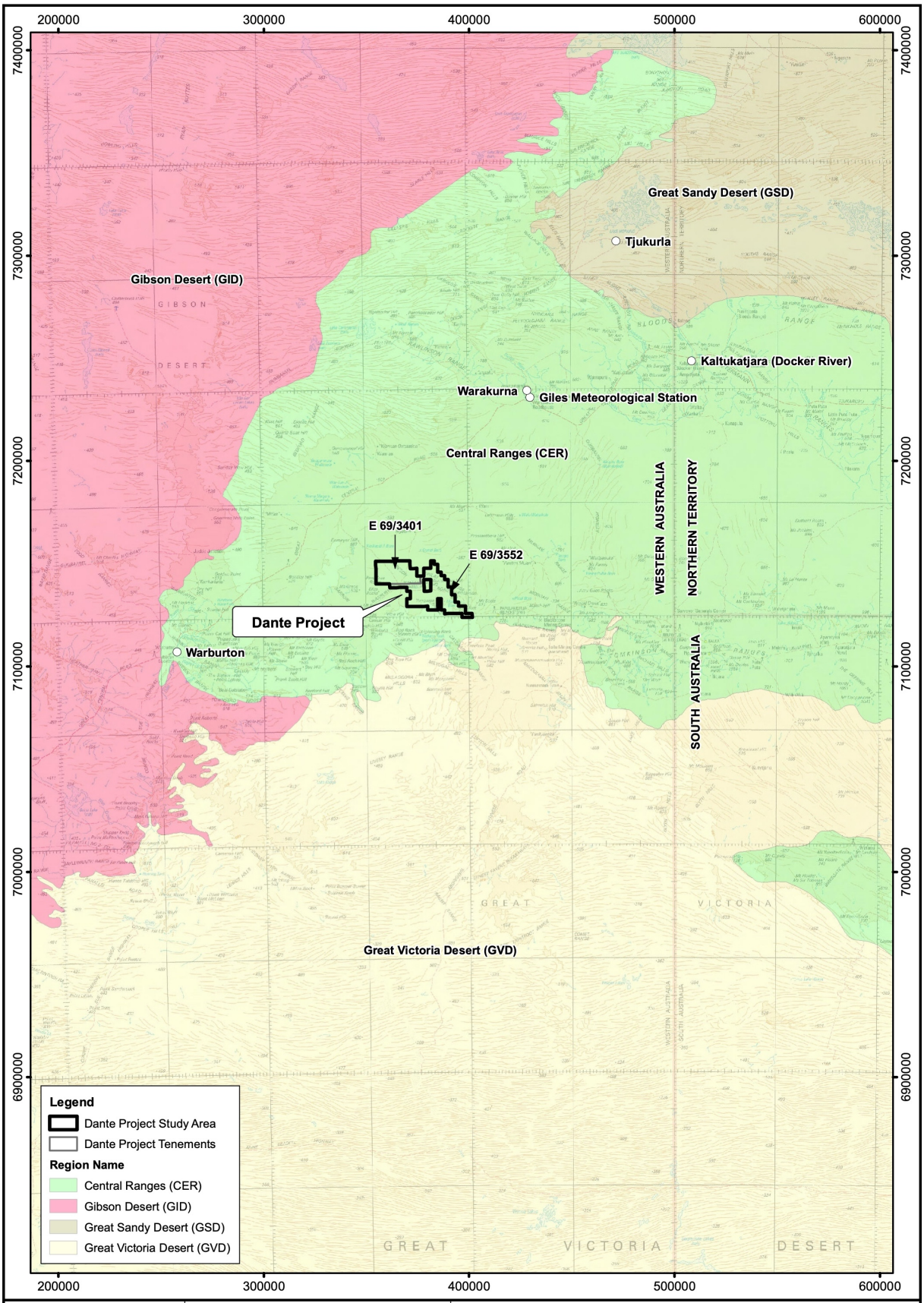
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Giles Meteorological Station
Central Ranges (CER)
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Warburton
Great Victoria Desert (GVD)
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Gibson Desert (GID)
Great Sandy Desert (GSD)
Great Victoria Desert (GVD)
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2.5.2. Pre-European Vegetation

The pre-European vegetation mapping of WA dataset maps the original native vegetation presumed to have existed prior to European settlement. It is based predominantly on the published and unpublished mapping of J.S. Beard. The first broad-scale vegetation mapping of Western Australia was conducted by Beard in 1979 with several revisions and updates resulting in the most recent and comprehensive iteration, detailed in Beard *et al*. (2013).

J.S. Beard describes five vegetation system associations across the Study Area (Table 2, Figure 8). Statistics on the pre-European and current extent of the Beard vegetation associations of WA are used in the assessment of development applications and both conservation and land use planning. A summary of the bio-regional extent of the pre-European vegetation associations present in the Study Area, is presented in Table 2. Information has been sourced from the latest (2020) dataset (WALGA, 2020).

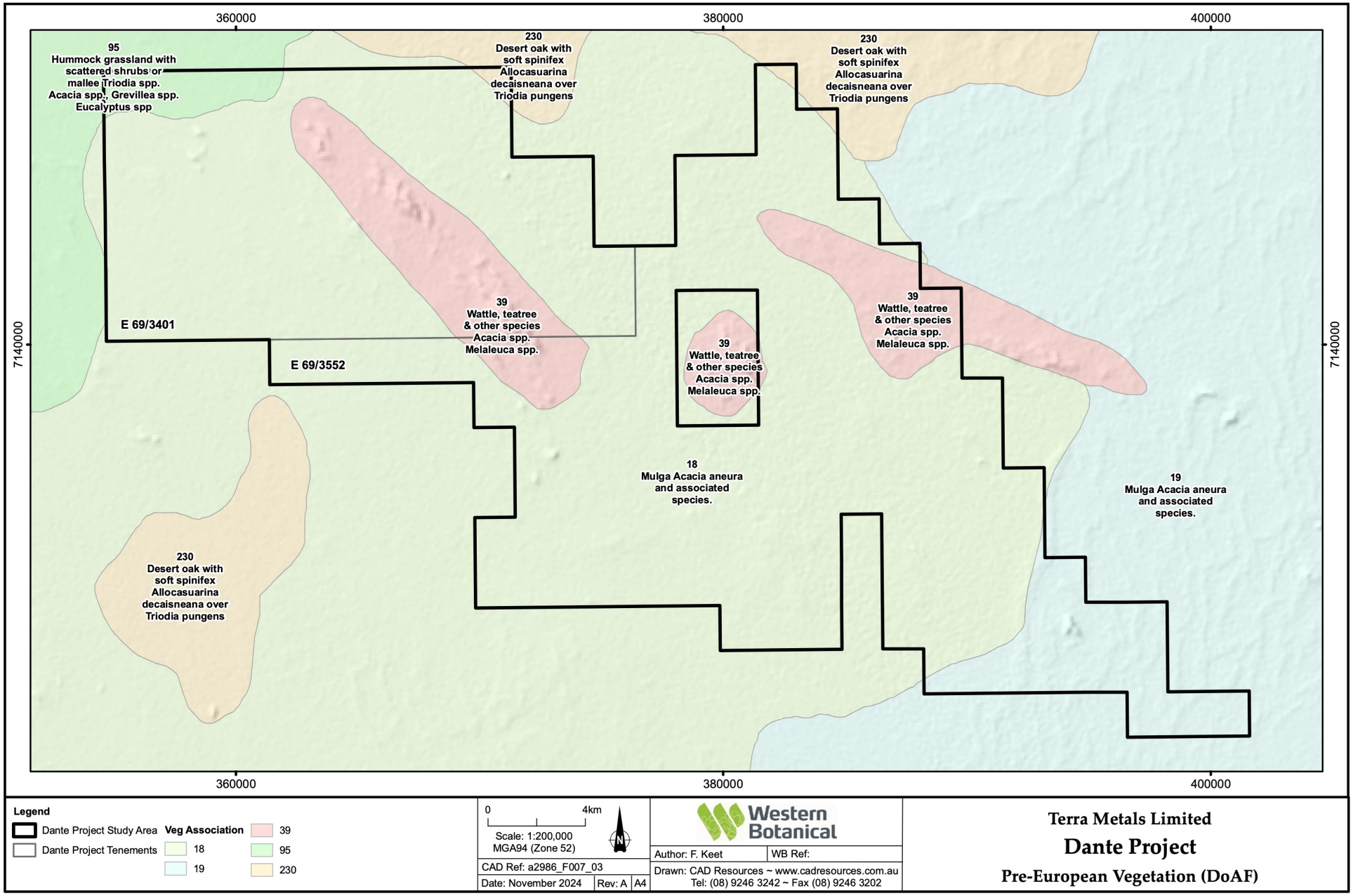
Approximately 78% of the Study Area is located within the Central Ranges_18 vegetation system association which is described as a low woodland, open low woodland or sparse woodland of Mulga (*Acacia aneura*) and associated species. The ranges and hills of the area support the Central Ranges_39 vegetation system association which is comprised of wattle, Teatree and other species (*Acacia* sp., *Melaleuca* sp.) as sparse scrub to scrub (~12% of Study Area). The most restricted vegetation system association is Central Ranges_230 which has been mapped as occurring within the northern boundary (Figure 8) and is characterised by a tree steppe of Desert Oak (*Allocasuarina decaisneana*) over soft spinifex (*Triodia pungens*). This association comprised <0.5% of the Study Area (Table 2).

All vegetation system associations mapped across the Study Area remain intact at a bioregional level with greater than 99% of pre-European extent remaining of each (Table 2). The Shire of Ngaanyatjarraku (in which the Study Area is located) currently has 99% of its pre-European vegetation extent remaining (DWER, 2023c).

Table 2. Pre-European vegetation system associations of the Study Area (WALGA, 2020).

Veg. System	Veg. Assoc.	SA Code	Description	Scale	Pre-European extent (ha)	Current extent (ha) and % remaining	Extent in Study Area (ha)	% within Study Area
Central Ranges	18	18	Low woodland, open low woodland or sparse woodland of Mulga (*Acacia aneura*) and associated species.	Central Ranges Bioregion	1,075,925.77	1,075,162.54 99.9 %	46,155.68	4.3
Central Ranges	19	19	Low woodland, open low woodland or sparse woodland of Mulga (*Acacia aneura*) and associated species.	Central Ranges Bioregion	902,247.67	902,171.11 100 %	4,188.62	0.5
Central Ranges	39	39	Scrub, open scrub or sparse scrub of Wattle, Teatree and other species (*Acacia* spp. *Melaleuca* spp).	Central Ranges Bioregion	404,690.75	404,690.75 100 %	7,407.61	1.8
Central Ranges	95	95	Shrub-steppe. Hummock grassland with scattered shrubs or mallee *Triodia* spp. *Acacia* spp., *Grevillea* spp. *Eucalyptus* spp	Central Ranges Bioregion	47,953.38	47,953.38 100 %	1,184.92	2.5
Central Ranges	230	230	Tree steppe of Desert oak (*Allocasuarina decaisneana*) with soft spinifex (*Triodia pungens*).	Central Ranges Bioregion	1,180,953.21	1,180,953.21 100 %	263.59	<0.1
						Total	59,200.42 ha	

Figure 8. Pre-European Vegetation of the Study Area.



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2.5.3. Environmentally Sensitive Areas

The Study Area is located within an ESA (DWER, 2023b) (

Figure 9) as the region, known as the Ranges of the Western Desert, is listed on the Register of the National Estate. Registered in 1978, the area was recognised as having Indigenous values of National Estate significance and is approximately 8,016,568 ha in size (Laverton - Warburton Road, extending from 25 km east of Warburton to the Northern Territory and South Australian Borders, 8 km west of Kaltukatjara NT) (DCCEEW, 2023). Other ESAs within the region include;

- Gibson Desert Nature Reserve (now referred to as Pila Nature Reserve): located 128 km north-west of the Study Area and listed on the Register of the National Estate for being an area typical of the Gibson Desert.

- Baker Lake Area: located 145 km west of the Study Area (and 30 km south of Warburton). Registered on the National Estate for having Indigenous values of National Estate significance, contains fossils in sediments and diverse flora.

- Neale Junction Nature Reserve: located 258 km to the south-west and listed on the Register of the National Estate for being Representative of the area between Great Victoria Desert Wildlife Sanctuary and Queen Victoria Spring Reserve. Serves as an important corridor for movement of animals and plants between wetter parts of western and eastern Australia.

- Great Victoria Desert Nature Reserve: located 337 km south of the Study Area and listed on the Register of the National Estate for containing rich and extremely varied vegetation and providing a connecting corridor for the faunas of eastern and western Australia (DCCEEW, 2023).

2.5.4. Areas of Conservation Significance

There are seven conservation reserves or parks within approximately 450 km of the Study Area (Error! Reference source not found.**). This includes five nature reserves within WA (DBCA Legislated Lands), the nearest of which is Pila (Gibson Desert) Nature Reserve, located approximately 128 km to the north-west of the Study Area (DBCA, 2023c) (**

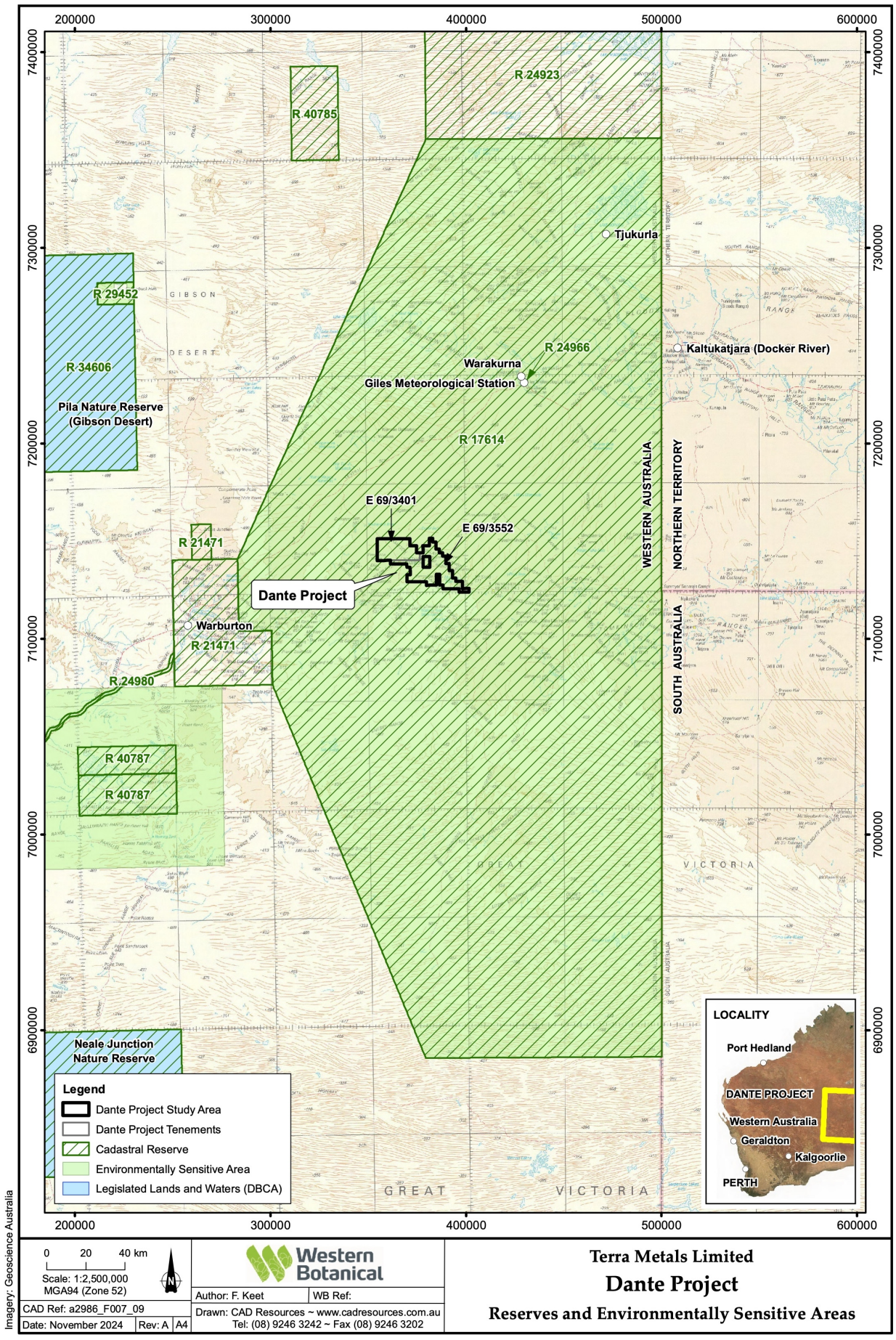
Figure 9). Within SA, the Mamungari Conservation Park is located approximately 253 km from the Study Area (DEW, 2023) while the NT Uluru-Kata Tjuta National Park is situated 273 km north-east of the Study Area (DEPWS, 2023a).

Table 3. Conservation areas within the vicinity of the Study Area (DBCA, 2023c; DEW, 2023; DEPWS, 2023a).

Name	ID No.	Type	~Distance from Study Area
Western Australia			
Pila Nature Reserve (Gibson Desert)	34606	A Class Nature Reserve	128 km NW
Neale Junction Nature Reserve	34720	A Class Nature Reserve	258 km SW

Name	ID No.	Type	~Distance from Study Area
Great Victoria Desert Nature Reserve	30490	A Class Nature Reserve	337 km S
Yeo Lake Nature Reserve	36271	A Class Nature Reserve	360 km SW
Plum Lakes Nature Reserve	25801	A Class Nature Reserve	440 km SW
South Australia			
Mamungari Conservation Park	CP 49	Conservation Park	253 km SE
Northern Territory			
Uluru-Kata Tjuta National Park		National Park Commonwealth	273 km NE

Figure 9. Environmentally Sensitive Areas and Conservation Reserves of the Region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Pila Nature Reserve
(Gibson Desert)
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DESERT
Tjukurla
Kaltukatjara (Docker River)
R 24966
Warakurna
Giles Meteorological Station
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Dante Project
Warburton
R 21471
R 24980
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Neale Junction
Nature Reserve
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LOCALITY
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DANTE PROJECT
Western Australia
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Kalgoorlie
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WB Ref:
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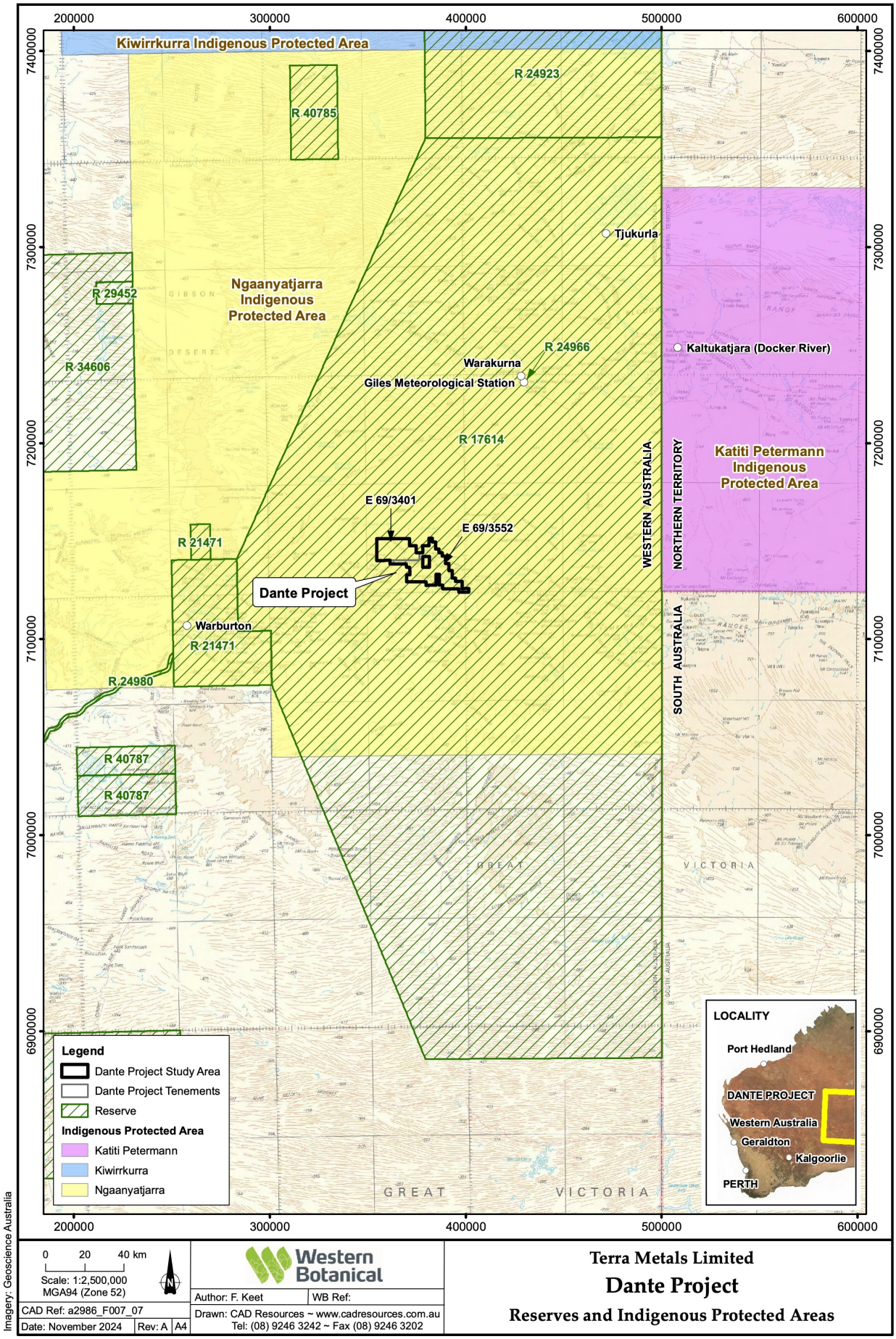
Reserves and Environmentally Sensitive Areas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R 24966
Warakurna
Giles Meteorological Station
Kaltukatjara (Docker River)
R 17614
Katiti Petermann Indigenous Protected Area
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E 69/3552
R 21471
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Warburton
R 21471
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WESTERN AUSTRALIA
NORTHERN TERRITORY
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Reserves and Indigenous Protected Areas

3. Methods

3.1. Desktop Survey

3.1.1. Literature Review

A review of available literature relevant to the Study Area was undertaken, utilising (but not limited to) the Index of Biodiversity Surveys for Assessment search portal. Of the 16 reports reviewed, the majority (13) pertained to the Wingellina Nickel Cobalt Project (WNCP) (previously referred to as the Wingellina Nickel Project), located approximately 90 km east of the Study Area. Also included were the reported results of botanical survey work conducted between 2014 – 2019 for the West Musgrave Copper and Nickel Project (WMCNP) which is currently in construction and located approximately 11 km south of the Study Area.

3.1.2. Database Searches

Database searches were conducted to identify potential Threatened and Priority Flora species, Threatened Ecological Communities (TECs), Priority Ecological Communities (PECs), or other areas of conservation significance that may be encountered during field surveys (Table 4). The DBCA Framework for Conservation Significant Flora; and the Definitions of TECs and PECs are presented in Appendix 1 and Appendix 2.

Subsequent to the database searches, a desktop assessment of the likelihood of each Threatened and Priority flora species occurring within the Study Area was performed by considering (a) the proximity of known Conservation Significant flora and communities to the Study Area; and (b) the similarities between supporting habitats for each species and those of the Study Area.

A search of DPIRD's Western Australian Organism List (WAOL) for the Shire of Ngaanyatjarraku was completed to identify plant species declared under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) that are known to occur in WA, for the local government area.

Table 4. Details of database searches conducted.

Provider	Reference	Database	Search parameters
Western Australia			
Department of Biodiversity, Conservation and Attractions (DBCA)	DBCA, (2023d) (Ref: 60-1023FL)	Threatened and Priority Flora database	100 km radius of Study Area polygon.
	DBCA (2023e) (Ref: 60-1023FL)	Western Australian Herbarium Specimen database	
	DBCA (2023f)	Threatened and Priority Ecological Communities database	100 km radius of Study Area polygon.

Provider	Reference	Database	Search parameters
Department of Agriculture, Water and the Environment (DAWE)	DAWE (2023a)	Protected Matters Search Tool (PMST)	50 km radius of Study Area polygon
Department of Primary Industries and Regional Development (DPIRD)	DPIRD (2023c)	Western Australian Organism List	Shire of Ngaanyatjarraku

3.2. Field Survey

3.2.1. Timing and Personnel

The field survey was conducted by two Western Botanical botanists Jonathan Warden and Felicity Keet over eight days, from the 4th to the 11th of August 2024, with subsequent mobilisation and travel days taking place either side. The field survey consisted of a series of traverses on foot and ATVs along the proposed drilling alignments and access tracks, to determine the presence and distribution of significant flora. Where practicable, two traverses were performed along each drilling alignment providing a coverage of roughly 50 m. It was deemed reasonable to traverse several of the drilling alignments located within simple vegetation associations with broad visibility in one pass only. Overall, 37 drilling alignments measuring a total of 29.43 km, and nine access tracks measuring a total of 8.97 km were assessed. All observations of flora and vegetation associations were recorded.

3.2.2. Vegetation Mapping and Condition

Following the Environmental Protection Authority's (EPA) Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment (2016), a relevé was conducted at each new vegetation association when encountered. The relevé location was way-pointed using hand-held GPS devices, and photographed to provide visual reference following the survey. At each relevé site a description of the dominant vegetation within each stratum (upper, middle and lower), and estimated heights and projected foliage cover (PFC) of each flora species was recorded. Vegetation Condition was assessed against the EPA Technical Guidance (2016) Vegetation Condition scale (adapted from Keighery 1994 and Trudgen 1988) (Appendix 3). Descriptions of predominating soils and geology were recorded to contextualise vegetation associations.

The description of each vegetation association was defined on ground and confirmed through foot and ATV traverses across the Study Area. Vegetation association mapping within the Study Area was recorded on high-resolution aerial photography at a scale of 1:10,000. After compiling all

relevé data collected along the survey lines, indicative vegetation associations were interpreted and interpolated to generate a continuous surface across the Study Area, highlighting extents and distributions of each observed vegetation association. Vegetation associations within the Study Area that did not intersect the survey lines were not assessed.

3.2.3. Significant Flora

All Conservation Significant Flora recognised during the field survey were way-pointed, with the number of plants recorded at each point. Drilling alignments that clearly intersected Priority Flora populations were surveyed at greater intensity. Specimens of any significant flora and flora of interest were retained to later be vouchered at the Western Australian Herbarium.

3.2.4. Flora Composition and Identification

Flora that comprised each vegetation association, was not readily recognised in the field, or that required further identification was collected and pressed for later identification, together with information pertaining to the date, location, and field description. The identification and range confirmation of specimens was carried out using the resources of the Western Australian Herbarium (WAH). Taxa with diagnostic material (fruit and flower) that were unable to be identified by Western Botanical were submitted to the WAH for further examination by Western Australian flora experts.

4. Results and Discussion

4.1. Desktop Survey

4.1.1. Species with Conservation Significance

A total of 30 flora taxa of conservation significance were identified by the DBCA database searches as having been recorded within approximately 100 km of the Study Area (Figure 10). This included 12 Priority 1; two Priority 2; 15 Priority 3 and one Priority 4 taxa. No flora taxa listed as Threatened under the *BC Act* or *EPBC Act* were identified as occurring within 100 km of the Study Area (DBCA, 2023d, 2023e; DAWE. 2023a).

In addition to the 30 taxa identified by the DBCA database searches, five flora taxa of conservation significance were found within the literature review as having been recorded in the region (but did not appear in the database search). This included four species recorded within the WMCNP area that were located within < 1km to 48 km of the Study Area (Western Botanical, 2020): *Aenictophyton anomalum* (P1); *Acacia eremophila* var. numerous nerved variant (A.S. George 11924) (P3); *Aristida jerichoensis* var. *subspinulifera* (P3) and *Eragrostis* sp. Limestone (P.K. Latz 5921) (P3). *Goodenia virgata* (P2) has been recorded within the Warburton Road bypass area and one associated gravel pit by GHD (2021) (approximately 105 km from the Study Area).

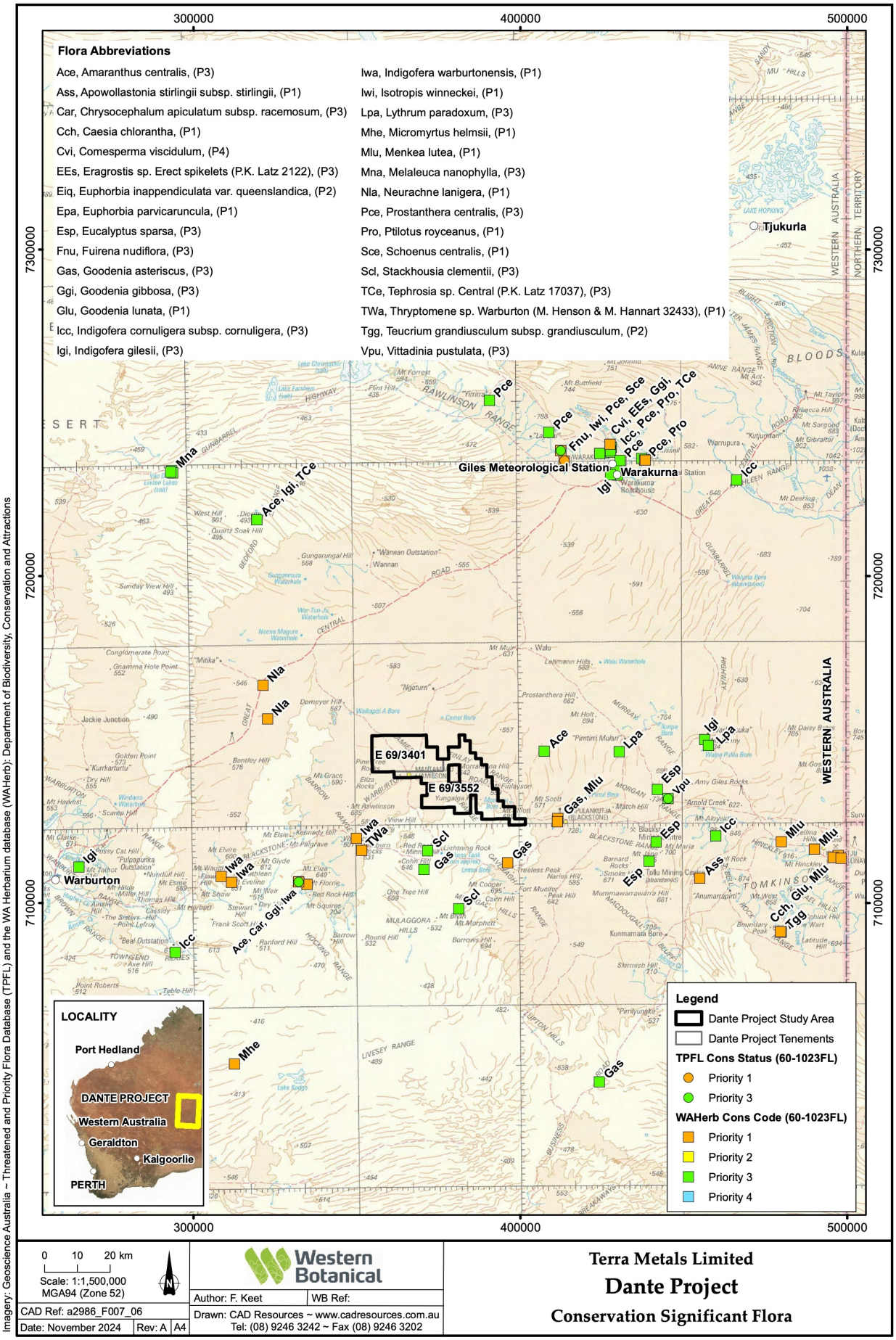
A further ten Priority species that did appear in the database search results have also been recorded during botanical surveys in the region in closer proximity to the Study Area (than indicated in the database search results). This includes eight species recorded in association with the WMCNP: *Goodenia lunata* (P1); *Indigofera warburtonensis* (P1); *Isotropis winneckei* (P1); *Amaranthus centralis* (P3); *Chrysocephalum apiculatum* subsp. *racemosum* (P3); *Eragrostis* sp. Erect spikelets (P.K. Latz 2122) (P3); *Goodenia asteriscus* (P3); *Stackhousia clementii* (P3) and *Tephrosia* sp. Central (P.K. Latz 17037) (P3). A single specimen of *Goodenia gibbosa* (P3) was recorded by GHD (2021) in a gravel pit along Great Central Road, to the north of the Study Area (Table 7, WB1021).

A summary of the 35 taxa of conservation significance identified from all database searches and the literature review, regarding description/habitat, known distribution and nearest known location to the Study Area is presented in Table 7. Included is an assessment of likelihood of occurrence within the Study Area. Of the 35 flora taxa, 27 were assessed as having the potential (Possible) to occur due to the habitats present within the Study Area (Table 7, WB1021).

4.1.2. Threatened and Priority Ecological Community

There are no known Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) occurring within a 100 km radius of the Study Area (DBCA, 2023f).

Figure 10. Priority Flora locations outside the Study Area


Flora Abbreviations
Ace, Amaranthus centralis, (P3)
Ass, Apowollastonia stirlingii subsp. stirlingii, (P1)
Car, Chrysocephalum apiculatum subsp. racemosum, (P3)
Cch, Caesia chlorantha, (P1)
Cvi, Comesperma viscidulum, (P4)
EEs, Eragrostis sp. Erect spikelets (P.K. Latz 2122), (P3)
Eiq, Euphorbia inappendiculata var. queenslandica, (P2)
Epa, Euphorbia parvicaruncula, (P1)
Esp, Eucalyptus sparsa, (P3)
Fnu, Fuirena nudiflora, (P3)
Gas, Goodenia asteriscus, (P3)
Ggi, Goodenia gibbosa, (P3)
Glu, Goodenia lunata, (P1)
Icc, Indigofera cornuligera subsp. cornuligera, (P3)
Igi, Indigofera gilesii, (P3)
Iwa, Indigofera warburtonensis, (P1)
Iwi, Isotropis winneckei, (P1)
Lpa, Lythrum paradoxum, (P3)
Mhe, Micromyrtus helmsii, (P1)
Mlu, Menkea lutea, (P1)
Mna, Melaleuca nanophylla, (P3)
Nla, Neurachne lanigera, (P1)
Pce, Prostanthera centralis, (P3)
Pro, Ptilotus royceanus, (P1)
Sce, Schoenus centralis, (P1)
Scl, Stackhousia clementii, (P3)
TCe, Tephrosia sp. Central (P.K. Latz 17037), (P3)
TWa, Thryptomene sp. Warburton (M. Henson & M. Hannart 32433), (P1)
Tgg, Teucrium grandiusculum subsp. grandiusculum, (P2)
Vpu, Vittadinia pustulata, (P3)
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TPFL Cons Status (60-1023FL)
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Scale: 1:1,500,000
MGA94 (Zone 52)
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Tel: (08) 9246 3242 ~ Fax (08) 9246 3202
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Conservation Significant Flora
Imagery: Geoscience Australia ~ Threatened and Priority Flora Database (TPFL) and the WA Herbarium database (WAHerb): Department of Biodiversity, Conservation and Attractions

4.1.3. Invasive Species

Within the Shire of Ngaanyatjarraku there are currently 49 flora taxa listed as Declared Plants under Section 22(2) of the *BAM Act* (DPIRD, 2023c). This includes 30 taxa which are listed as Weeds of National Significance (WoNS) (DAWE, 2023b) (Appendix 4).

Fourteen weed species have been recorded during botanical surveys associated with the WNP (Hinkley Range Pty Ltd, 2015), WMCNP (Western Botanical, 2020) and Shire of Ngaanyatjarraku roadworks (GHD, 2021). None are listed as WoNS or Declared Plants although the invasive nature of **Cenchrus ciliaris* (Buffel Grass) and **Rumex vesicarius* is noted. Buffel Grass is known to occur along roadsides within the Study Area (GHD, 2021).

A summary of the fourteen weed species identified from the literature review regarding their ecological impact and invasiveness ratings from the Department of Parks and Wildlife (DPaW) Goldfields Region Species Prioritisation Process (2014) is presented in Table 5. Buffel Grass, Ruby Dock and Spiked Malvastrum have been recorded across all three survey areas within the region.

Table 5. Ecological impact and invasiveness ratings of weed species recorded within the vicinity of the Study Area (DPaW, 2014).

Scientific and common name	Present in surveyed area:			Ecological impact[1]	Invasiveness[2]
	WNP[3]	WMCNP[4]	Shire of Ngaanyatjarraku[5]		
**Bidens bipinnata* Bipinnate Beggartick			*	U	U
**Brassica tournefortii* Mediterranean Turnip		*		U	R
**Capsella bursa-pastoris* Shepherd's Purse	*			NA	NA
**Cenchrus ciliaris* Buffel Grass	*	*	*	H	R
**Cenchrus pennisetiformis*[6] Cloncurry Buffel Grass	*			NA	NA
**Citrullus colocynthis* Camel Melon, Colocynth	*	*		M	R
**Citrullus lanatus* Pie Melon, Paddy Melon	*			M	R
**Chloris virgata* Feather Top Rhodes Grass		*		U	U

[1] H = High, L = Low, M = Medium, U = Unknown, NA = Not assessed
[2] R = Rapid, M = Moderate, U = Unknown, NA = Not assessed
[3] Wingellina Nickel Project (Hinckley Range Pty Ltd, 2015)
[4] West Musgrave Copper and Nickel Project (Western Botanical, 2020)
[5] GHD (2021)
[6] At the time of survey in 2011 – 2012, **Cenchrus pennisetiformis* had not previously been recorded from WA but was known from arid parts of SA (Hinckley Range Pty Ltd, 2015). Although still excluded from the WA Herbarium database as occurring in WA (WAH, 1998-), this species appears within the Atlas of Living Australia (ALA) as occurring throughout north-west WA where it is considered naturalised (ALA, 2023).

Scientific and common name	Present in surveyed area:			Ecological impact[1]	Invasiveness[2]
	WNP[3]	WMCNP[4]	Shire of Ngaanyatjarraku[5]		
**Erodium aureum* Cork Screw		*		U	U
**Malvastrum americanum* Spiked Malvastrum	*	*	*	H	R
**Portulaca oleracea* Common Purslane	*			U	U
**Rumex vesicarius* Ruby Dock	*	*	*	H	R
**Sonchus oleraceus* Common Sowthistle	*			U	R
**Tribulus terrestris* Caltrop	*	*		L	M

4.2. Field Survey

4.2.1. Flora

One hundred and ninety-eight species from 104 genera and 38 families were recorded during the field survey (Appendix 5). Of these, ten were recognised readily in the field, and 210 collections were made for reference or further identification using resources of the WA Herbarium. The results obtained are considered a good representation of annual and perennial flora of the Study Area due to adequate seasonal conditions across the site in the months prior to the survey.

The identification of four taxa was indeterminate due to insufficient material (flowering or reproductive material required to gain a definitive identification). Of the four indeterminate taxa, three were identified to genus level with one to family level. Three of these indeterminant taxa are considered Species of Interest (SOI) and are discussed in section 4.2.3 below. The remaining taxa, *Acacia* sp. maroon branchlets (Collection 135, Wpt 342/1006) 0.7 m, was unable to be identified as there were no diagnostic features (flowers or fruits) on the plant during the 2024 survey.

Overall, the Study Area contains species that are typical of similar landforms both within and adjacent to the study region, and more broadly, in the lower portions of the Central Ranges bioregion (Mann-Musgrave subregion).

A systematic species list is presented in Appendix 5.

4.2.2. Significant Flora

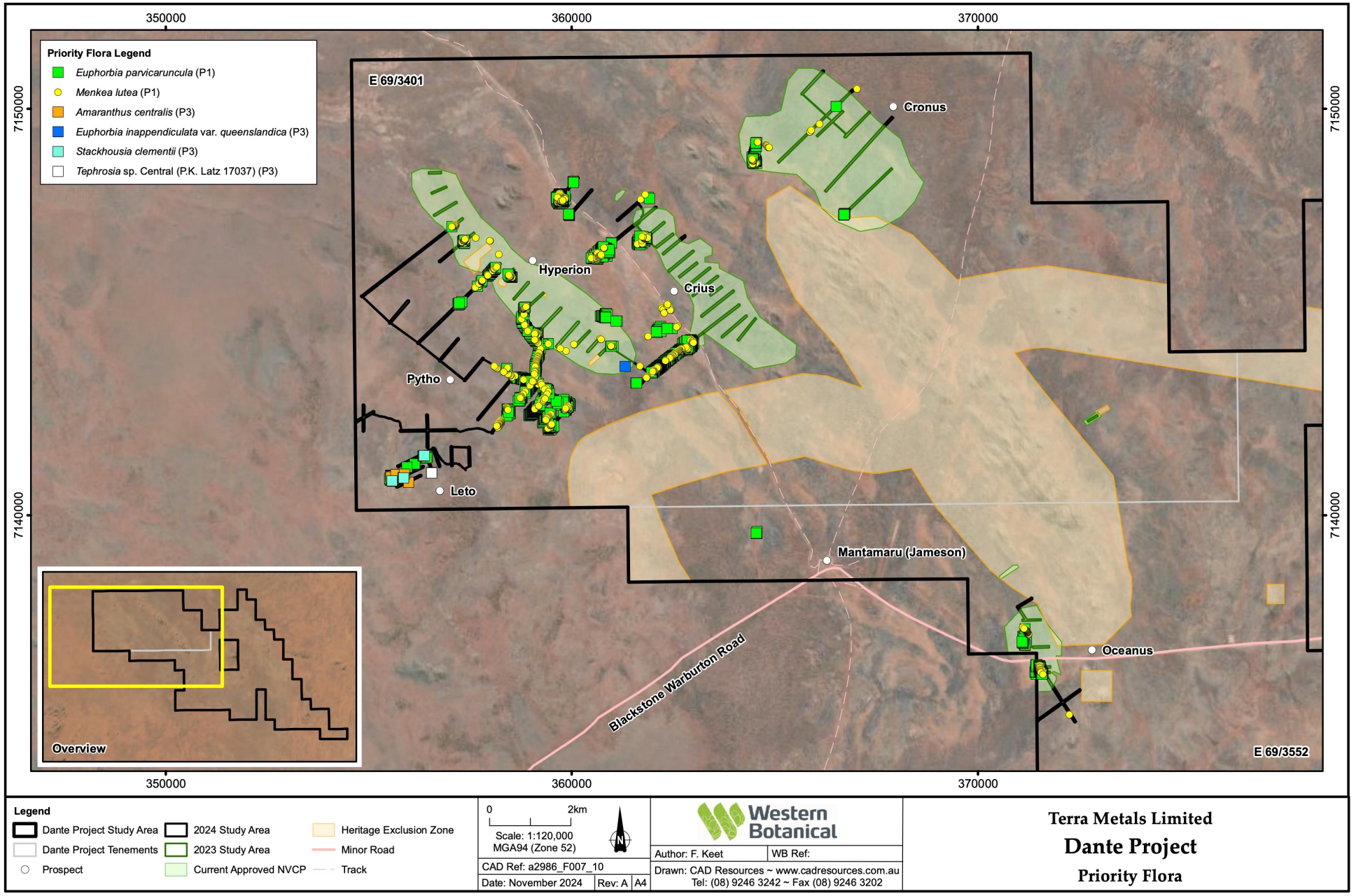
Two Priority One and four Priority Three Flora were identified during the survey, including:

- *Amaranthus centralis* P3;
- *Euphorbia inappendiculata* var. *queenslandica* P3;
- *Euphorbia parvicaruncula* P1;
- *Menkea lutea* P1;
- *Stackhousia clementii* P3; and
- *Tephrosia* sp. Central (P.K. Latz 17037) P3.

Locations of each record of Priority flora encountered are presented in Figure 11, and a brief description of each species is presented below.

No Threatened Flora listed under the *Biodiversity Conservation Act 2016 (WA)* or the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* were recorded within the Study Area.

Figure 11. Locations of Priority Species Recorded Within the Study Area


Priority Flora Legend
Euphorbia parvicaruncula (P1)
Menkea lutea (P1)
Amaranthus centralis (P3)
Euphorbia inappendiculata var. queenslandica (P3)
Stackhousia clementii (P3)
Tephrosia sp. Central (P.K. Latz 17037) (P3)
E 69/3401
Cronus
Hyperion
Crius
Pytho
Leto
Mantamaru (Jameson)
Oceanus
Blackstone Warburton Road
E 69/3552
Overview
350000
360000
370000
7150000
7140000
Legend
Dante Project Study Area
Dante Project Tenements
Prospect
2024 Study Area
2023 Study Area
Current Approved NVCP
Heritage Exclusion Zone
Minor Road
Track
0
2km
Scale: 1:120,000
MGA94 (Zone 52)
N
CAD Ref: a2986_F007_10
Date: November 2024
Rev: A
A4
Western Botanical
Author: F. Keet
WB Ref:
Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202
Terra Metals Limited
Dante Project
Priority Flora

***Amaranthus centralis* (P3)**

Amaranthus centralis is an erect annual herb growing to 0.6 m tall with angular, sometimes reddish, and sparsely hairy to glabrous stems (Western Australian Herbarium 1988-2024) (Plate 1). It grows in red sand in ephemeral watercourses, sandy to clayey loam associated with riverbanks and edges of permanent pools in *Eucalyptus* lined channels, or *Acacia* Shrublands (Palmer, 2009).

Amaranthus centralis (P3) is currently recognised from seven records within Western Australia (Western Australian Herbarium 2024), occurring from the Pilbara and Central Ranges IBRA regions. It is more widespread within Australia, with 87 records recognised by AVH (2024), most of which occur in the Northern Territory and South Australia, with some records in Queensland (Figure 12).

Amaranthus centralis (P3) was found at six sites within the Leto Prospect, two within the buffer zone of proposed drill lines, two bordering the buffer zone of proposed drill lines, and two along an existing access track (Figure 11). A total of 190 *Amaranthus centralis* (P3) were recorded during the field survey, in association with the Senna Shrubland (SS) and Hardpan Mulga Woodland (HPMW) vegetation associations.

Plate 1. *Amaranthus centralis* (P3).

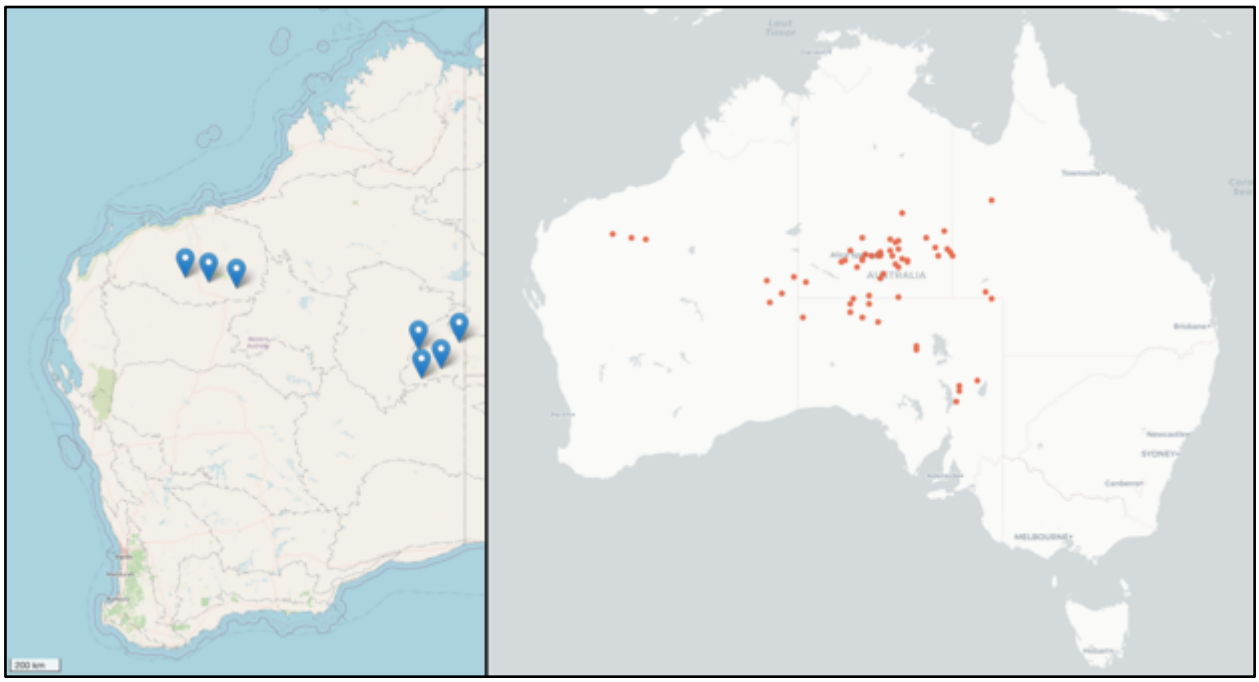


Figure 12. Distribution of *Amaranthus centralis* (P3) within Western Australia (WA Herbarium 1998-2024) and Australia (AVH 2024).

Euphorbia inappendiculata var. *queenslandica* (P3)

Euphorbia inappendiculata var. *queenslandica* (P3) is a glabrous annual herb growing to 0.15 m tall with prostrate, decumbent or ascending to erect stems (D. Halford & W. Harris, 2012) (Plate 2). It differs from *Euphorbia inappendiculata* var. *inappendiculata* (P3) in having glabrous stems, narrow rounded irregular ridges on the seed surface, and mucilaginous exotesta when moistened (D. Halford & W. Harris, 2012). *Euphorbia inappendiculata* var. *robustior* is not known to occur in Western Australia, nor central Australia. However, this variant is distinct from *Euphorbia inappendiculata* var. *queenslandica* (P3) by its larger gland appendages (0.1-0.3 mm long versus <0.1 mm long), and shorter seeds (1-1.1 mm long versus 1.1-1.3 mm) (D. Halford & W. Harris, 2012). *Euphorbia inappendiculata* var. *queenslandica* (P3) grows on cracking clay soils on plains or gently undulating terrain (D. Halford & W. Harris, 2012).

Euphorbia inappendiculata var. *queenslandica* (P3) is currently recognised from 16 records within Western Australia (Western Australian Herbarium, 2024), occurring from the Pilbara and Central Ranges IBRA regions. It is more widespread within Australia, with 213 records recognised by AVH (2024), most of which occur in the Northern Territory, Queensland and South Australia, with some records in New South Wales (Figure 13).

Euphorbia inappendiculata var. *queenslandica* (P3) was found at one site within the current approved NVCP for the Hyperion Prospect, 190 m south of a proposed access track (Figure 11). One plant was recorded at this site, in association with the Hardpan Mulga Woodland (HPMW) vegetation association. *Euphorbia inappendiculata* var. *queenslandica* was only recognised during the identification process post-field survey. As it was not recognised in the field the counts and distribution of this species across the Study Area are not accurate. It is expected that *Euphorbia inappendiculata* var. *queenslandica* may occur in other HPMW areas across the Study Area. Further surveys during appropriate seasonal conditions are required to ascertain accurate counts and distribution of this species across the Dante Project.

The recording of *Euphorbia inappendiculata* var. *queenslandica* within the Study Area represents a 150 km range infill of the current known distribution (Figure 13).

Plate 2. ***Euphorbia inappendiculata*** **var.** ***queenslandica*** **(P3).**

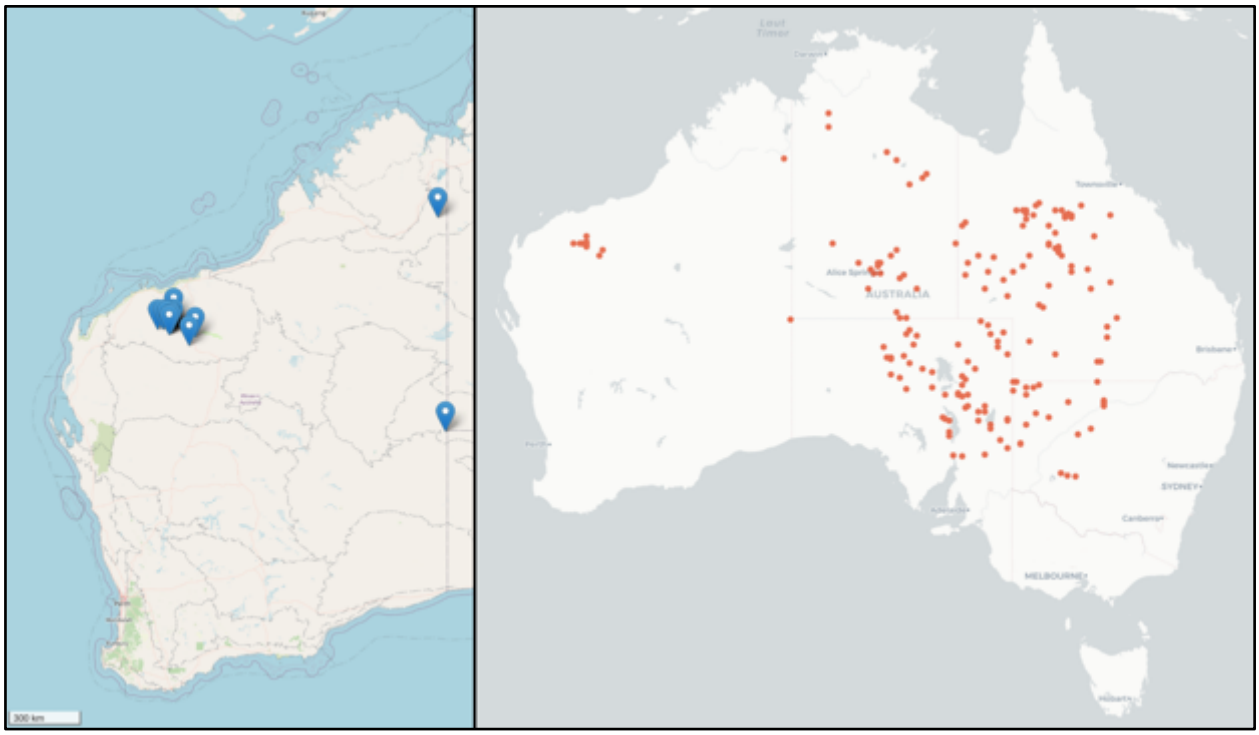


Figure 13. Distribution of ***Euphorbia inappendiculata*** **var.** ***queenslandica*** **(P3) within Western Australia (WA Herbarium 1998-2024) and Australia (AVH 2024). 150 km range infill.**

***Euphorbia parvicaruncula* (P1)**

Euphorbia parvicaruncula (P1) is an erect annual herb, possibly a short-lived perennial to 0.5 m tall with glabrous stems and leaves (Flora of Central Australia, 1981) (Plate 3). It grows on hard, crusty duplex soils, often associated with clay-based ephemeral playa lakes in central Australia.

Euphorbia parvicaruncula (P1) is relatively poorly collected and identified in Western Australia, currently recognised from two records (Western Australian Herbarium, 2024), occurring from the Pilbara and Central Ranges IBRA regions. It is more widespread within Central Australia, with 238 records recognised by AVH (2024), most of which occur in the Northern Territory, South Australia, and Queensland, with some records in New South Wales (Figure 14).

Euphorbia parvicaruncula (P1) was recorded within most Claypan Grassland (CPNG) habitats, and smaller hardpan patches within the Hardpan Mulga Woodland (HPMW) vegetation association across the Study Area (Plate 3) (Figure 11). A total of 19,188 *Euphorbia parvicaruncula* (P1) were recorded during the 2024 field survey, often in association with *Menkea lutea* (P1).

Notably, three of proposed access tracks, and 14 of the proposed 37 drilling alignments intersect *Euphorbia parvicaruncula* (P1) populations (Figure 11). The affected populations can be easily avoided by modifying the locations of the access track and drilling alignments to go around the Claypan Grassland (CPNG) vegetation associations.

Plate 3. *Euphorbia parvicaruncula* (P1).

Plate 4. Habitat supporting *Euphorbia parvicaruncula* (P1) within the Study Area.

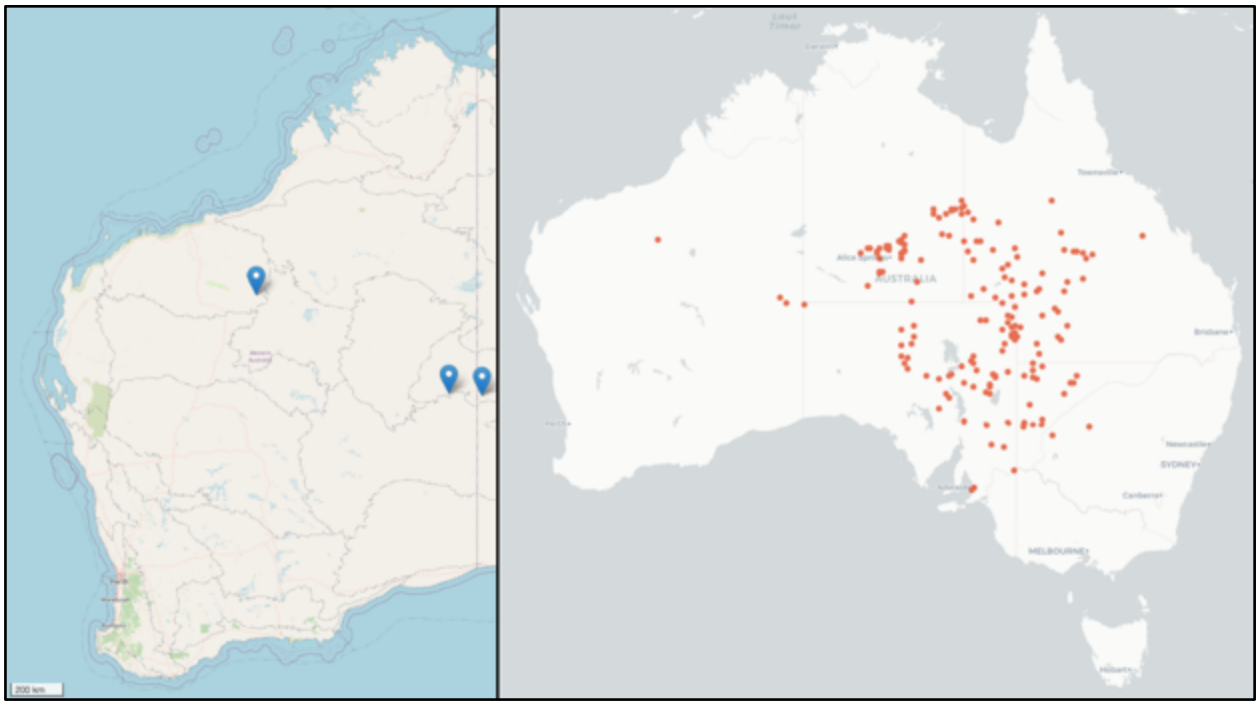


Figure 14. Distribution of *Euphorbia parvicaruncula* (P1) within Western Australia (WA Herbarium 1998-2024) and Australia (AVH 2024).

***Menkea lutea* (P1)**

Menkea lutea (P1) is described as an erect to prostrate annual glabrous herb that grows to 0.15m tall. The basal leaves grow to 6cm long and up to 1cm wide, with 2-4 segments on either side (Flora of Australia, 1982). The flowers are a vibrant yellow recorded in July following suitable seasonal conditions (Plate 5). It grows on red loam soils, often associated with clay-based ephemeral playa lakes in central Australia.

Menkea lutea (P1) is currently recognised from five records within Western Australia (Western Australian Herbarium, 2024), only occurring in the Central Ranges IBRA regions. It is localised to the Central Ranges IBRA region in Central Australia, with 21 recognised by AVH (2024) (Figure 15). Two of the AVH records are questionable due to their significant disjunction from the majority of records at the junction of the SA/NT/WA borders. The record within central WA, 114 km east-north-east of Wiluna (NSW447774), is likely a taxonomic error where the specimen is noted as having pink flowers versus the typical yellow flowers of *Menkea lutea*. The record in eastern SA (AD99635331) is significantly disjunct from the majority of records and may also be suspect. As *Menkea lutea* is considered Rare in South Australia, these two anomalies have been raised with AVH to review the ID of each specimen.

Menkea lutea (P1) was recorded within most Claypan Grassland (CPNG) habitats, and smaller hardpan patches within the Hardpan Mulga Woodland (HPMW) vegetation association across the Study Area (Plate 6) (Figure 11). A total of 17,737 *Menkea lutea* (P1) were recorded during the 2024 field survey, often in association with *Euphorbia parvicaruncula* (P1) (Plate 6).

The holotype specimen (the original collected and curated specimen - used to describe the species) for *Menkea lutea* was collected from the Wingellina airstrip, Tomlinson Range (130 km SSE of the Study Area) with further collections from the Blackstone Range mining camp (60 km SSE). At both these locations it is also associated with the CPNG vegetation association (Figure 15).

Notably, three of proposed access tracks, and 15 of the proposed 37 drilling alignments intersect *Menkea lutea* (P1) populations (Figure 11). The affected populations can be easily avoided by modifying the locations of the access track and drilling alignments to go around the Claypan Grassland (CPNG) vegetation associations.

Plate 5. ***Menkea lutea*** **(P1).**

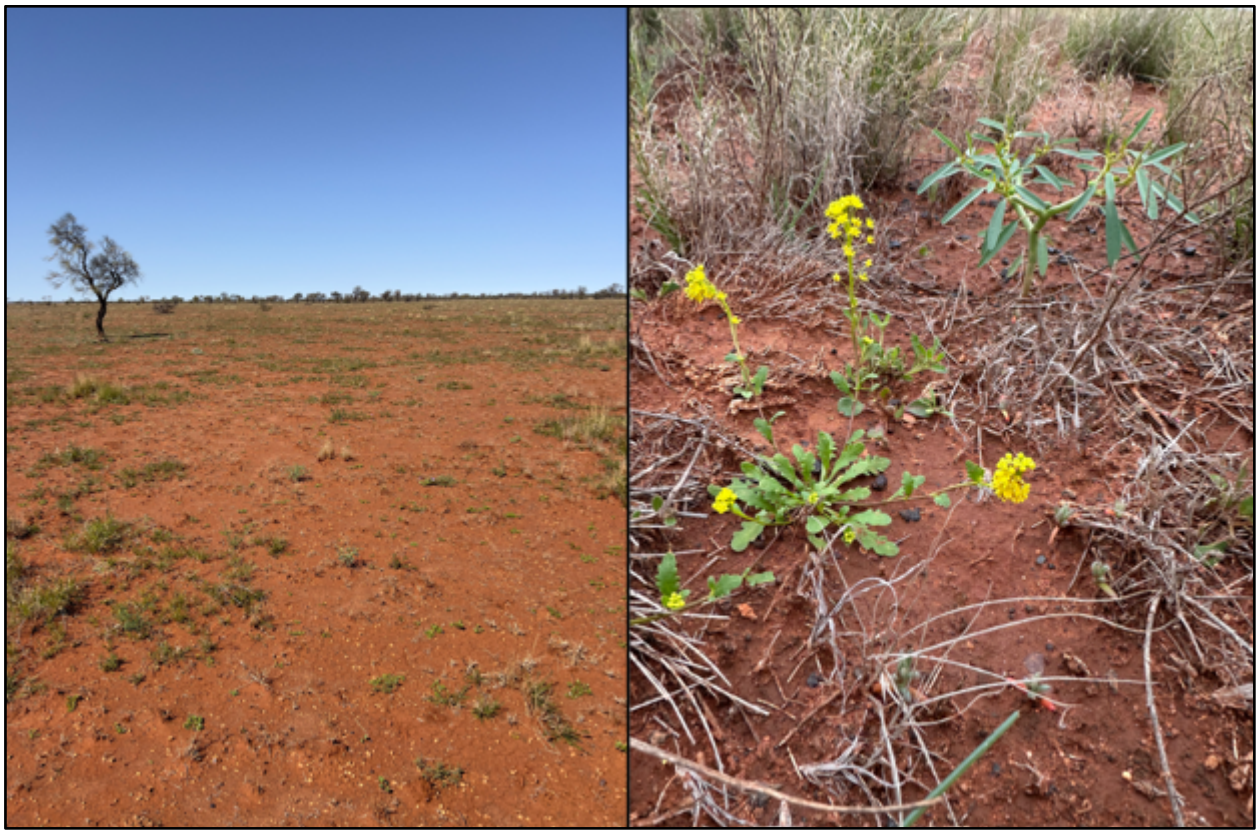


Plate 6. Habitat supporting ***Menkea lutea*** **(P1) within the Study Area (left), and** ***Menkea lutea*** **(P1) growing in association with** ***Euphorbia parvicaruncula*** **(P1).**

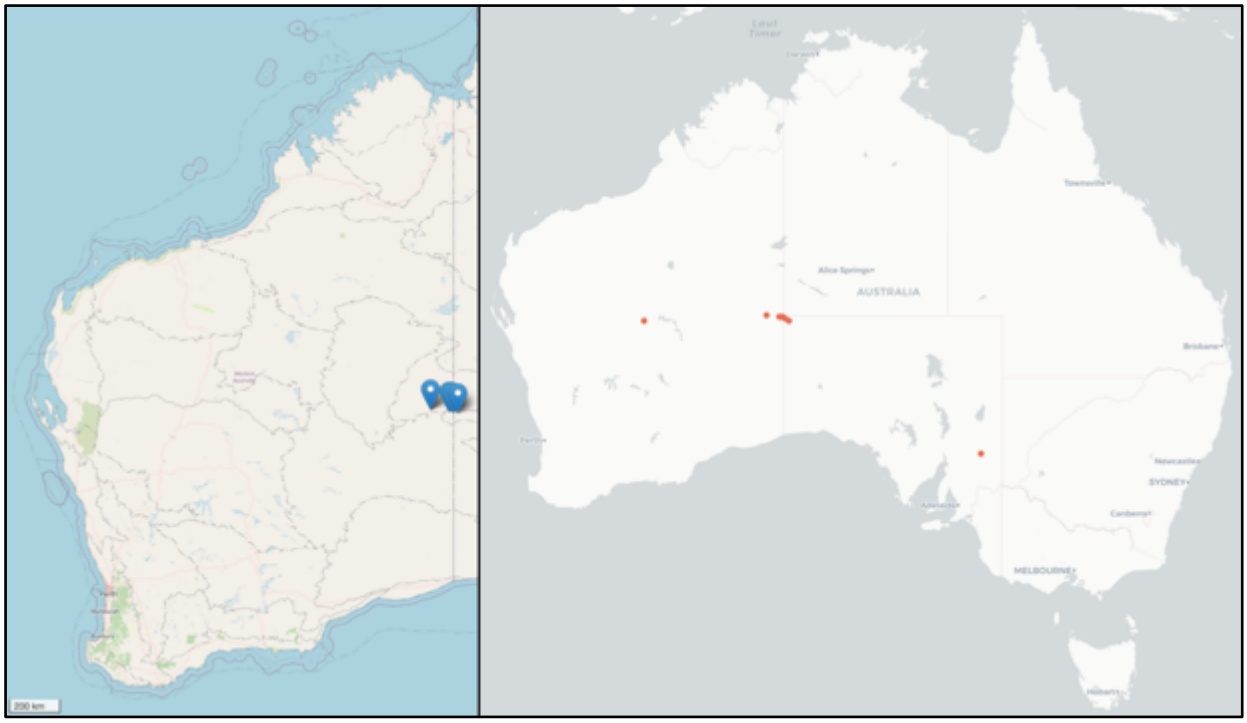


Figure 15. Distribution of *Menkea lutea* (P1) within Western Australia (WA Herbarium 1998-2024) and Australia (AVH 2024).

Stackhousia clementii (Priority 3)

Stackhousia clementii (P3) is a member of the Celastraceae family. It is a dense broom-like perennial herb growing to 0.45 m high (Plate 7). It grows on skeletal soils and sandstone hills and has been recorded in the region growing on shallow sands over calcrete (Western Australian Herbarium 1988-2024).

Stackhousia clementii (P3) is currently recognised from 22 records within Western Australia (Western Australian Herbarium 2024), occurring from Carnarvon and the Pilbara to the Central Ranges IBRA regions. It is more widespread within Australia, with 189 records recognised by AVH (2024), most of which occur in the Northern Territory, with some records in South Australia and Queensland (Figure 16).

Stackhousia clementii (P3) was found at three sites within the Leto Prospect, two bordering proposed drill line buffers, and one along an existing access track (Figure 11). Twenty-two plants were recorded at these sites combined. *Stackhousia clementii* was always associated with the HPMW vegetation association.

Plate 7. *Stackhousia clementii* (P3).

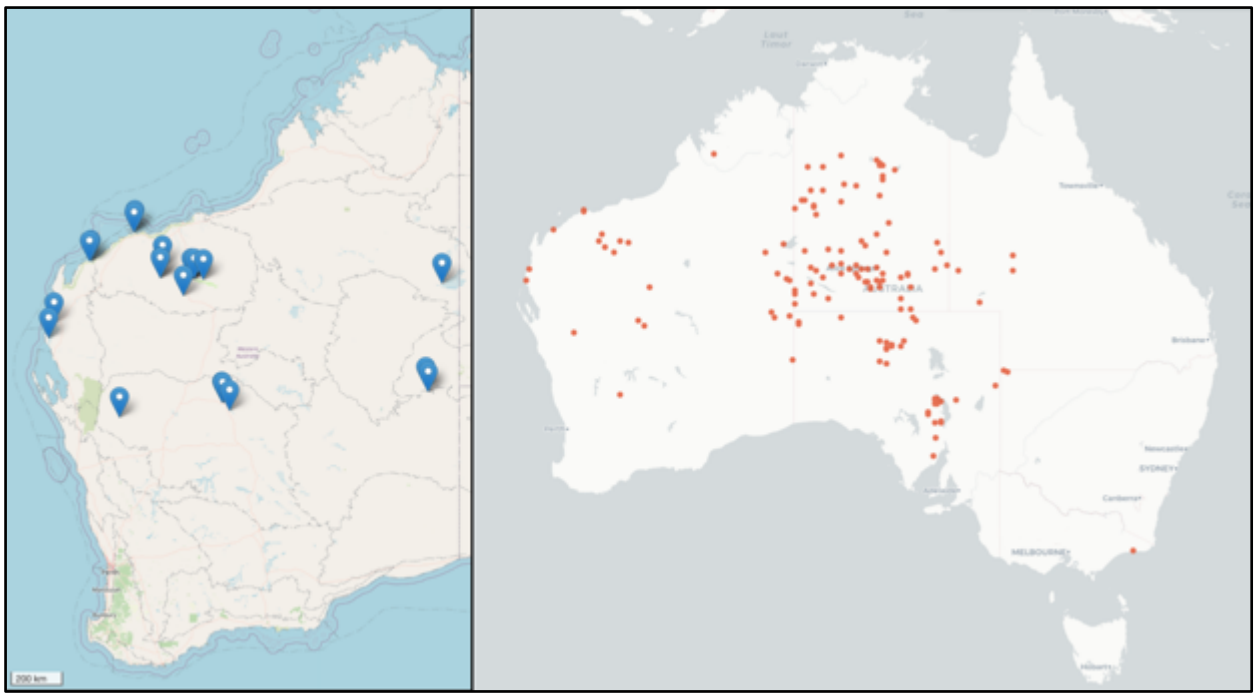


Figure 16. Distribution of *Stackhousia clementii* (P3) within Western Australia (WA Herbarium 1998-2024) and Australia (AVH 2024).

Tephrosia sp. Central (P.K. Latz 17037) (Priority 3)

Tephrosia sp. Central (P.K. Latz 17037) (P3) is a member of the Fabaceae family. It is an ascending perennial herb to 0.5 m. The leaves are pinnate with 11-15 leaflets per leaf; the leaflets 4-10mm long x 5mm wide. The flowers are small and orange and the fruits are elongated, approximately 4 mm wide x 20mm long (Plate 8).

Tephrosia sp. Central (P.K. Latz 17037) (P3) is recognised from only three records within Western Australia (Western Australian Herbarium 1998-2024). However, is widespread in the Northern Territory and south-western Queensland, with a total of 77 records recognised by the Australasian Virtual Herbarium (2024) (Figure 17). Although *Tephrosia* sp. Central (P.K. Latz 17037) is well known across wider Australia, it has been assigned a Priority 3 status by DBCA due to the low amount of collections in W.A.

Two plants of *Tephrosia* sp. Central (P.K. Latz 17037) (P3) were found at one site within the Leto Prospect (Figure 11). This population sits outside the buffer of any proposed drill lines and access tracks. However, *Tephrosia* sp. Central (P.K. Latz 17037) (P3) is associated with the Hardpan Mulga Woodland (HPMG) vegetation association of the Leto Prospect.

Plate 8. *Tephrosia* sp. Central (P.K. Latz 17037) (P3).

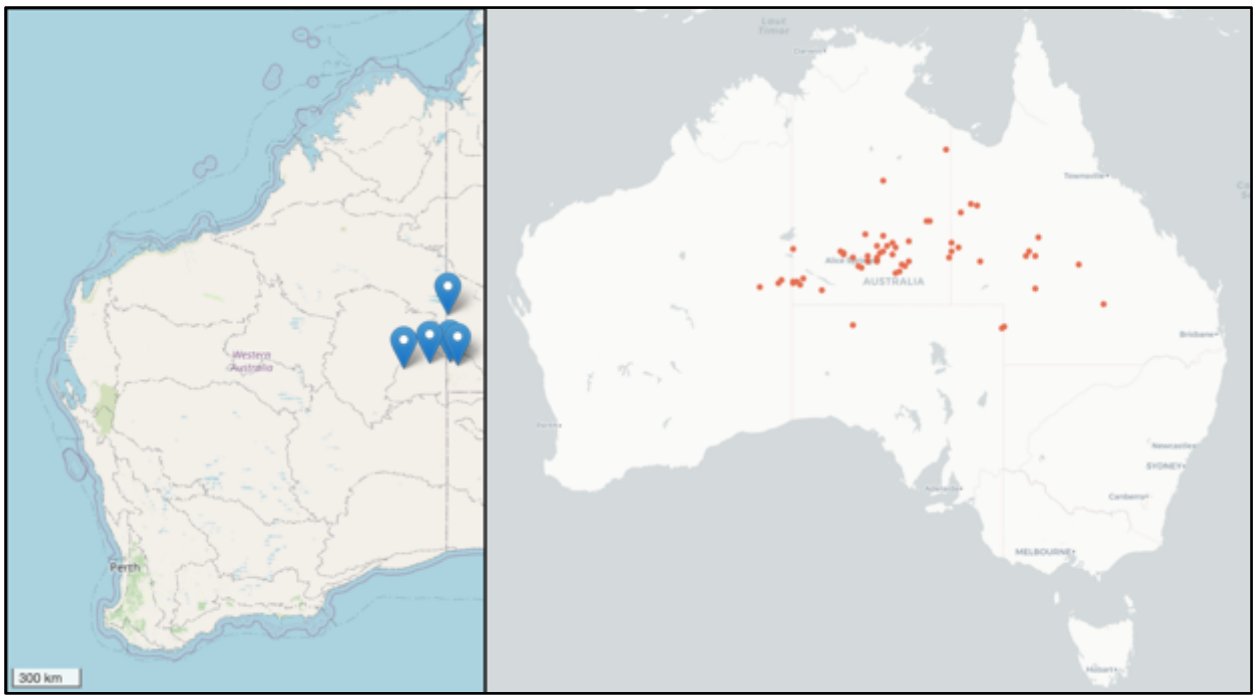


Figure 17. Distribution of *Tephrosia* sp. Central (P.K. Latz 17037) (P3) within Western Australia (WA Herbarium 1998-2024) and Australia (AVH 2024).

4.2.3. Species of Interest

The following four species collected during the survey are regarded as Species of Interest (SOIs) for a number of reasons (Figure 18). A brief description of each species and reasoning for SOI status is presented below.

Leiocarpa leptolepis

Leiocarpa leptolepis is an erect bushy perennial herb, growing 0.1 m to 0.45 m high with a woody base and cottony hairy stems. The narrow leaves are glabrous or sparsely glandular-hairy, linear to oblanceolate in shape, 1.5 cm to 5 cm long, and 2 mm to 7 mm wide (NHNSW, 2024). *Leiocarpa leptolepis* is distinct in the pappus bristle length being equal to the corolla, and older branches covered with a dense woolly indumentum that forms a silvery sheen (Wilson, 2001). It typically grows in grassland and woodland habitats on a variety of soils (Greig, 2001). *Leiocarpa leptolepis* is the type species of the *Leiocarpa* genus (Wilson, 2001).

It is currently recognised from 730 records within Australia, widespread across the Northern Territory, Queensland, New South Wales, and South Australia, with some records in Victoria (AVH, 2024). There is one AVH record of *Leiocarpa leptolepis* within Western Australia from the Petermann Ranges, this specimen is preserved at the Australian National Herbarium in Canberra (AVH, 2024). *Leiocarpa leptolepis* is currently not listed on the WA Plant Census as it is not recognised as occurring in Western Australia by the Department of Biodiversity, Conservation and Attractions (DBCA).

Leiocarpa leptolepis was collected at two locations within the Dante Project, in the south-west corner of the Leto Prospect (Collection 193, Wpt 1009/1006) and in the northern corner of the Crius Prospect (Collection 68, Wpt 165/1006) (Figure 18). In the Leto Prospect *Leiocarpa leptolepis* was growing alongside the buffer zone of a proposed drilling alignment and an existing track, in association with the Hardpan Mulga Woodland (HPMW) vegetation association. In the Crius Prospect *Leiocarpa leptolepis* was growing along the northern proposed drilling alignment in the Claypan Grassland (CPNG) vegetation association.

Western Botanical was unable to identify this specimen using available botanical keys and didn't match any specimens at the WA Reference Herbarium. The specimen was lodged at the WA Herbarium for expert confirmation of ID and was confirmed by Michael Hislop (Identification Botanist Technical Officer) as *Leiocarpa leptolepis*. This collection represents a new species for the WA Plant Census and has been lodged for vouchering at the WA Herbarium. It will likely obtain Priority One status upon processing by the WA Herbarium (M. Hislop, personal communication, November 11, 2024).

As *Leiocarpa leptolepis* was only recognised during the identification process post-field survey, it was not recognised in the field and counts and distribution of this species across the Study Area are not accurate. It is expected that *Leiocarpa leptolepis* may occur in other HPMW and CPNG

areas across the Study Area. Further surveys during appropriate seasonal conditions are required to ascertain accurate counts and distribution of this species across the Dante Project.

Poaceae sp. Indet

Poaceae sp. Indet was collected at one location within the Study Area, in the north-west area of the Crius Prospect (Collection 74, Wpt 238/1006) (Figure 18). Poaceae sp. Indet was growing on the boundary of a buffer zone for a proposed drilling alignment, in association with the Claypan Grassland (CPNG) vegetation association.

Poaceae sp. Indet could not be fully identified using available botanical keys and resources at the WA Reference Herbarium. It most resembles and has the same basal structure as *Aristida jerichoensis* var. *subspinulifera* (P3). However, our collection of Poaceae sp. Indet lacks the appropriate flowering material needed to confirm it's ID as *Aristida jerichoensis* var. *subspinulifera* (P3). *Aristida jerichoensis* var. *subspinulifera* (P3) is known to occur in the area, previously recorded by Western Botanical at the West Musgrave Copper and Nickle Project (<50 km south of the Dante Project). Furthermore, the habitat of Poaceae sp. Indet matches that of *Aristida jerichoensis* var. *subspinulifera* (P3), which grows on claypans hardpan plains (Western Botanical, 2022). It is unlikely that Poaceae sp. Indet is *Aristida jerichoensis* var. *jerichoensis* as that species is not known to occur in central Australia, extending from central Queensland to southern New South Wales (Simon & Alfonso, 2011).

Senna cardiosperma* subsp. *microphylla

Senna cardiosperma subsp. *microphylla* is a low to medium shrub, or rarely small tree, growing 0.4 m to 2 m tall with terete, densely woolly leaflets in pairs of eight to ten, 8 to 12 mm long and 1 mm in diameter (Randell, 1989). It is currently recognised from 30 records within Australia, most of which occur in South Australia, with some records in the Northern Territory (AVH, 2024). There is one AVH record of *Senna cardiosperma* subsp. *microphylla* within Western Australia from the Elder Exploring Expedition in 1891. *Senna cardiosperma* subsp. *microphylla* is currently not listed on the WA Plant Census as it is not recognised as occurring in Western Australia by the Department of Biodiversity, Conservation and Attractions (DBCA).

Senna artemisioides subsp. x *artemisioides* is a recognised species of Western Australia that is a hybrid between *Senna artemisioides* and *Senna cardiosperma* subsp. *microphylla* (Randell, 1989). A separation between *Senna artemisioides* subsp. x *artemisioides* and *Senna cardiosperma* subsp. *microphylla* can be made on the length of petioles and the distance between leaflets. *Senna artemisioides* subsp. x *artemisioides* has petioles 6 to 15 mm long and leaflets 5 to 15 mm apart, whereas *Senna cardiosperma* subsp. *microphylla* has petioles 1 to 5 mm long and leaflets 1 to 5 mm apart (Randell, 1989).

Senna cardiosperma subsp. *microphylla* was collected in the north-western area of the Crius Prospect (Collection 108, Wpt 214/1006) (Figure 18). It was growing adjacent to the buffer zone of a proposed drilling alignment in a Hardpan Mulga Woodland (HPMW) vegetation association.

The diagnostic features of this collection are aligned with that of *Senna cardiosperma* subsp. *microphylla* with densely woolly indumentum on vegetative parts, 8 to 11 mm long leaflets in pairs of eight to ten with 2 mm spacing, and petioles 4 mm long. There were no specimens of *Senna cardiosperma* subsp. *microphylla* available for comparison at the WA Reference Herbarium. However, the collection was compared to and matched online images of *Senna cardiosperma* subsp. *microphylla* collections available through JSTOR.

This collection of *Senna cardiosperma* subsp. *microphylla* represents a north-west range extension of 250 km, and a new species for the WA Plant Census. The specimen has been lodged at the WA Herbarium for expert confirmation of ID and vouchering, and will likely obtain Priority flora status upon taxonomic review. *Senna cardiosperma* subsp. *microphylla* was only recognised during the identification process post-field survey. As it was not recognised in the field the counts and distribution of this species across the Study Area are not accurate. It is expected that *Senna cardiosperma* subsp. *microphylla* may occur in other HPMW areas across the Study Area. Pending taxonomic review, further surveys during appropriate seasonal conditions may be required to ascertain accurate counts and distribution of this species across the Dante Project.

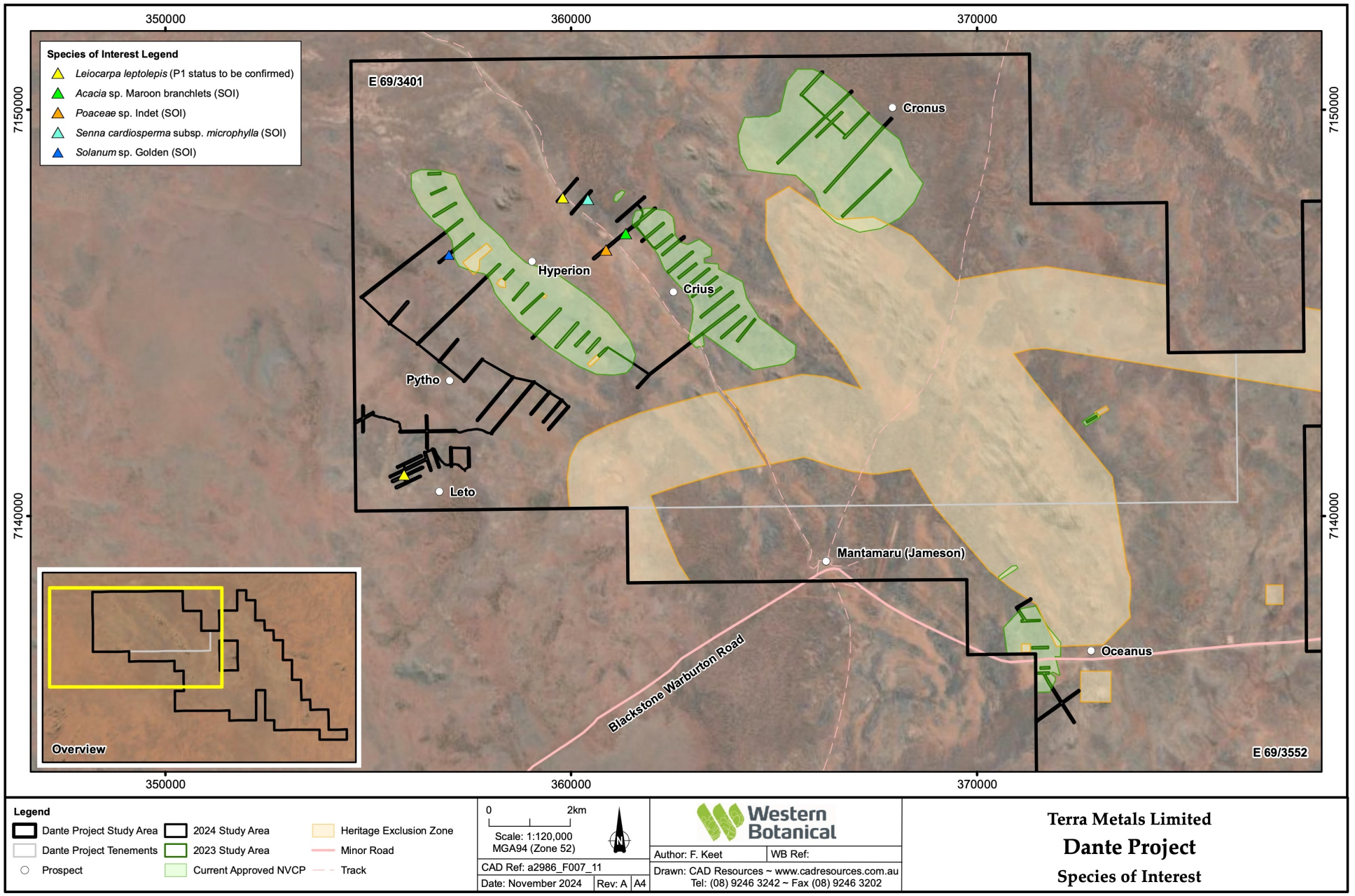
Solanum sp. Golden

Solanum sp. Golden was collected at one location within the Dante Project, in the north-western area of the Hyperion Prospect (Collection 175, Wpt 929/1006) (Figure 18). It was growing along a proposed drilling alignment, in association with the Hardpan Mulga Woodland (HPMW) vegetation association.

Solanum sp. Golden could not be identified using available botanical keys and specimens at the WA Reference Herbarium, and shares characteristics of *Solanum centrale* and *Solanum terraneum*. *Solanum* sp. Golden is covered in dense stellate non-glandular indumentum, has discolorous golden foliage, 1 to 2 mm long spines on the stems, and entire leaves 1 to 3 cm wide (Symon, 1981). It shares diagnostic indumentum, leaf size and margin characteristics with *Solanum terraneum*, differing in *S. terraneum* having "slightly" discolorous leaves that are grey-green in colour, and 3 to 5 mm long spines on the stems (Symon, 1981). *Solanum centrale* differs to *Solanum* sp. Golden in having grey-green concolorous leaves (sometimes rusty or yellowish green), and leaves 1 to 2 cm wide (Symon, 1981). *Solanum terraneum* grows on red sand or clay of undulating plains and stony hills, similar to that of *Solanum* sp. Golden, whereas *Solanum centrale* grows on red sand or loam of sandplains and sand dunes (Western Australian Herbarium 1988-2024).

Solanum sp. Golden requires the collection of flower and fruit material for definitive identification. Neither *Solanum centrale* or *Solanum terraneum* are priority species. However, if *Solanum* sp. Golden is identified as *Solanum terraneum* it'll be a major range extension of 520 km north-east for that species within Western Australia, and the first record within the Central Ranges IBRA region.

Figure 18. Locations of Species of Interest Recorded Within the Study Are


Species of Interest Legend
Leiocarpa leptolepis (P1 status to be confirmed)
Acacia sp. Maroon branchlets (SOI)
Poaceae sp. Indet (SOI)
Senna cardiosperma subsp. microphylla (SOI)
Solanum sp. Golden (SOI)
E 69/3401
Cronus
Hyperion
Crius
Pytho
Leto
Mantamaru (Jameson)
Oceanus
Blackstone Warburton Road
E 69/3552
Overview
350000
360000
370000
7150000
7140000
Legend
Dante Project Study Area
Dante Project Tenements
Prospect
2024 Study Area
2023 Study Area
Current Approved NVCP
Heritage Exclusion Zone
Minor Road
Track
0 2km
Scale: 1:120,000
MGA94 (Zone 52)
CAD Ref: a2986_F007_11
Date: November 2024 Rev: A A4
Western Botanical
Author: F. Keet WB Ref:
Drawn: CAD Resources ~ www.cadresources.com.au
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Terra Metals Limited
Dante Project
Species of Interest

4.2.4. Range Extensions

Nine collections of species representing extensions, and four collections representing infills to their current known distribution were made during the 2024 field survey. These species include:

Table 6. Range extensions and infills of species within the Study Area.

Name	Type	Distance	Coll #	Latitude	Longitude
Abutilon cryptopetalum	Infill	130 km	83	N/A	N/A
Abutilon malvifolium	Infill	130 km	56	-25.781381	127.600875
Alternanthera angustifolia	Extension	160 km South-East	157	N/A	N/A
Calandrinia ptychosperma	Extension	100 km South	149	-25.818718	127.616374
Eremophila battii	Extension	150 km East	145	-25.830402	127.602268
Euphorbia inappendiculata var. *queenslandica* P3	Extension	150 km	151	-25.818718	127.616374
Maireana pyramidata	Extension	220 km East	54	-25.780340	127.600734
			Recoll	-25.820896	127.590324
Pluchea dunlopii	Extension	150 km South	144	-25.855031	127.658835
Rhodanthe citrina	Extension	100 km East	137	-25.821991	127.621021
Sclerolaena cuneata	Extension	160 km North-East	44	-25.780313	127.600732
			139	-25.821991	127.621021
			n.c.	-25.823583	127.597075
Senna sp. Billabong (J.D. Alonzo 721)	Infill	100 km	23	-25.805562	127.626682
Streptoglossa liatroides	Extension	230 km East	53	-25.781381	127.600875
Triodia longiceps	Extension	340 km South-East	203	-25.897818	127.725179

The above species have been lodged for vouchering at the WA Herbarium. *Maireana pyramidata*, *Streptoglossa liatroides*, and *Triodia longiceps* are significant range extensions (>200 km). A description of each of these species is outlined below.

Maireana pyramidata – 220km Range Extension

Maireana pyramidata is a divaricately branched shrub that grows 0.3 m to 1.5 m in height (Western Australian Herbarium 1988-2024) (Plate 9). It is commonly found on clay loam, sandy loam, and red/brown sand of saline flats and salt lakes (Western Australian Herbarium 1988-2024).

Maireana pyramidata is currently recognised from 105 records within Western Australia, and is widespread from the Pilbara and Great Sandy Desert to the Avon Wheatbelt and Nullarbor IBRA regions (Western Australian Herbarium 1988-2024) (Figure 19). It is further widespread within Australia, with 988 records recognised by AVH (2024), most of which occur in South Australia and New South Wales, with some records in the Northern Territory, Queensland and Victoria (Figure 19).

During the survey, two records of *Maireana pyramidata* were collected, occurring along a proposed track in the Pytho Prospect and adjacent to a proposed drilling alignment in the Crius Prospect, both growing within the Claypan Grasslands (CPNG) vegetation association. This collection represents a 220 km range extension to the east of the current known distribution of *Maireana pyramidata*, and is the first known occurrence within the Central Ranges IBRA region.

Plate 9. *Maireana pyramidata* (DPIRD, 2022).

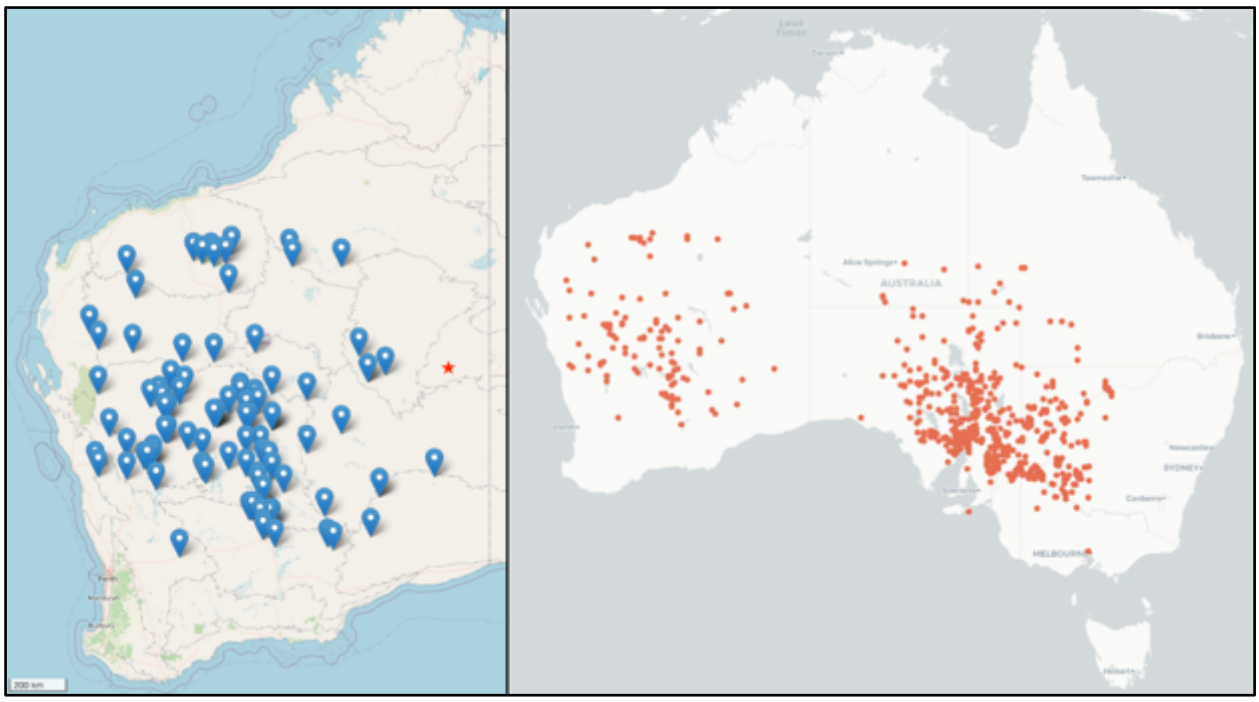


Figure 19. Distribution of *Maireana pyramidata* within Western Australia (WA Herbarium 1998-2024) and Australia (AVH 2024), and 220 km range extension.

Streptoglossa liatroides – 230km Range Extension

Streptoglossa liatroides is a short-lived, procumbent or erect perennial herb with pink to red-purple flowers and grows 0.15 m to 0.5 m in height (Western Australian Herbarium 1988-2024) (Plate 10). It grows on a variety of soils and is commonly found along stony watercourses, on coastal limestone, and saline flats (Western Australian Herbarium 1988-2024).

Streptoglossa liatroides is currently recognised from 181 records within Western Australia, and is widespread from the Carnarvon and the Pilbara to the Great Sandy Desert and Coolgardie IBRA regions, with one record in the Victoria Bonaparte IBRA region (Western Australian Herbarium 1988-2024) (Figure 20). It is further widespread across Australia, 669 records recognised by AVH (2024), most of which occur in the Northern Territory and South Australia, with some records in Queensland and New South Wales (Figure 20).

During the survey, one record of *Streptoglossa liatroides* was collected, occurring on a proposed drilling alignment in the Crius Prospect within the Claypan Grasslands (CPNG) vegetation association. This collection represents a 230 km range extension to the south of the current known distribution of *Streptoglossa liatroides*, and is the first known occurrence within the Central Ranges IBRA region of Western Australia.

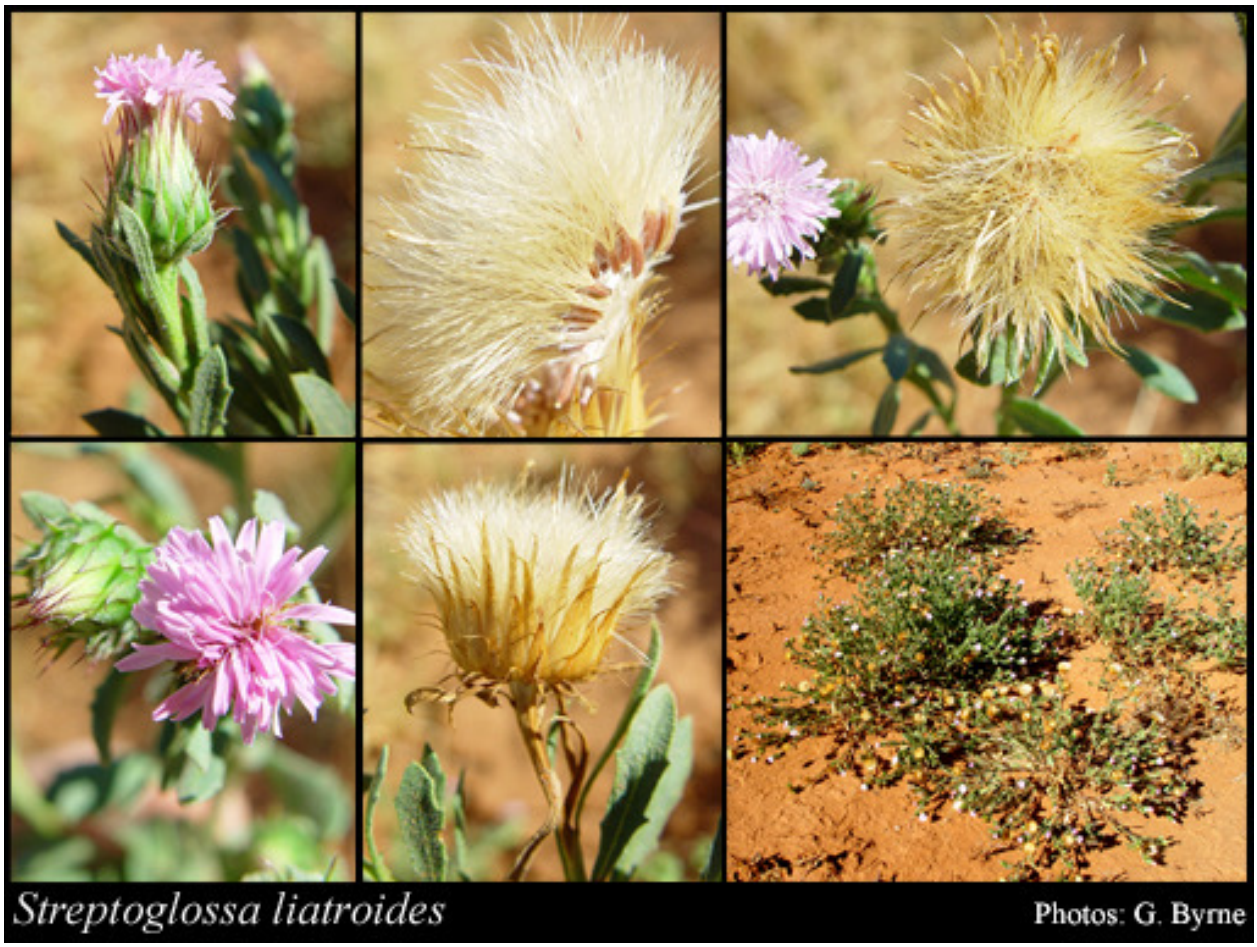


Plate 10. *Streptoglossa liatroides* (WA Herbarium 1998-2024).

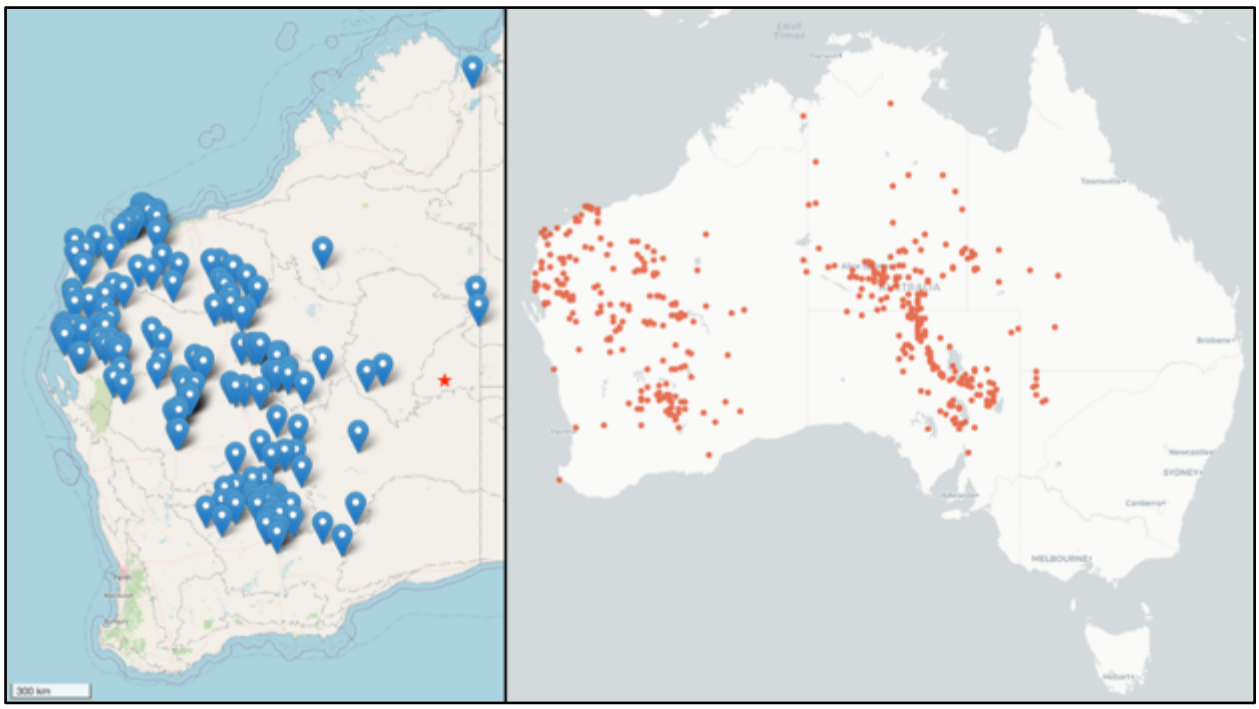


Figure 20. Distribution of *Streptoglossa liatroides* within Western Australia (WA Herbarium 1998-2024) and Australia (AVH 2024), and 230 km range extension.

Triodia longiceps – 340 km Range Extension

Triodia longiceps is a tussock-forming perennial grass that grows 0.45 m to 2 m high, with a spiciforma panicle, linear spikelets, and minutely lobed lemma (Western Australian Herbarium 1988-2024) (Plate 11). It grows on the white alluvium, rocky loam, or red sands of stony hills and watercourses (Western Australian Herbarium 1988-2024).

Triodia longiceps is currently recognised from 112 records within Western Australia, from the Carnarvon and the Pilbara to the Gibson Desert and Murchison IBRA regions, with one record in the Tanami IBRA region (Western Australian Herbarium 1988-2024) (Figure 21). It is further widespread within Australia, with 392 records recognised by AVH (2024), most of which occur in the Northern Territory and Queensland, with some records in South Australia (Figure 21).

During the survey, one specimen of *Triodia longiceps* was collected from a population occurring on a proposed drilling alignment of the Oceanus Prospect within the *Triodia longiceps* Shrubland (TlS) vegetation association. This collection represents a 340 km range extension to the east of the current known distribution of *Triodia longiceps*, and is the first known occurrence within the Central Ranges IBRA region of Western Australia.

Plate 11. *Triodia longiceps* within Oceanus Prospect, and inflorescence, leaf sheath and leaf orifice (SpiKey, 2017).

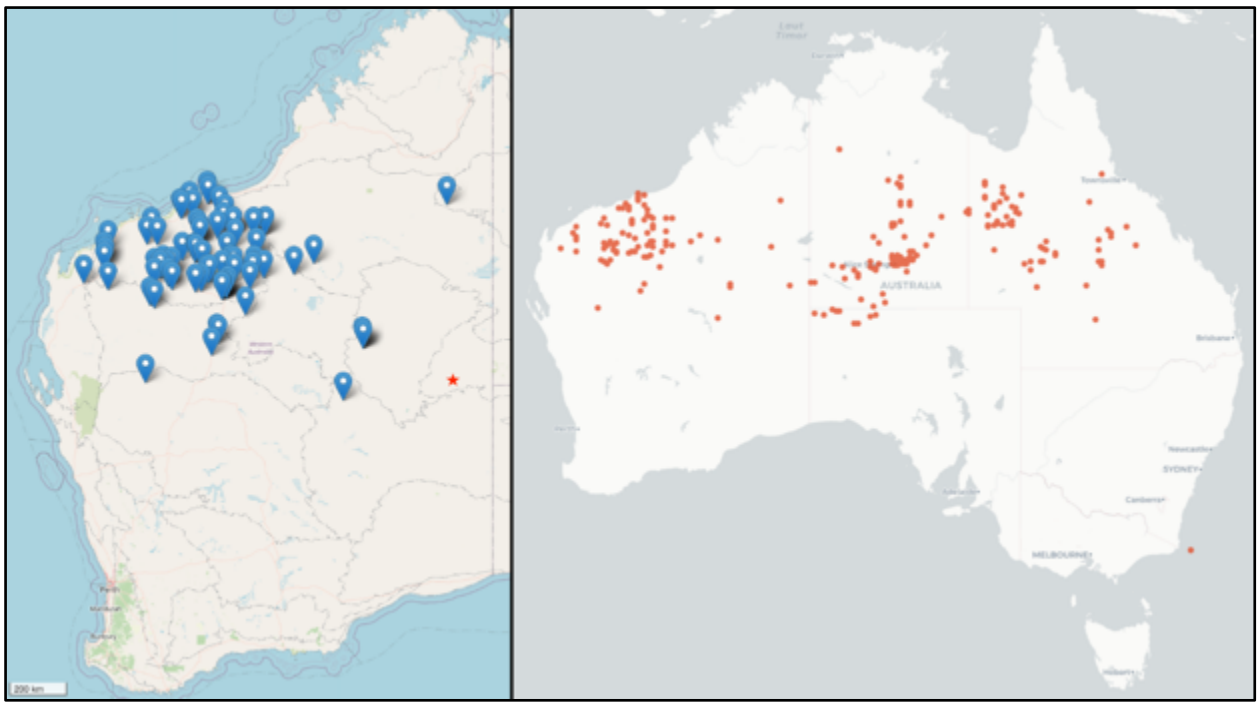


Figure 21. Distribution of *Triodia longiceps* within Western Australia (WA Herbarium 1998-2024) and Australia (AVH 2024), and 340 km range extension.

4.2.5. Weeds

***Cenchrus ciliaris* (Buffel Grass)**

Cenchrus ciliaris (Buffel Grass) is a member of the Poaceae Family, described as a tufted occasionally stoloniferous perennial grass. It grows from 0.2 m to 1.5 m tall with purple flowers. Flowering has been recorded occurring between February and October, including on plants less than 3 months old. It is a known weed originating from Africa introduced as a livestock forage (Western Australian Herbarium 1988-2024) (Plate 12).

Cenchrus ciliaris is not listed by the Department of Primary Industries and Regional Development (DPIRD) as a Weed of National Significance (WoNS), and the occurrences of it within the WMP are not surprising as it is a common weed species associated with rangeland agriculture and is readily distributed by Camels. *Cenchrus ciliaris* has been recorded widely across Western Australia within the Avon Wheatbelt, Carnarvon, Central Kimberley, Central Ranges, Coolgardie, Dampierland, Gascoyne, Geraldton Sandplains, Gibson Desert, Great Sandy Desert, Little Sandy Desert, Murchison, Nullarbor, Ord Victoria Plain, Pilbara, Swan Coastal Plain, Tanami, Victoria Bonaparte, and Yalgoo IBRA regions (Western Australian Herbarium 1988-2024), (Figure 22).

One Hundred and ninety-two locations of *Cenchrus ciliaris* were recorded with approximately 11,088 plants within the Dante Project. This species is widespread within the Survey Area (Figure 27).

Plate 12. *Cenchrus ciliaris* (Buffel Grass).

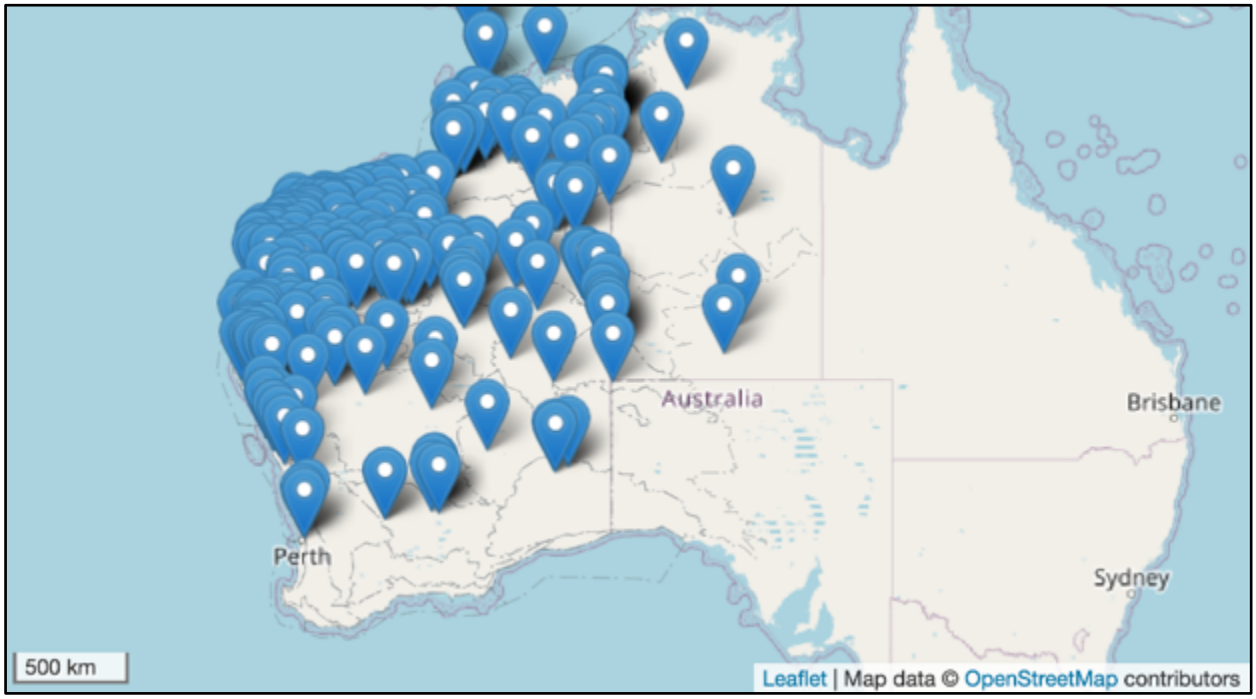


Figure 22. *Cenchrus ciliaris* (Buffel Grass) distribution in W.A. (Western Australian Herbarium 1988-2024).

***Citrullus colocynthis* (Bitter Melon)**

Citrullus colocynthis is a member of the Cucurbitaceae Family, and is described as a trailing perennial, herb or climber, with yellow flowers that have been recorded between January through to October. *Citrullus colocynthis* colonises disturbed areas and happily grows within many different soil types including sandy, rocky, stony, loam, clay, and wet soils (Western Australian Herbarium 1988-2024) (Plate 13).

Citrullus colocynthis is not listed by DPIRD as a WoNS. It was recorded at one location with within the Dante Project with 2 plants recorded on the edge of the Mantamaru road where it intersects with the Project (Figure 27). *Citrullus colocynthis* is a wide spread weed species across Western Australia and has been recorded within the Avon Wheatbelt, Carnarvon, Central Kimberley, Central Ranges, Coolgardie, Dampierland, Gascoyne, Murchison, Ord Victoria Plain, Pilbara, Tanami, Victoria Bonaparte, and Yalgoo IBRA regions (Figure 23) (Western Australian Herbarium 1988-2024).

Plate 13. *Citrullus colocynthis* photographed along the side of the Mantamaru road.

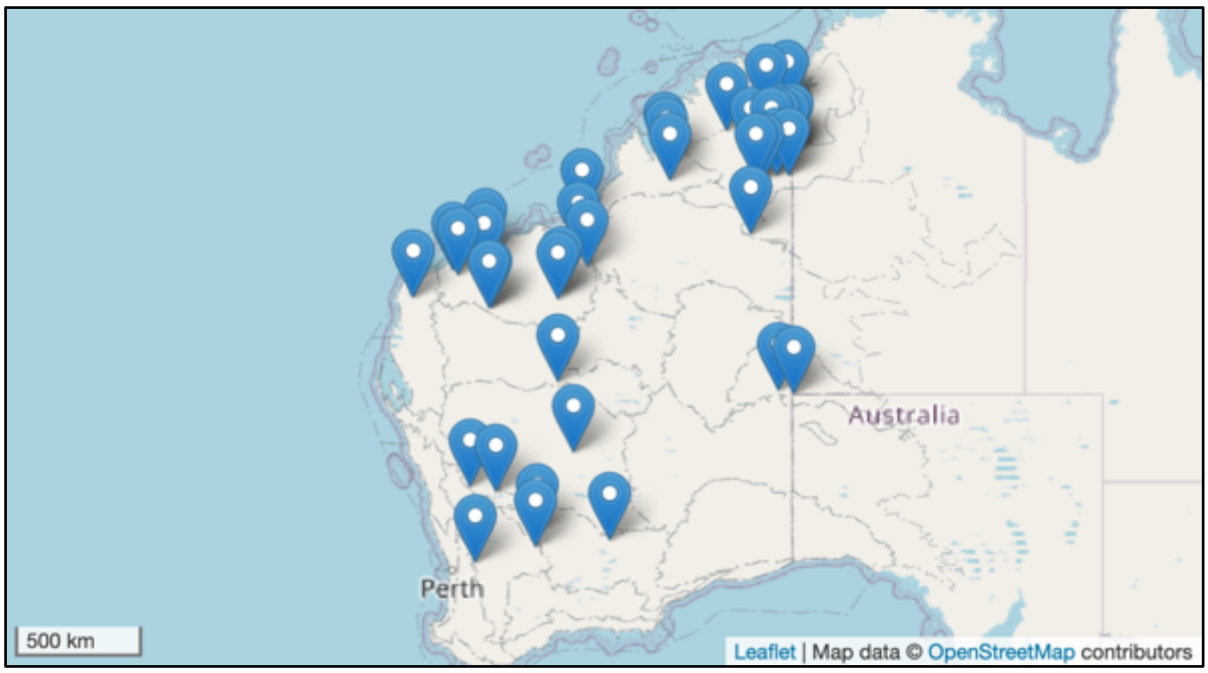


Figure 23. Map of *Citrullus colocynthis* distribution in WA (Western Australian Herbarium 1988-2024).

***Eragrostis minor* (Smaller Stinkgrass)**

Eragrostis minor is a member of the Poaceae Family, described as an aromatic, glandular erect, decumbent or prostrate annual. It grows from 0.06 m to 0.6 m tall. The inflorescence is an open green panicle to 0.2m long. It is a known weed to Western Australia originating from Africa, Asia, and parts of Australia (Western Australian Herbarium 1988-2024) (Plate 14).

Eragrostis minor is not listed by the DPIRD as a WoNS. It was recorded at one location with approximately 50 plants as a roadside weed (Figure 27). The location is at the point where the proposed alignment meets the Mantamaru road. *Eragrostis minor* has been recorded widely across Western Australia, from the Avon Wheatbelt, Carnarvon, Central Ranges, Dampierland, Geraldton Sandplains, Pilbara, and Swan Coastal Plain, IBRA regions (Western Australian Herbarium 1988-2024) (Figure 24).

Plate 14. *Eragrostis minor* (Smaller Stinkgrass).

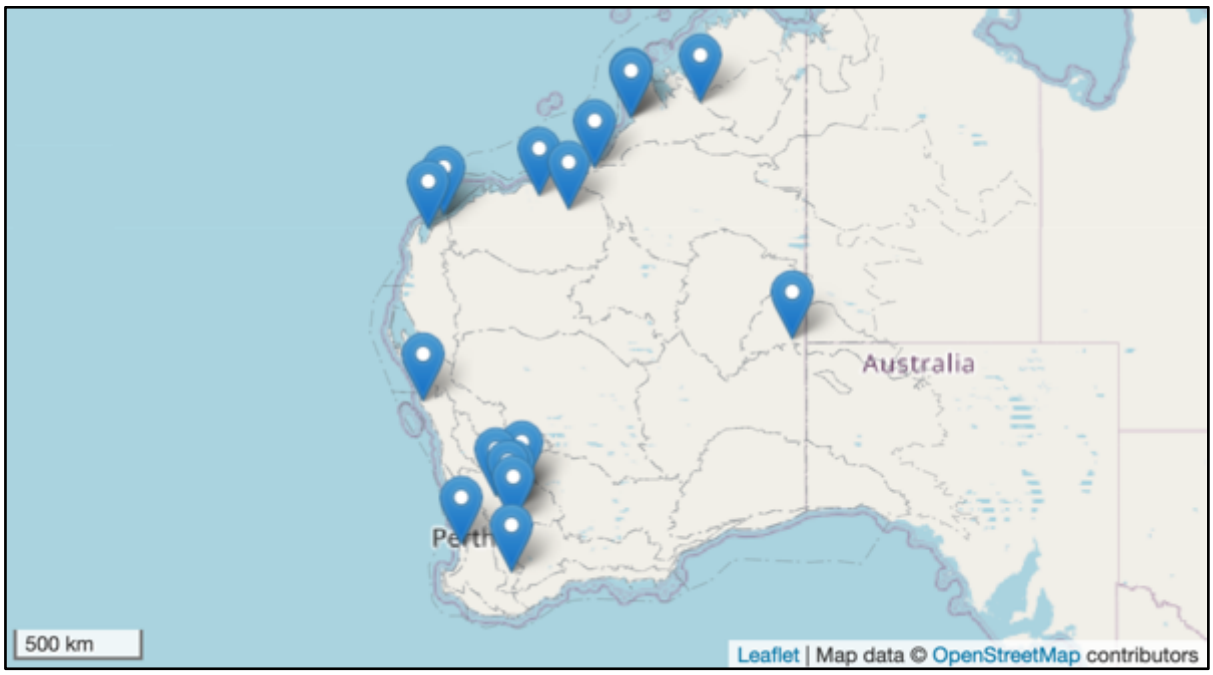


Figure 24. *Eragrostis minor* distribution in W.A. (Western Australian Herbarium 1988-2024).

Malvastrum americanum (Spiked Malvastrum)

Malvastrum americanum is a member of the Malvaceae Family, and is described as an erect perennial, herb or shrub from 0.5 m to 1.3 m high. The flowers are yellow/orange and occur between April and July (Plate 15). It has been recorded across a variety of soil types and

landscapes, including different types of sands, clays, limestone, and calcrete, whilst the landscapes include stony ridges and hillsides, floodplains, and along drainage lines (Western Australian Herbarium 1988-2024).

Malvastrum americanum is not listed by DPIRD as a WoNS. It's a wide spread weed species across Western Australia and has been recorded within the Carnarvon, Central Kimberley, Central Ranges, Dampierland, Gascoyne, Great Sandy Desert, Little Sandy Desert, Murchison, Nullarbor, Ord Victoria Plain, Pilbara, and Victoria Bonaparte IBRA regions, (Western Australian Herbarium 1988-2024) (Figure 25). A total of 442 *Malvastrum americanum* plants were recorded within the Dante Project from 10 locations. The populations are spread sporadically through the Hardpan Mulga Woodland (HPMW), and Calcrete Open Grasslands (COG). At one of the locations 200 plants were recorded (Figure 27).

Plate 15. *Malvastrum americanum* (Spiked Malvastrum).

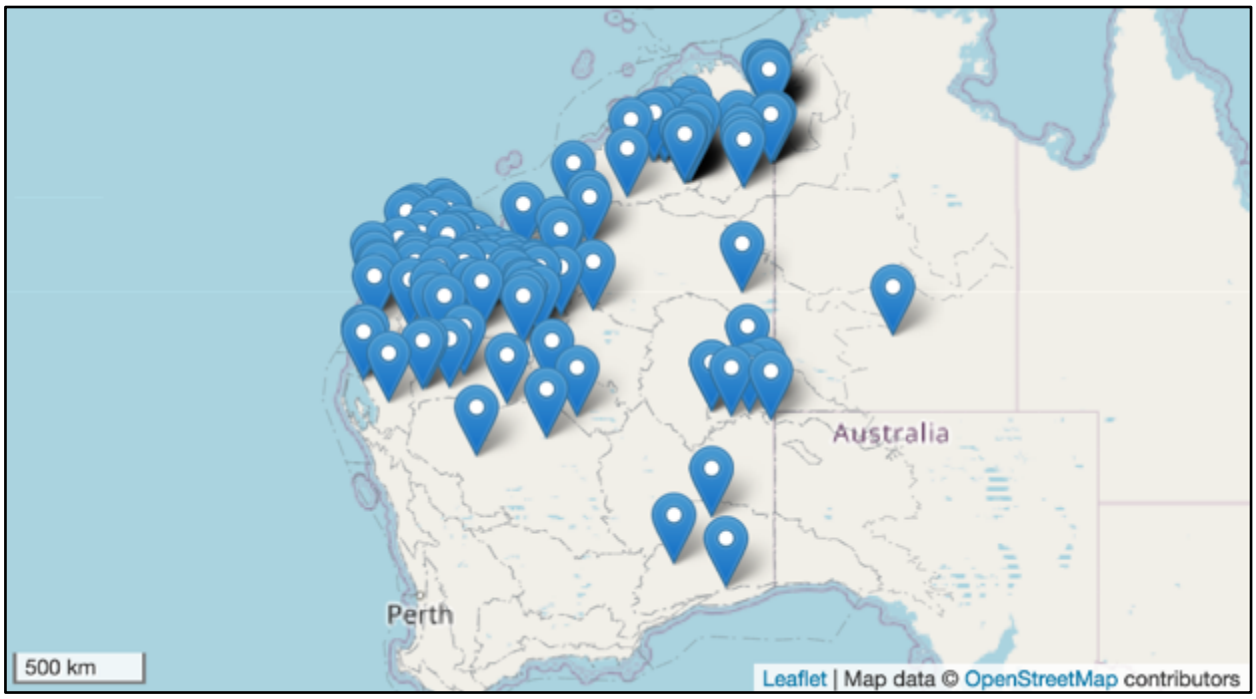


Figure 25. Map of *Malvastrum americanum* distribution in WA (Western Australian Herbarium 1988-2024).

***Rumex vesicarius* (Ruby Dock)**

Rumex vesicarius (Ruby Dock) is a member of the Polygonaceae Family, described as a stout fleshy annual that grows to approximately 0.8 m with broadly triangular leaves and inconspicuous flowers. The fruit valves are inflated, pinkish red and up to 2 cm in size. It is a known weed that has been introduced from North Africa and the middle east, (Western Australian Herbarium 1988-2024) (Plate 16).

Rumex vesicarius is not listed by DPIRD as a WoNS. Its occurrence within the Survey Area is not surprising as it is a common naturalised arid zone weed species associated with disturbed areas and has previously been recorded within the Central Ranges IBRA Region. *Rumex vesicarius* has been recorded widely across western Australia within the Avon Wheatbelt, Carnarvon, Central Ranges, Coolgardie, Gascoyne, Geraldton Sandplains, Great Victoria Desert, Mallee, Murchison, Nullarbor, Pilbara, Swan Coastal Plain, and Yalgoo IBRA regions (Western Australian Herbarium 1988-2024) (Figure 26).

Ten plants were recorded from two locations within the Dante Project with many more plants noted growing within the township of Mantamaru (Figure 27).

Plate 16. *Rumex vesicarius* (Ruby Dock).

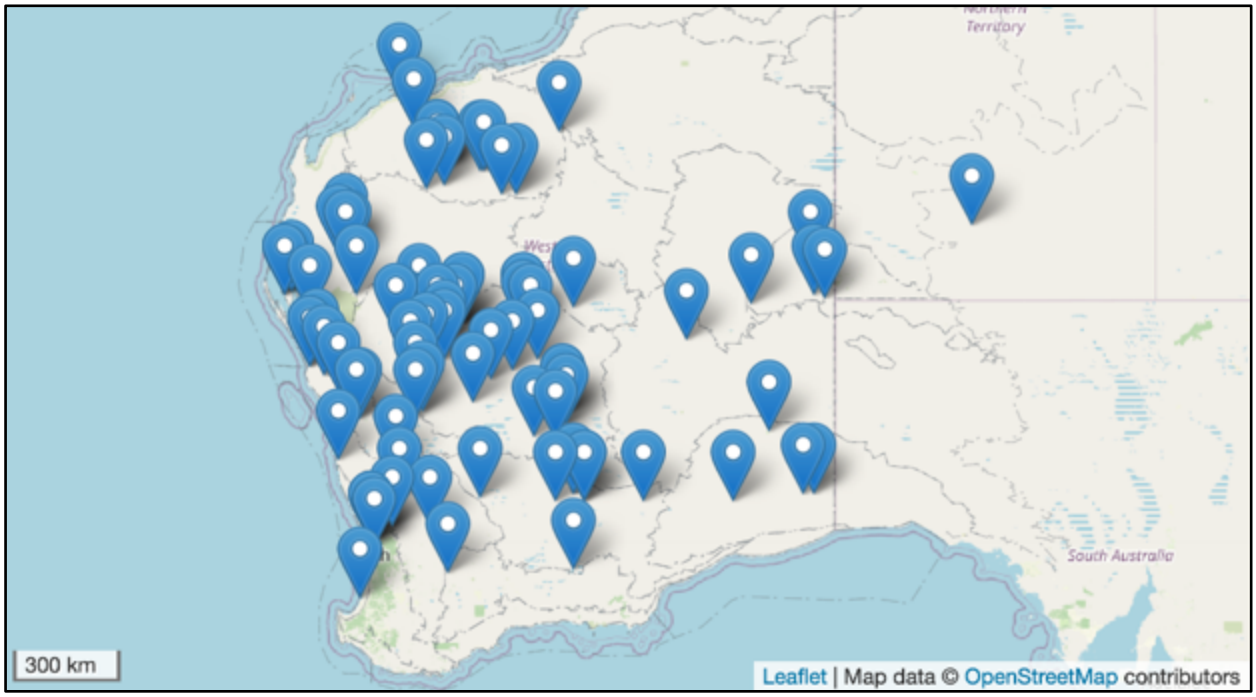
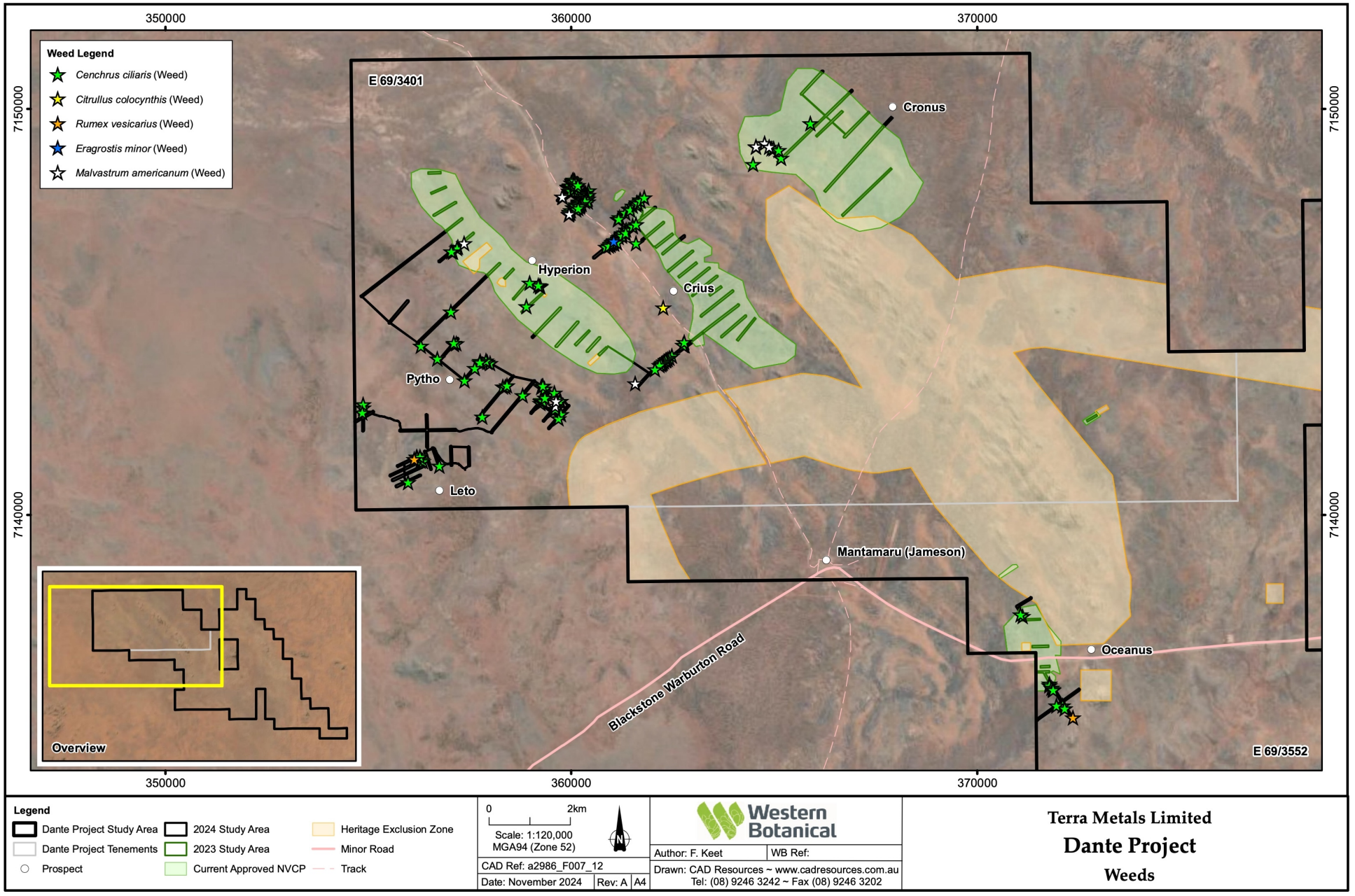


Figure 26. *Rumex vesicarius* (Ruby Dock) distribution in W.A. (Western Australian Herbarium 1988-2024).

Figure 27. Weed locations within the Study area.


350000
360000
370000
7150000
7140000
Weed Legend
Cenchrus ciliaris (Weed)
Citrullus colocynthis (Weed)
Rumex vesicarius (Weed)
Eragrostis minor (Weed)
Malvastrum americanum (Weed)
E 69/3401
Cronus
Hyperion
Crius
Pytho
Leto
Mantamaru (Jameson)
Oceanus
Blackstone Warburton Road
E 69/3552
Overview
Legend
Dante Project Study Area
Dante Project Tenements
Prospect
2024 Study Area
2023 Study Area
Current Approved NVCP
Heritage Exclusion Zone
Minor Road
Track
0 2km
Scale: 1:120,000
MGA94 (Zone 52)
CAD Ref: a2986_F007_12
Date: November 2024
Rev: A
A4
Western Botanical
Author: F. Keet
WB Ref:
Drawn: CAD Resources ~ www.cadresources.com.au
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Terra Metals Limited
Dante Project
Weeds

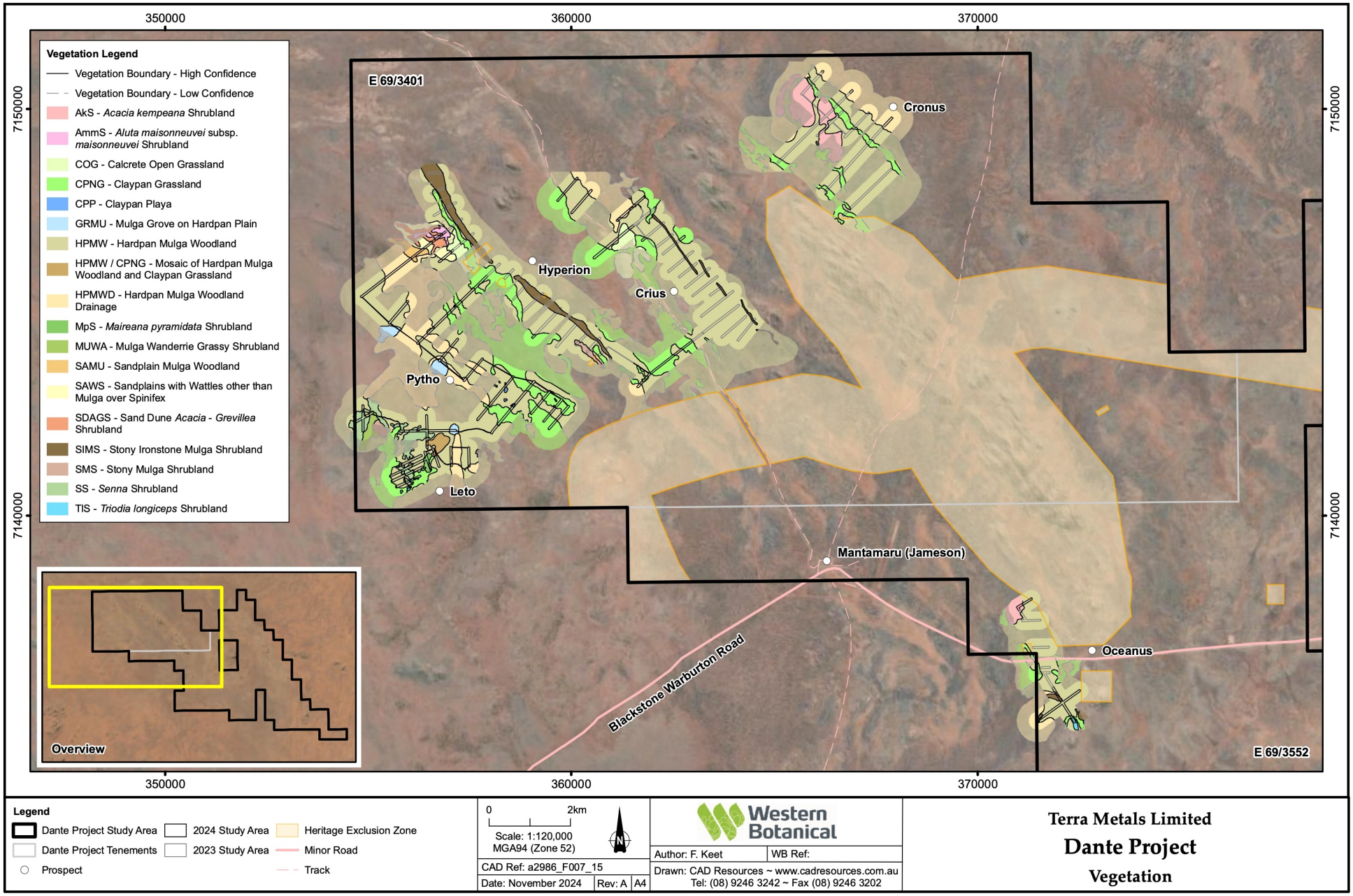
4.2.6. Vegetation Mapping

Seventeen vegetation associations of five landform systems were identified, described, and mapped at NVIS Level 5 within the Dante Project Study Area (Table 7) (Figure 28). Descriptions of each described vegetation association within the Study Area are presented below with a representative photograph. Mapping of vegetation associations within 200 m either side of the surveyed lines were mapped with high confidence, with mapping beyond this boundary extrapolated based on satellite imagery and is considered to be of low confidence (Figure 29). The vegetation association type and boundaries of low confidence areas have not been verified on ground and targeted priority flora surveys have not been conducted in these areas.

Table 7. Vegetation associations of the Dante Project Study Area

Landform System	Vegetation Association	Vegetation Code
Calcrete Plain	*Acacia kempeana* Shrubland	AkS
	Calcrete Open Grassland	COG
Hardpan Plain & Drainage	Claypan Grassland	CPNG
	Claypan Playa	CPP
	Hardpan Mulga Woodland	HPMW
	Hardpan Mulga Woodland Drainage	HPMWD
	Maireana pyramidata Shrubland	MpS
	Mulga Grove on Hardpan Plain	GRMU
Sand Dune	*Aluta maisonneuvei* subsp. *maisonneuvei* Shrubland	AmmS
	Sand Dune *Acacia – Grevillea* Shrubland	SDAGS
Sand Plain	Mulga Wanderrie Grassy Shrubland	MUWA
	Sand Plain Mulga Woodland	SAMU
	Sand Plains with Wattles other than Mulga over Spinifex	SAWS
Stony Hills	*Senna* Shrubland	SS
	Stony Ironstone Mulga Shrubland	SIMS
	Stony Mulga Shrubland	SMS
	Triodia longiceps Shrubland	TlS

Figure 28. Vegetation Association Mapping of Dante Project Study Area



Legend

Dante Project Study Area | 2024 Study Area | Heritage Exclusion Zone
Dante Project Tenements | 2023 Study Area | Minor Road
Prospect | Track

0 2km
Scale: 1:120,000
MGA94 (Zone 52)

CAD Ref: a2986_F007_15
Date: November 2024 | Rev: A | A4

Western Botanical
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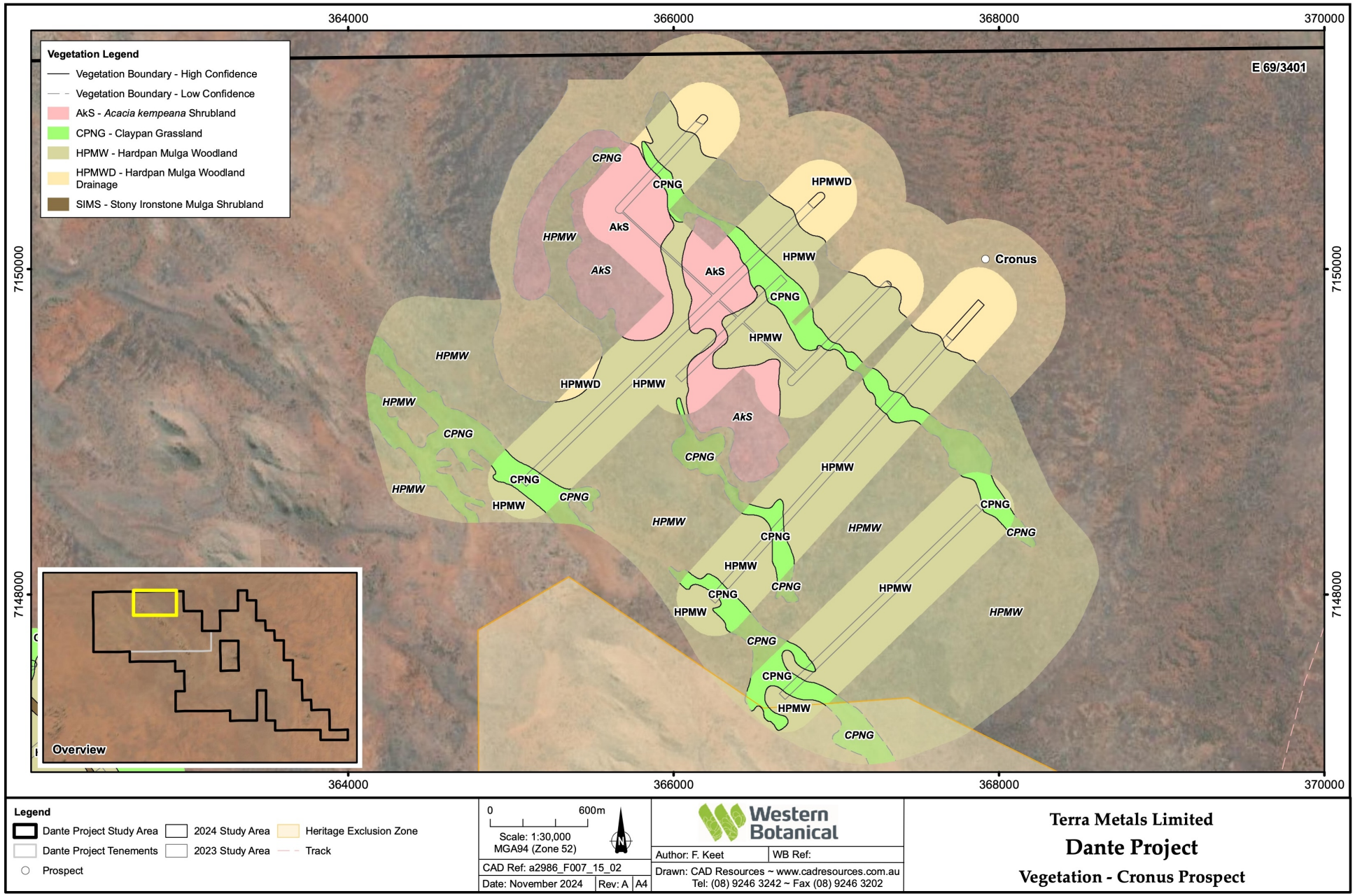
Terra Metals Limited
Dante Project
Vegetation


Vegetation Legend
Vegetation Boundary - High Confidence
Vegetation Boundary - Low Confidence
AkS - Acacia kempeana Shrubland
CPNG - Claypan Grassland
HPMW - Hardpan Mulga Woodland
HPMWD - Hardpan Mulga Woodland Drainage
SIMS - Stony Ironstone Mulga Shrubland
E 69/3401
Cronus
364000
366000
368000
370000
7150000
7148000
Overview
Legend
Dante Project Study Area
Dante Project Tenements
Prospect
2024 Study Area
2023 Study Area
Heritage Exclusion Zone
Track
0
600m
Scale: 1:30,000
MGA94 (Zone 52)
CAD Ref: a2986_F007_15_02
Date: November 2024
Rev: A
A4
Western Botanical
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Drawn: CAD Resources ~ www.cadresources.com.au
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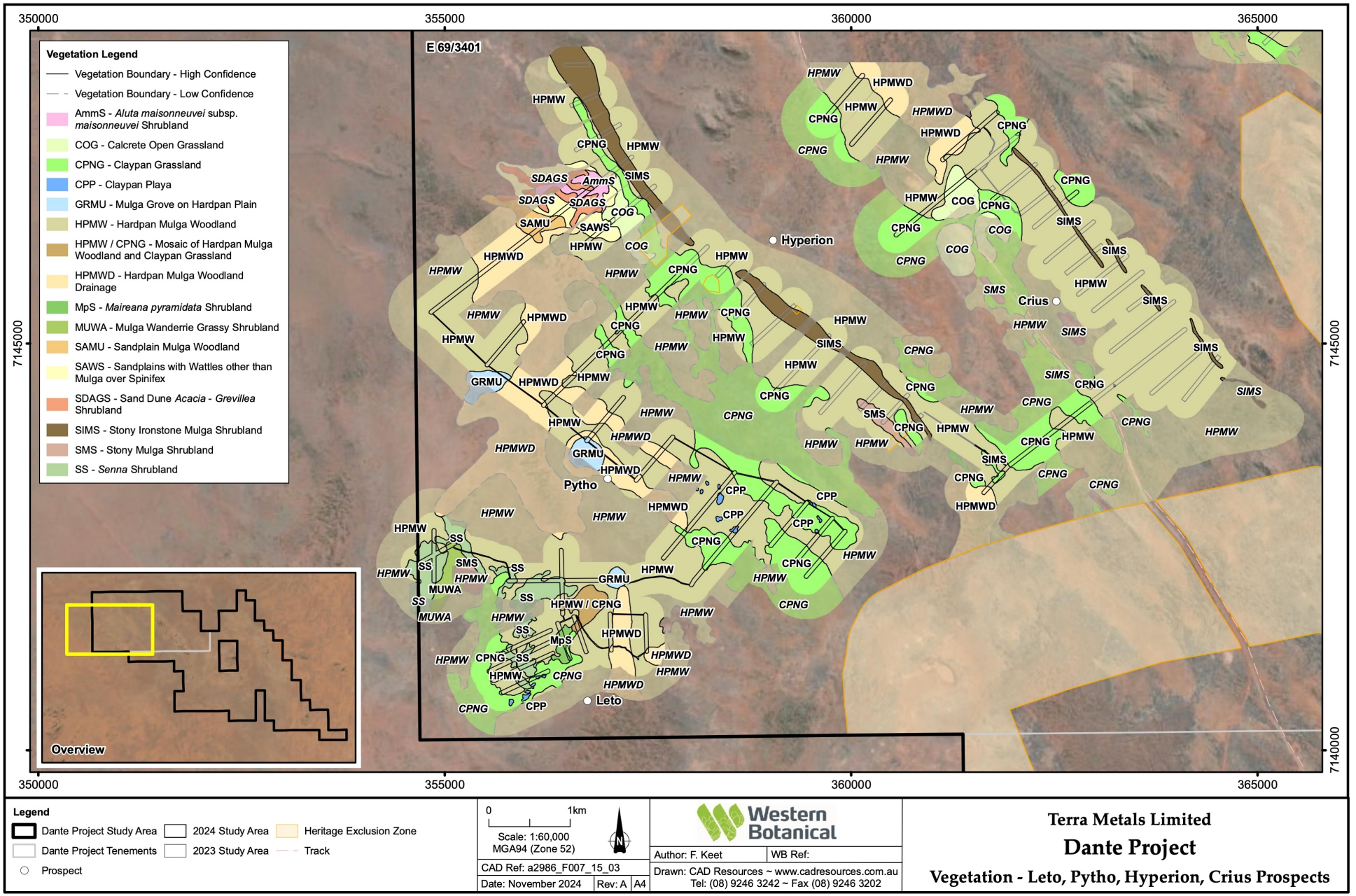
Terra Metals Limited
Dante Project
Vegetation - Cronus Prospect


Vegetation Legend
Vegetation Boundary - High Confidence
Vegetation Boundary - Low Confidence
AmmS - Aluta maisonneuvei subsp. maisonneuvei Shrubland
COG - Calcrete Open Grassland
CPNG - Claypan Grassland
CPP - Claypan Playa
GRMU - Mulga Grove on Hardpan Plain
HPMW - Hardpan Mulga Woodland
HPMW / CPNG - Mosaic of Hardpan Mulga Woodland and Claypan Grassland
HPMWD - Hardpan Mulga Woodland Drainage
MpS - Maireana pyramidata Shrubland
MUWA - Mulga Wanderrie Grassy Shrubland
SAMU - Sandplain Mulga Woodland
SAWS - Sandplains with Wattles other than Mulga over Spinifex
SDAGS - Sand Dune Acacia - Grevillea Shrubland
SIMS - Stony Ironstone Mulga Shrubland
SMS - Stony Mulga Shrubland
SS - Senna Shrubland
E 69/3401
Hyperion
Crius
Pytho
Leto
Overview
350000
355000
360000
365000
7145000
7140000
Legend
Dante Project Study Area
Dante Project Tenements
Prospect
2024 Study Area
2023 Study Area
Heritage Exclusion Zone
Track
0 1km
Scale: 1:60,000
MGA94 (Zone 52)
CAD Ref: a2986_F007_15_03
Date: November 2024
Rev: A
A4
Western Botanical
Author: F. Keet
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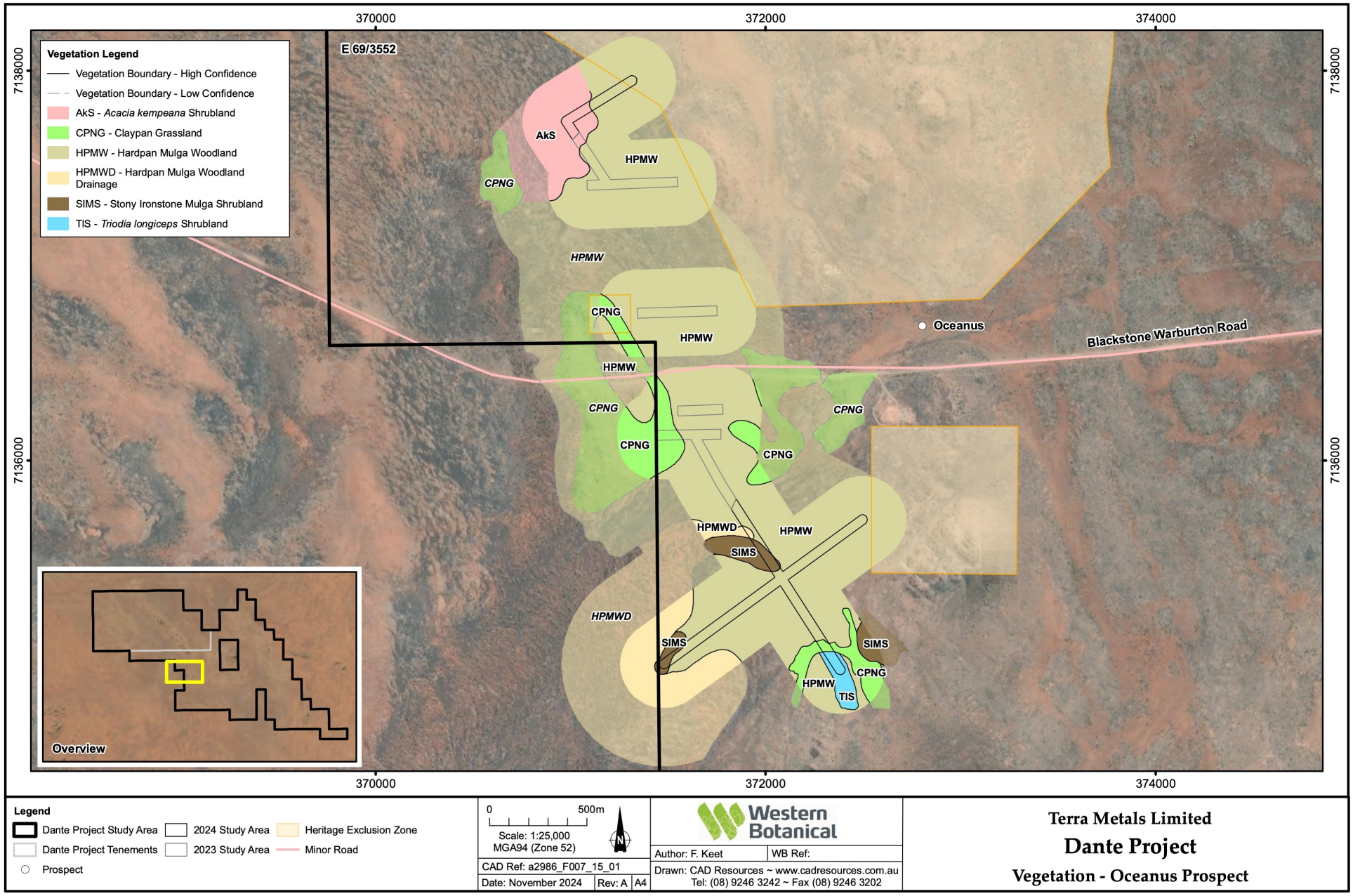
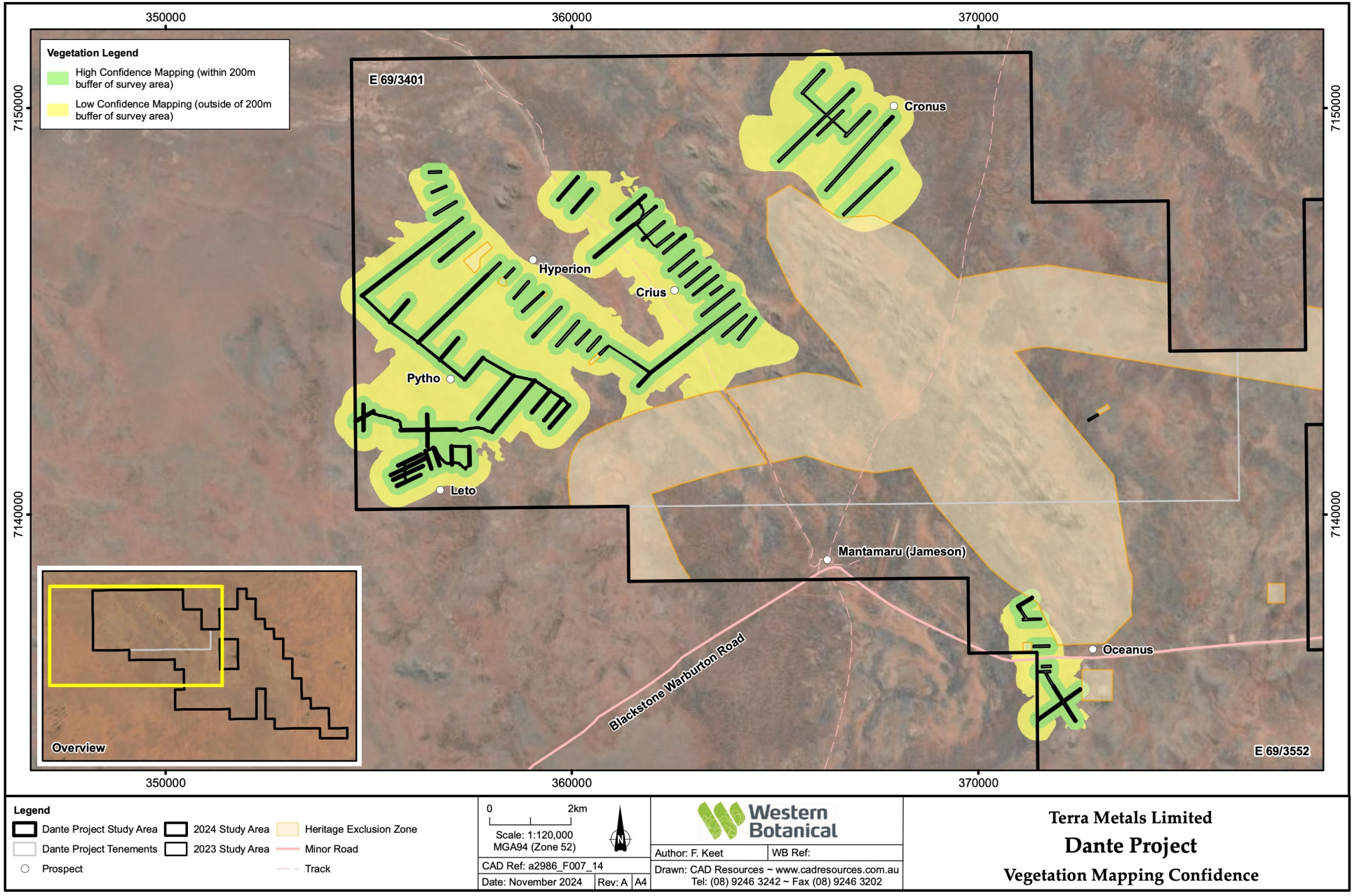
Terra Metals Limited
Dante Project
Vegetation - Leto, Pytho, Hyperion, Crius Prospects



Western Botanical

Figure 29. Confidence of Vegetation Association Mapping of the Dante Project Area


Vegetation Legend
High Confidence Mapping (within 200m buffer of survey area)
Low Confidence Mapping (outside of 200m buffer of survey area)
E 69/3401
Cronus
Hyperion
Crius
Pytho
Leto
Mantamaru (Jameson)
Oceanus
Blackstone Warburton Road
E 69/3552
Overview
350000
360000
370000
7150000
7140000
Legend
Dante Project Study Area
Dante Project Tenements
Prospect
2024 Study Area
2023 Study Area
Heritage Exclusion Zone
Minor Road
Track
0 2km
Scale: 1:120,000
MGA94 (Zone 52)
CAD Ref: a2986_F007_14
Date: November 2024
Rev: A
A4
Western Botanical
Author: F. Keet
WB Ref:
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Terra Metals Limited
Dante Project
Vegetation Mapping Confidence

4.2.7. Vegetation Associations

Calcrete Plain Landform System

Acacia Kempeana Shrubland (AkS)

The *Acacia kempeana* Shrubland is characterised by a very open woodland consisting of the occasional *Acacia aptaneura* to 8 m and *Hakea lorea* subsp. *lorea* to 6 m with a PFC of >1%, over an open Shrubland dominated *by Acacia kempeana* to 3.5 m and *Acacia tetragonophylla* to 3 m with a PFC 2-5%. The mid stratum is dominated by *Senna artemisioides* subsp. *helmsii* to 1.8 m, Senna oligophylla 1.5m, Acacia kempeana 1m *Rhagodia eremaea* 1.2 m, and *Ptilotus obovatus* 0.6 m with a PFC 5 – 10%. The lower stratum is characterised by an open forbland dominated by *Sida* sp. L. (A.M. Ashby 4202) to 0.3 m, *Boerhavia repleta* 0.2 m, *Roepera eichleri* to 0.2 m, *Enneapogon polyphyllus* 0.15 m, *Enneapogon avenaceus* 0.1 m, *Panicum decompositum* 0.4 m, *Salsola australis* to 0.3 m, *Sclerolaena cornishiana* to 0.2 m and *Aristida contorta* 0.15 m with a PFC 5 - 15%. Soil is a red silty sand with a continuous lag gravel mantle composed of: angular cellular calcrete fragments to 0.5 to 8 cm, subrounded ironstone gravel 0.5 - 1.5 cm. Estimated 95% bare ground (Plate 17).

Other associated species recorded within this vegetation association include: *Rutidosis helichrysoides, Sida fibulifera*, *Abutilon otocarpum*, *Salsola australis*, *Euploca cunninghamii, Tribulus occidentalis, Euphorbia australis* var. *erythrantha, Sclerolaena eriacantha,* and *Cymbopogon ambiguus*.

Plate 17. *Acacia kempeana* Shrubland (AkS)

Calcrete Open Grassland (COG)

The Calcrete Open Grassland is characterised by an open grass plain associated with shallow sands over a calcrete plain, the upper stratum that is restricted to the edges of the association is dominated by *Acacia aptaneura* 6 m, *Hakea lorea subsp. lorea* to 5 m, *Acacia victoriae* subsp. *victoriae* to 3 m, *Acacia kempeana* 1-3 m, *Acacia tetragonophylla* 3 m and with a PFC of 1%. The mid stratum is a very open Shrubland of *Senna artemisioides* subsp. *petiolaris* to 1.5 m, and *Eremophila duttonii* to 1.5 m, The lower stratum grassland is dominated by *Enneapogon polyphyllus* 0.15 m, *Enneapogon avenaceus* 0.1 m, *Aristida contorta* 0.15m, *Sclerolaena cornishiana* 0.15 m, *Salsola australis* to 0.3 m, *Cenchrus ciliaris* (weed) to 0.4 m, *Eragrostis eriopoda* to 0.3 m *Sida* sp. L. (A.M. Ashby 4202) to 0.3 m, *Eremophea spinosa* to 0.15m, and *Boerhavia repleta* 0.2 m with a PFC of 50 -65%, (Plate 18).

Other associated species recorded within this vegetation association include *Panicum decompositum*, *Tribulus occidentalis*, *Arivela viscosa, Solanum lasiophyllum*, *Dysphania melanocarpa*, *Malvastrum americanum* (weed), *Euphorbia australis* var. *erythrantha, Einadia nutans* subsp. *eremaea*, and *Solanum centrale*.

Plate 18. Calcrete Open Grassland (COG)

Hardpan Plain and Drainage Landform System

Claypan Grassland (CPNG)

The Claypan Grassland Vegetation Association represents large, extensive low lying internally drained areas with medium to heavy heaving, cracking red sandy clay soil. The vegetation is relatively uniform and consists of a perennial grassland dominated by *Aristida latifolia* 1.2 m tall, *Eragrostis xerophila* 0.3 m, *Eragrostis setifolia* 0.4 m, *Iseilema eremaea* 0.2 m with forbs dominated by *Rhynchosia minima* 0.4 m, *Menkea lutea* (P1), *Euphorbia parvicaruncula* (P1) and the occasional *Cenchrus ciliaris* (weed) to 0.6 m PFC 50 - 65%, with occasional emergent *Eremophila longifolia* 2 m, *Acacia pteraneura* 2 - 4m, PFC < 1%. (Plate 19).

Other associated species recorded within this vegetation association include *Astrebla pectinata, Erodium carolinianum*, *Tribulus astrocarpus*, *Portulaca oleracea*, *Ptilotus helipteroides*, *Rutidosis helichrysoides* subsp. *helichrysoides*, *Solanum cleistogamum*, *Ptilotus aervoides*, *Euphorbia australis* var. *erythrantha, Dysphania melanocarpa,* and *Dichanthium sericeum* subsp. *humilis*.

Plate 19. Claypan Grassland (CPNG).

Claypan Playa (CPP)

The Claypan Playa Association is found within the Hardpan Mulga Woodlands and represents the lowest part of that landscape. They are very open hardpan areas with a lag gravel mantle which are seasonally inundated for periods following rainfall. The vegetation within the Clay pan playa is dominated by annual grasses and herbs with very few to no perennial species present in the inundated central parts. The fringing vegetation is characterised by a very scattered upper stratum of *Hakea lorea subsp. lorea* to 8 m, *Acacia tetragonophylla* 3 m, *Acacia aptaneura* 4 m, *Eremophila longifolia* 2 m and *Acacia victoriae* subsp. *victoriae* to 2.5 m, with a combined PFC 5 - 10% occurring in an annular ring on the margins of the clay pan. The central part of the claypans have a lower stratum characterised by a very open grassland dominated by *Eragrostis setifolia,* 0.4 m, *Cenchrus ciliaris* (weed) to 0.4 m, *Eragrostis dielsii* 0.05 m, *Trianthema triquetrum* 0.05 m and *Sclerolaena cornishiana* to 0.2 m with a PFC 10-15% (Plate 20).

Other associated species recorded within this vegetation association include *Ptilotus obovatus*, *Astrebla pectinata, Boerhavia repleta, Tripogonella loliiformis*, *Dysphania melanocarpa*, *Salsola australis*, *Panicum decompositum*, *Pluchea dentex*, *Solanum orbiculatum* subsp. *orbiculatum, Aristida contorta*, *Dactyloctenium radulans*, *Enteropogon ramosus* and *Einadia nutans* subsp. *eremaea.*

Plate 20. Claypan Playa (CPP)

Hardpan Mulga Woodland (HPMW)

The Hardpan Mulga Woodland is characterised by an upper stratum woodland dominated by *Acacia ayersiana* (narrow phyllode variant) 5 - 10 m, *Acacia incurvaneura* 5-10 m, *Acacia aptaneura* 5-10 m, *Acacia*, *Hakea lorea* subsp. *lorea* 6-8 m and the occasional *Acacia tetragonophylla* 4 m, with a combined PFC 10 - 25%. The mid stratum is characterised by juvenile *Acacia ayersiana* (narrow phyllode variant) to 1.2 m, *Acacia aptaneura* to 1.6 m and *Senna artemisioides* subsp. x *artemisioides* to 1.2m and the occasional *Eremophila longifolia* to 1.5 m, *Eremophila latrobei* subsp. *glabra* to 1.5 m, with a PFC 2 - 5%. The ground stratum is a composite of sparse low chenopod shrubland and sparse tussock grassland. The sparse chenopod shrubland is dominated by *Ptilotus obovatus, Sclerolaena cornishiana* to 0.3 m, *Sclerolaena convexula* to 0.2 m, *Sclerolaena eriacantha* to 0.2 m and *Sclerolaena johnsonii* to 0.2 m with a PFC 5% and the sparse tussock grassland is dominated by low grasses of *Aristida contorta*, *Enneapogon avenaceus*, *Enneapogon polyphyllus* and *Cymbopogon ambiguus* with the addition of *Rhodanthe floribunda* 0.1 m 5 - 15% (Plate 21).

Other associated species recorded within this vegetation association include, *Eriachne helmsii*, *Euphorbia tannensis* subsp. *eremophila*, *Sida fibulifera*, *Ptilotus polystachyus*, *Boerhavia repleta*, *Euphorbia drummondii*, *Erodium carolinianum*, *Rutidosis helichrysoides* subsp. *helichrysoides*, *Alternanthera angustifolia*, *Amaranthus centralis* (P3), *Lepidium phlebopetalum*, *Enchylaena tomentosa* var. *tomentosa*, *Solanum lasiophyllum*, *Panicum decompositum*, *Einadia nutans* subsp. *eremaea*, *Nicotiana velutina, Calotis hispidula* and *Calotis latiuscula*.

Plate 21. Hardpan Mulga Woodland (HPMW)

Hardpan Mulga Woodland Drainage (HPMWD)

The Hardpan Mulga Woodland drainage associations are characterised by a woodland upper stratum dominated by *Acacia pruinocarpa* to 7 m, *Acacia aptaneura* to 7 m, *Acacia ayersiana* to 6m, *Acacia aneura* to 4 m with a PFC 15 - 20%. The mid stratum is characterised by *Eremophila latrobei* subsp. *glabra* to 1.8m, *Teucrium teucriiflorum* to 1.2 m, *Rhagodia eremaea* 1.5 m, juvenile *Acacia aptaneura* and *Acacia ayersiana* to 1.5 m, *Acacia tetragonophylla* to 1.5 m with a PFC 5 - 10%. The ground stratum is characterised by an open forbland dominated by *Eremophila gilesii* subsp. *gilesii* to 0.5 m, *Thyridolepis mitchelliana* to 0.2 m, *Eragrostis eriopoda* to 0.3 m, *Monachather paradoxus* to 0.2 m, *Eriachne helmsii*, to 0.4 m, *Cheilanthes sieberi subsp. sieberi* to 0.2 m, *Maireana planifolia* to 0.3 m with a PFC 20 - 30%, (Plate 22).

Other associated species recorded within this vegetation association include *Cymbopogon ambiguus*, *Ptilotus polystachyus, Eremophila battii, Solanum lasiophyllum, Solanum centrale, Hibiscus burtonii, Ptilotus obovatus, Sida fibulifera, Erodium crinitum,* and *Solanum orbiculatum* subsp. *orbiculatum.*

Plate 22. Hardpan Mulga Woodland Drainage (HPMWD)

Maireana pyramidata Shrubland (MpS)

The *Maireana pyramidata* Shrubland is located in the lower part of the landscape and is characterised by a low open shrubland of *Maireana pyramidata.* The upper stratum is a very open Shrubland of occasional *Acacia tetragonophylla* to 2 m, Acacia victoriae subsp. victoriae to 2 m, and *Hakea lorea* subsp. *lorea* to 1.8 m with a PFC of >1%. The mid stratum shrubland is dominated by *Maireana pyramidata* to 1.2 m with a PFC 8-15%. The lower stratum is represented by a diverse suite of herbs and grasses, including *Ptilotus xerophila* to 0.4 m, *Rhodanthe citrina* to 0.15 m, *Eragrostis setifolia* to 0.3 m, *Ptilotus obovatus* to 0.4 m, *Calotis hispidula* to 0.15 m, *Sida* sp. L (A.M. Ashby 4202) to 0.3 m, *Ptilotus helipteroides* to 0.1 m, *Aristida contorta* to 0.1 m, *Maireana tomentosa* to 0.4 m, Sclerolaena eriacantha to 0.2 m and *Portulaca oleracea* to 0.05 m with a PFC 10-20% (Plate 23).

Other associated species recorded within this vegetation association include *Swainsona phacoides, Salsola australis*, *Streptoglossa liatroides*, *Sida fibulifera*, *Convolvulus clementii*, *Enneapogon polyphyllus*, *Tribulus astrocarpus*, *Tribulus occidentalis*, *Panicum decompositum Pterocaulon sphacelatum,* and *Calotis plumulifera.*

Plate 23. *Maireana pyramidata* Shrubland (MpS).

Mulga Grove on Hardpan Plain (GRMU)

The Mulga Groves are localised internally drained sites receiving run-on from adjacent HPMW and HPMWD communities. Mulga Groves are characterised by a woodland upper stratum dominated *Acacia aptaneura* 8 – 10 m with a PFC 20- 25. The ground stratum is characterised by an open Forbland dominated by *Ptilotus polystachyus* 0.3 - 0.5 m with a PFC 20%, *Ptilotus helipteroides* to 0.2 m with a PFC 5%. Occasional occurrences of *Cenchrus ciliaris* (Buffel Grass) to 0.5 m with a PFC 2% were noted. These areas have significantly denser vegetation than surrounding hardpan plains, and consist largely of the same species (Plate 24).

Other associated species recorded within this vegetation association include *Eragrostis eriopoda*, *Ptilotus sessilifolius*, *Chrysocephalum apiculatum* subsp. *glanduliferum*, *Rhodanthe floribunda*, *Ptilotus obovatus*, *Erodium aureum*, *Maireana planifolia*, *Enneapogon polyphyllus*, *Sclerolaena convexula*, *Solanum lasiophyllum*, *Enchylaena tomentosa* var. *tomentosa*, *Lepidium phlebopetalum*, *Alternanthera nana*, *Calotis hispidula*, *Enneapogon avenaceus*, *Aristida contorta*, *Lepidium oxytrichum*, *Salsola australis* and *Hibiscus solanifolius.*

Plate 24. Mulga Grove on Hardpan Plain (GRMU).

Sand Dune Landform System

Aluta maisonneuvei subsp. *maisonneuvei* Shrubland (AmmS)

The Aluta maisonneuvei subsp. maisonneuvei Shrubland is associated with the upper to mid slopes of sand dunes and is characterised by a shrubland of Aluta maisonneuvei subsp. maisonneuvei to 1.8 m as a dominant shrub stratum, with a PFC of 25 - 40%. The upper stratum, if present, may include a sparse Shrubland of Grevillea eriostachya from 2 - 3m, Grevillea juncifolia subsp. juncifolia 2 - 4m, Acacia ligulata 3 - 4 m and Dodonaea viscosa subsp. angustissimus, with a PFC of 1 %. The ground stratum is comprised of sparse hummock grassland of scattered Triodia basedowii to 0.3 m, with a PFC 1% to 8% (Plate 25).

Other associated species recorded within this vegetation association are *Acacia melleodora*, *Goodenia triodiophila*, *Aristida contorta*, *Eragrostis eriopoda*, *Amphipogon caricinus* var. *caricinus*, *Solanum centrale*, *Ptilotus obovatus*, *Ptilotus polystachyus*, *Rhodanthe floribunda*, *Solanum cleistogamum* and *Calandrinia polyandra*.

Plate 25. *Aluta maisonneuvei* subsp. *maisonneuvei* Shrubland (AmmS)

Sand Dune *Acacia* - *Grevillea* Shrubland (SDAGS)

The Sand Dune *Acacia* - *Grevillea* Shrubland represents the crests of dunes and is characterised by an upper stratum shrubland dominated by *Acacia ligulata* to 3 m, *Grevillea juncifolia* subsp. *juncifolia* to 3 m, *Dodonaea viscosa* subsp. *angustissimus* to 3 m, *Acacia melleodora* to 4 m with a PFC 5-10. The mid-stratum is a sparse Shrubland of *Aluta maisonneuvei* subsp. *maisonneuvei* to 1 m with a PFC 2 %, with the ground stratum dominated by *Triodia basedowii* 0.5 m, *Dicrastylis doranii* 0.5 m, *Sida sp.* Golden calyces pubescent (G.J. Leach 1966) 0.4m, *Aristida holathera* var. *holathera* 0.3 m, and *Eriachne aristidea* 0.3 m with a PFC 5 - 20% (Plate 26).

Other associated species recorded within this vegetation association include *Solanum centrale*, *Eriachne helmsii*, *Eremophila platythamnos* subsp. *exotrachys*, *Eremophila willsii* subsp. *integrifolia, Eragrostis eriopoda*, *Aristida contorta, Monachather paradoxus*, *Chrysocephalum puteale*, *Ptilotus polystachyus*, *Ptilotus sessilifolius*, *Ptilotus latifolius Scaevola parvifolia subsp. parvifolia*, *Calandrinia balonensis*, and *Chrysocephalum pterochaetum*.

Plate 26. Sand Dune *Acacia* - *Grevillea* Shrubland (SDAGS).

Sand Plain Landform System

Mulga Wanderrie Grassy Shrubland (MUWA)

The Mulga Wanderrie Grassy Shrubland association was recorded on the mid slopes associated with deeper sands. The Mulga Wanderrie Association is described with an Open Woodland upper stratum of *Acacia aptaneura* to 6 m of >1%. The mid stratum of *Eremophila latrobei* subsp. *glabra* to 1 m with a PFC 1 to 2%. The grassland stratum dominated by *Eriachne helmsi*i to 0.4 m with a PFC 20-25%, and *Ptilotus polystachyus* to 0.4 m with a PFC of 5% are a key feature of this Association (Plate 27).

Other associated species recorded within this vegetation association include *Ptilotus obovatus*, *Maireana planifolia*, *Eragrostis eriopoda, Enneapogon polyphyllus,* and occasional *Alyogyne pinoniana*.

Plate 27. Mulga Wanderrie Grassy Shrubland (MUWA).

Sandplain Mulga Woodland (SAMU)

The Sandplain Mulga Woodland is characterised by Mulga Woodland with a Spinifex hummock grassland lower stratum. The upper stratum is dominated by *Acacia aptaneura* to 5 m, *Acacia ayersiana* to 4 m with a PFC 5 - 8%. The mid stratum is very open with occasional *Eremophila latrobei* subsp. *glabra* to 1 m, *Eremophila longifolia* to 1.5m and *Acacia ligulata* 1.8 m, with a combined PFC of 1%. The ground stratum is characterised by grassland dominated by either *Triodia basedowii* to 0.6 m, or *Triodia pungens* to 0.7 m with the occasional *Aristida holathera* var. *holathera* 0.3 m, *Aristida contorta* 0.15 m, *Monachather paradoxus* 0.2 m and *Amphipogon caricinus* subsp. *caricinus* 0.4 m, with a PFC 15 - 25% (Plate 28).

Other associated species recorded within this vegetation association include occasional *Corymbia opaca* to 8 m, *Brachychiton gregorii* to 8 m, *Acacia kempeana, Digitaria brownii, Eragrostis eriopoda, Enneapogon polyphyllus, Ptilotus obovatus, Androcalva loxophylla, Dicrastylis exsuccosa* and *Goodenia triodiophila.*

The SAMU vegetation association often occurs on the borders between SAWS or SDAGS and where they meet HPMW. The soils in these areas have a higher sand content over a clay pan base.

Plate 28. Sandplain Mulga Woodland (SAMU).

Sand Plains with Wattles other than Mulga over Spinifex (SAWS)

The Sand plains with Wattles other than Mulga over Spinifex (SAWS) hummock Grassland is associated with deep red sands often located at the base of sand dunes and between the calcrete platforms and can form expansive plains. This vegetation association is characterised by an upper stratum characterised by an open shrubland dominated by one or, on occasions up to three, *Acacia* species including *Acacia ligulata*, 2 – 3 m, *Acacia pachyacra*, 1 - 2 m, *Acacia melleodora* 1 - 2 m, and *Acacia pruinocarpa* to 4 m with a PFC of 2 - 15%. The mid stratum is characterised by a sparse shrubland dominated by G*revillea eriostachya juvenile Acacia* spp. with occasional *Eremophila longifolia*. The ground stratum is characterised by a composite hummock grassland (in a mature, long unburnt state) and open forbland (post-fire). The hummock grassland is dominated by the Spinifex species *Triodia basedowii* from 0.4 - 0.5 m, with a PFC of 30 - 40%. The post-fire forbland is rapidly dominated by*, Androcalva loxophylla* and *Kennedia prorepens* while the Spinifex species regenerates slowly from seed (Plate 29).

Other associated species include *Santalum lanceolatum, Eremophila platythamnos subsp. exotrachys, Eragrostis eriopoda, Petalostylis cassioides, Cymbopogon ambiguus, Chrysocephalum apiculatum, Ptilotus polystachyus, Calandrinia balonensis, Chrysocephalum pterochaetum, Rhodanthe floribunda, Stackhousia megaloptera, Acacia tetragonophylla, Goodenia triodiophila, Aristida contorta, Lepidium phlebopetalum, Solanum lasiophyllum, Alyogyne pinoniana,* and *Paraneurachne muelleri*.

Plate 29. Sand Plains with Wattles other than Mulga over Spinifex (SAWS)

Stony Hills Landform System

Senna Shrubland (SS)

The *Senna* Shrubland is located on the lower slopes of granitic hills and is characterised by an open shrubland with a very open upper stratum of *Hakea lorea* subsp. *lorea* to 3 m *Acacia pruinocarpa* to 6 m and *Acacia ayersiana* to 4 m with a PFC of 1-2%. The mid stratum is dominated by *Senna* sp. Billabong (J.D. Alonzo 7221) 1.8 m and *Senna artemisioides* subsp. *helmsii* to 1 m and *Senna oligophylla* to 1.2 m with a PFC 10 - 15%. The ground stratum is dominated by *Aristida contorta* 0.15 m, *Cymbopogon ambiguus* 0.6 m, *Ptilotus obovatus* 0.6 m, *Digitaria brownii* 0.4 m, *Enneapogon polyphyllus*, *Enneapogon avenaceus*, *Dissocarpus paradoxus* to 0.2 m, and *Dactyloctenium radulans* to 0.05 m with a PFC 10 - 12% (Plate 30).

Other associated species recorded within this vegetation association include *Cleome viscosa*, *Solanum lasiophyllum Boerhavia repleta*, *Euploca cunninghamii, Euploca tanythrix, Convolvulus clementii, Einadia nutans* subsp. *eremaea, Evolvulus alsinoides* var. *villosicalyx, Euphorbia australis, Senna artemisioides* subsp. *filifolia* and *Tribulus astrocarpus.*

Plate 30. *Senna* Shrubland (SS).

Stoney Ironstone Mulga Shrubland (SIMS)

The Stoney Ironstone Mulga Shrubland is located on the upper slopes of Ironstone hills and is characterised by an open Shrubland with an upper stratum of *Acacia aptaneura* to 5 m, and *Acacia aneura* to 5 m with a PFC of 10-15%. The mid stratum is dominated by *Eremophila georgei* to 0.7m, and *Eremophila latrobei* subsp. *glabra* to 0.7 m with a PFC 2-5%. The ground stratum is dominated by *Eragrostis eriopoda* to 0.3 m, *Monachather paradoxus* to 0.2 m, *Ptilotus helipteroides* to 0.1 m, *Maireana triptera* to 0.4 m, *Maireana tomentosa* var. *tomentosa* to 0.4 m, *Enchylaena tomentosa* var. *tomentosa* to 0.4 m, *Ptilotus obovatus* to 0.4 m, and Euphorbia *tannensis* subsp. *eremophila* to 0.2 m, with a PFC 5-10%, (Plate 31).

Other associated species include *Aristida contorta*, *Cymbopogon ambiguus*, *Ptilotus polystachyus,* and *Eriachne helmsii.*

Previously reported as Gabbro and Magnetite Hill Mulga Shrubland (GHMS), and Magnetite Hill Mulga Shrubland (MHMS) vegetation associations by Western Botanical in the Desktop Assessment of Flora and Vegetation: Jameson Project (WB1021) (2023).

Plate 31. Stoney Ironstone Mulga Shrubland (SIMS).

Stony Mulga Shrubland (SMS)

The Stony Mulga Shrubland is characterised by an open shrubland where the upper stratum is dominated by *Acacia pruinocarpa* to 5 m, *Acacia aptaneura* to 6 m and with a PFC 2-8%. The mid stratum is dominated by *Eremophila latrobei* subsp. *glabra* to 1.5 m, *Senna artemisioides* subsp. x *artemisioides* to 1.5 m, *Acacia ayersiana* (narrow phyllode form) 1 m with PFC10-15%. The lowest stratum is dominated by *Eriachne mucronata* (desert form glabrous) 0.3 m, *Eragrostis eriopoda* to 0.3 m, *Eriachne helmsii* to 0.4m, *Aristida holathera* var. *holathera* 0.2 m, *Maireana planifolia*, *Sida fibulifera* 0.3 m and *Cymbopogon ambiguus* 0.4 m with a PFC 8-10%, (Plate 32).

Other associated species recorded within this vegetation association include *Solanum centrale*, *Hibiscus burtonii*, *Euploca cunninghamii*, *Vincetoxicum lineare*, and occasional *Triodia basedowii.*

Plate 32. Stony Mulga Shrubland (SMS).

***Triodia longiceps* Shrubland (TlS)**

The *Triodia longiceps* Shrubland is a unique vegetation association within the Stoney Hill Landform system. It was recorded within the Oceanus prospect and is the only known location of this unit within the Project. *Triodia longiceps* is a 340km Range extension of its current known distribution for this species hence this is the first time this unit has not been recorded locally.

The *Triodia longiceps* Shrubland is characterised by an open woodland consisting of *Corymbia opaca* to 5 m, *Acacia pruinocarpa* to 3 m, *Hakea lorea* subsp. *lorea* to 3 m, and *Acacia kempeana* to 2 m, with a PFC of 2-5%. The Mid stratum is dominated by *Triodia longiceps* to 1.5 m with a PFC of 20-25% with occasional *Senna artemisioides* subsp. *helmsii* to 1.2 m, and *Senna glaucifolia* to 1.5 m. the understorey ground stratum is characterised by *Neurachne muelleri* to 0.3 m, *Ptilotus sessilifolius* to 0.2 m, *Roepera eichleri* to 0.2 m, *Eriachne aristidea* to 0.15 m, and *Goodenia triodiophila* to 0.3 m with a PFC 10-12% (Plate 33).

Other associated species include *Hibiscus solanifolius, Lepidium phlebopetalum*, *Enneapogon avenaceus*, *Euploca tanythrix*, *Evolvulus alsinoides* var. *villosicalyx,* and *Tribulus occidentalis.*

Plate 33. *Triodia longiceps* Shrubland (TlS).

4.2.8. Vegetation Condition

Vegetation condition was assessed against the Vegetation Condition Scale (Keighery 1994 and Trudgen 1988) for the Eremaean and Northern Botanical Provinces (EPA, 2016) (Appendix 3). The vegetation condition across the Study Area was generally considered to be in Excellent condition, with areas that are pristine or nearly so with no obvious signs of damage from human activities, to Very Good with areas of relatively slight signs of damage from human activities. The most prominent impacts to vegetation condition across the Study Area are grazing from camels and wild horses, occasional Traditional Owner access tracks to sites of significance (i.e. ceremonial and hunting), exploration mining access tracks and associated drilling alignments, and the presence of some relatively non-aggressive weeds. Evidence of fire events, whether natural or from human activity, was present but not considered significant to the overall vegetation condition.

5. Assessment Against the 10 Clearing Principles

Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity.

The Study Area is comprised of 198 endemic species, including six Priority flora species. The floristic composition and biodiversity of the Study Area corresponds to what is known in the surrounding Central Ranges, Great Victoria Desert, and Gibson Desert IBRA regions and is not considered to be comprised of a high level of biological diversity.

The Project is not at variance with this principle.

Principle (b) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Whilst the survey conducted wasn't focused on fauna habitats, the habitats encountered within the Study Area are well represented in the surrounding region and are not restricted to the Study Area. No known significant habitats for known significant fauna of the region (*Liopholis kintorei* and *Macrotis lagotis*) are present within the Study Area.

The Project is not at variance with this principle.

Principle (c) – Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

No threatened species gazetted as Declared Rare Flora under the *Biodiversity Conservation Act 2016 (WA*) or the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* were recorded in the Study Area. However, the Study Area supports six Priority taxa, including two Priority One taxa, *Menkea lutea* and *Euphorbia parvicaruncula*. Impacts to populations of Priority taxa should be avoided or minimized where possible. *Euphorbia parvicaruncula* (P1) is regionally restricted but is locally common and has a broad distribution across Australia. *Menkea lutea* (P1) is also locally common, but is restricted regionally and nationally. Within the Study Area there is evidence of *Menkea lutea* being a colonizer species, with populations coming back strongly in disturbed sites (i.e. cleared tracks). Both Priority One species are strongly associated with the Claypan Grassland (CPNG) vegetation association and impacts to this vegetation association should be limited.

On the proviso that impacts to populations of Priority taxa are avoided or minimized where possible, the Project is not at variance with this principle.

Principle (d) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.

There are no known Threatened or Priority Ecological Communities recorded within the Study Area or in the surrounding area. While the Study Area lies within an Environmentally Sensitive Area (Ranges of the Western Desert), it is listed due to Aboriginal Heritage, with its indigenous values considered of National Estate significance.

The Project is not at variance with this principle.

Principle (e) – Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

The vegetation of the Study Area is not considered remnant in either a local or bioregional context. There are five vegetation system associations across the Study Area, with all associations having 99% of the bioregional vegetation remaining in pre-European colonization condition. The Study Area is not considered significant as a remnant of native vegetation in either a local or bioregional context.

The Project is not at variance with this principle.

Principle (f) – Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Small ephemeral claypans (CPNG and CPP vegetation associations) are known within and nearby the Study Area. While these claypans collect water and are likely important for fauna utilization on an occasional basis, the wetlands are small and would only serve as water sources for short periods of time following rainfall. These are not considered significant wetlands in either a local or regional context.

The Project is not at variance with this principle.

Principle (g) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Areas of cleared native vegetation from Traditional Owner and historic mining activities are present within the Study Area. Other than the direct impacts of mining, clearing of native vegetation for proposed exploration activity of the Dante Project will not cause significant land degradation.

The Project is not at variance with this principle.

Principle (h) – Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

There are no Conservation Areas noted in close proximity to the Study Area, with the closest being the Pila Nature Reserve, 128 km north-west of the Study Area. There will be no direct or indirect impacts on the environmental values of this conservation area.

The Project is not at variance with this principle.

Principle (i) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

While the survey conducted was not focused on water quality, the proposed works are not expected and are unlikely to cause any significant deterioration of surface or underground water.

The Project is not at variance with this principle.

Principle (j) – Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

The development of the proposed Dante Project is not considered likely to cause or exacerbate the incidence of flooding in the local area.

The Project is not at variance with this principle.

6. Limitations

Few limitations were experienced in conducting this project. The region is reasonably well known to Western Botanical, having conducted over 22 surveys in the region in the last 18 years, and a proportion of the Study Area was previously surveyed by Western Botanical in 2023.

Potential limitations associated with the targeted flora and vegetation survey of the Dante Project are presented in Table 8. Overall, no major limitations to the survey have been encountered. Vegetation mapping was extrapolated based on satellite imagery for some unvisited areas, such as those outside the buffer zones for proposed access tracks and drilling alignments. This does not pose a limitation on the placement of proposed drilling alignments and access tracks.

Table 8. Limitations of the Survey.

Limitation	Discussion
Available sources of contextual information	An adequate level of contextual information was available for this project, including previous reports, personal experience of those staff implementing the survey, and preparing the report. Jonathan Warden has over 15 years' experience in assessing the flora of the Central Ranges bioregion, specifically in the Mantamaru area for the WMCNP. Felicity Keet has previously completed two flora and vegetation surveys within the Central Ranges bioregion, including the 2023 survey of Julimar Resources' Jameson tenements. This is not a limitation.
The scope of the survey	The scope was adequate for the purpose of assessing the flora and vegetation within the Dante Project area. This is not a limitation.
Proportion of flora collected and identified	210 flora specimens were collected for identification. Three collections were unable to be identified due to insufficient material, and one unable to be identified due to insufficient resources and has been submitted to the WA Herbarium for expert ID. None of the indeterminate taxa are suspected to be threatened or weed species. Two indeterminate taxa, *Leiocarpa* sp. Indet (submitted for expert ID) and *Solanum* sp. Golden are not suspected to be priority species but may represent major range extensions. One indeterminate taxon, Poaceae sp. Indet, may represent a Priority Three species, *Aristida jerichoensis* var. *subspinulifera*. This is not a limitation.
Completeness and further work which may be needed	Eight days were spent on ground and the targeted survey conducted was sufficient in the botanical assessment of the Study Area. This is not a limitation.
Mapping reliability	Vegetation was mapped using 1:10,000 A3 satellite imagery which was adequate for the habitats encountered, in conjunction with on-foot and ATV traverses. Majority of the Study Area was visited, with the extrapolation of some unvisited areas. This is a minor limitation.
Timing: weather, season	The 2024 survey was conducted following an unseasonable wet period in the previous months. Annuals and grasses were plentiful and dominant during the survey and were well represented. The previous survey of tenements by Western Botanical in October 2023 was conducted during a dry period when annuals and ephemerals were under-represented, largely

Limitation	Discussion
	absent and either not recorded or unable to be identified. Due to the timing and optimal seasonal conditions of the 2024 survey, 177 species that were not observed during the 2023 were identified. This is not a limitation.
Disturbances	No significant disturbances were observed within the Study Area. Some disturbance is present within the Study Area including, drill lines, access tracks, weed species, grazing, and fire. This is not a limitation
Intensity	While the field survey was a single pass, eight days were spent on site and the targeted survey conducted was adequate for survey area. Given the impacts of the Dante Project, the conducted intensity appears to represent a reasonable level of survey for the various sub-sets of the overall Study Area. This is not a limitation.
Resources	Adequate resources were available for the survey. This is not a limitation
Access	Access was mostly good throughout the Survey Area, with some areas unable to be surveyed due restricted access. Tracks and roads are limited for some areas within the Study Area. However, off-track driving using ATVs was utilised in undertaking the survey. A map of track logs of the field surveys in presented in Appendix 6. Areas with Heritage sensitivity were not surveyed and the surrounding area avoided. This is not a limitation
Experience levels	The region is reasonably well known to Western Botanical, having conducted over 20 surveys in the region in the last 18 years. Senior Botanist Jonathan Warden has over 15 years of experience in the assessment of flora and vegetation in WA and the Central Ranges for the WMCNP. Junior Botanist Felicity Keet was working under the supervision of Jonathan Warden, and has one year experience in the assessment of flora and vegetation in WA and the Central Ranges. This is not a limitation.

7. List of Participants

Staff Member	Field Surveys	Specimen Identification	Report Preparation
Jonathan Warden B.Sc. (Environmental Biology) License No. – FB62000494	**1**	**1**	**1**
Felicity Keet B.Sc. (Conservation Biology and Agricultural Science) License No. – FB62000299	**1**	**1**	**1**

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Appendix 1. Framework for Conservation Significant Flora: WA (DBCA)

DBCA Conservation Codes for Western Australian Flora

Under the Wildlife Conservation Act 1950, the Minister for the Environment may declare species of flora to be protected if they are considered to be in danger of extinction, rare or otherwise in need of special protection.

Specially protected flora are species which have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction, or otherwise in need of special protection, and have been gazetted as such.
Categories of specially protected flora are:

T Threatened species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species

Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.

EN Endangered species

Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.

VU Vulnerable species

Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where "there is no reasonable doubt that the last member of the species has died", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for extinct fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for extinct flora.

EW Extinct in the wild species

Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI Migratory species

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.

CD Species of special conservation interest (conservation dependent fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1 Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2 Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4 Priority 4: Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Last updated 3 January 2019

Appendix 2. DBCA Definitions of Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs)

DEFINITIONS, CATEGORIES AND CRITERIA FOR THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

1. GENERAL DEFINITIONS

Ecological Community

A naturally occurring biological assemblage that occurs in a particular type of habitat.

Note: The scale at which ecological communities are defined will often depend on the level of detail in the information source, therefore no particular scale is specified.

A **threatened ecological community** (TEC) is one which is found to fit into one of the following categories; "presumed totally destroyed", "critically endangered", "endangered" or "vulnerable".

Possible threatened ecological communities that do not meet survey criteria are added to DEC's Priority Ecological Community Lists under Priorities 1, 2 and 3. Ecological Communities that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

An **assemblage** is a defined group of biological entities.

Habitat is defined as the areas in which an organism and/or assemblage of organisms lives. It includes the abiotic factors (e.g. substrate and topography), and the biotic factors.

Occurrence: a discrete example of an ecological community, separated from other examples of the same community by more than 20 meters of a different ecological community, an artificial surface or a totally destroyed community.

By ensuring that every discrete occurrence is recognised and recorded future changes in status can be readily monitored.

Adequately Surveyed is defined as follows:

"An ecological community that has been searched for thoroughly in most likely habitats, by relevant experts."

Community structure is defined as follows:

"The spatial organisation, construction and arrangement of the biological elements comprising a biological assemblage" (e.g. Eucalyptus salmonophloia woodland over scattered small shrubs over dense herbs; structure in a faunal assemblage could refer to trophic structure, e.g. dominance by feeders on detritus as distinct from feeders on live plants).

Definitions of Modification and Destruction of an ecological community:

Modification: "changes to some or all of ecological processes (including abiotic processes such as hydrology), species composition and community structure as a direct or indirect result of human activities. The level of damage involved could be ameliorated naturally or by human intervention."

Destruction: "modification such that reestablishment of ecological processes, species composition and community structure within the range of variability exhibited by the original community is unlikely within the foreseeable future even with positive human intervention."

Note: Modification and destruction are difficult concepts to quantify, and their application will be determined by scientific judgment. Examples of modification and total destruction are cited below:

Modification of ecological processes: The hydrology of Toolibin Lake has been altered by clearing of the catchment such that death of some of the original flora has occurred due to dependence on fresh water. The system may be bought back to a semblance of the original state by redirecting saline runoff and pumping waters of the rising water table away to restore the hydrological balance. Total destruction of downstream lakes has occurred due to hydrology being altered to the point that few of the original flora or fauna species are able to tolerate the level of salinity and/or water logging.

Modification of structure: The understorey of a plant community may be altered by weed invasion due to nutrient enrichment by addition of fertiliser. Should the additional nutrients be removed from the system the balance may be restored, and the original plant species better able to compete. Total destruction may occur if additional nutrients continue to be added to the system causing the understorey to be completely replaced by weed species, and death of overstorey species due to inability to tolerate high nutrient levels.

Modification of species composition: Pollution may cause alteration of the invertebrate species present in a freshwater lake. Removal of pollutants may allow the return of the original inhabitant species. Addition of residual highly toxic substances may cause permanent changes to water quality, and total destruction of the community.

Threatening processes are defined as follows:

"Any process or activity that threatens to destroy or significantly modify the ecological community and/or affect the continuing evolutionary processes within any ecological community."

Examples of some of the continuing threatening processes in Western Australia include: general pollution; competition, predation and change induced in ecological communities as a result of introduced animals; competition and displacement of native plants by introduced species; hydrological changes; inappropriate fire regimes; diseases resulting from introduced microorganisms; direct human exploitation and disturbance of ecological communities.

Restoration is defined as returning an ecological community to its pre-disturbance or natural state in terms of abiotic conditions, community structure and species composition.

Rehabilitation is defined as the re-establishment of ecological attributes in a damaged ecological community although the community will remain modified.

2. DEFINITIONS AND CRITERIA FOR PRESUMED TOTALLY DESTROYED, CRITICALLY ENDANGERED, ENDANGERED AND VULNERABLE ECOLOGICAL COMMUNITIES

Presumed Totally Destroyed (PD)

An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant **and either** of the following applies (A or B):

A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or
B) All occurrences recorded within the last 50 years have since been destroyed

Critically Endangered (CR)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

An ecological community will be listed as **Critically Endangered** when it has been adequately surveyed and s found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C):

A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii):

i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years);

ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years);

ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes;

iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.

C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).

Endangered (EN)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

An ecological community will be listed as **Endangered** when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C):

A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii):

i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short-term future (within approximately 20 years);

ii) modification throughout its range is continuing such that in the short-term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short-term future (within approximately 20 years);

ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;

iii) there may be many occurrences but total area is small and all or most occurrences are

small and/or isolated and very vulnerable to known threatening processes.

C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).

Vulnerable (VU)

An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

An ecological community will be listed as **Vulnerable** when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium (within approximately 50 years) to long-term future. This will be determined on the basis of the best available information by it meeting **any one or more** of the following criteria (A, B or C):

A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.

B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.

C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long-term future because of existing or impending threatening processes

3. DEFINITIONS AND CRITERIA FOR PRIORITY ECOLOGICAL COMMUNITIES

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community List under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Priority One: Poorly-known ecological communities

Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤ 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Priority Two: Poorly-known ecological communities

Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: Poorly known ecological communities

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:

(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;

(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.

(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.

(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category.

(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

Priority Five: Conservation Dependent ecological communities

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

(Department of Environment and Conservation January 2013)

Appendix 3. Vegetation Condition Scale

Vegetation Condition Scale (Keighery 1994 and Trudgen 1988) for use in the Eremaean and Northern Botanical Provinces (EPA, 2016).

Code	Description
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

Appendix 4. Declared Pests -s22(2) of the Ngaanyatjarraku Local Government Area

Declared Pests - s22(2) of the Ngaanyatjarraku Local Government Area (DPIRD, 2023b).

Taxon	Control categories	WoNS	Common name
**Alhagi maurorum* Medik.	C3 Management		Camelthorn
**Asparagus asparagoides* (L.) Druce		Y	Bridal Creeper
**Austrocylindropuntia cylindrica* (Juss. ex Lam.) Backeb.	C3 Management	Y	Coral Cactus, Cane Cactus
**Austrocylindropuntia subulata* (Muehlenpf.) Backeb.	C3 Management	Y	Eve's Pin, Eve's Needle
**Calotropis procera* (Aiton) W.T.Aiton			Rubber Bush, *Calotropis*
**Chondrilla juncea* L.	C3 Management		Skeleton Weed, Rush Skeleton Weed, Naked Weed, Hogbite, Gum Succory
**Coccinea grandis*	C3 Management	Y	Tindola, Scarlet Gourd, Scarlet Fruited Gourd, Roh, Pepino cimarrón, Pepasan, Mughad, Little Gourd, Kundree, Ivy Gourd, Ekadala, Arakis
**Cryptostegia madagascariensis* Bojer ex Decne.			Rubbervine, Madagascar Rubbervine
**Cylindropuntia fulgida* (Engelm.) F.M.Knuth	C3 Management	Y	Coral Cactus, Boxing Glove Cactus
**Cylindropuntia imbricata* (Haw.) F.M.Knuth	C3 Management	Y	Rope Pear, Devil's Rope
**Cylindropuntia kleiniae* (DC.) F.M.Knuth	C3 Management	Y	Candle Cholla, Klein's Pencil Cactus, Klein's Cholla
**Cylindropuntia pallida* (Rose) F.M.Knuth	C3 Management	Y	White-spined Hudson Pear, Hudson Pear (white-spined)
**Cylindropuntia tunicata* (Lehm.) F.M.Knuth	C3 Management	Y	Thistle Cholla, Brown-spined Hudson Pear, Hudson Pear (brown-spined)
**Echium plantagineum* L.			Salvation Jane, Paterson's Curse
**Hydrocotyle ranunculoides* L. f.	C3 Management		Water Pennywort, Spaghetti Weed, Hydrocotyle, Grote Waternavel, Floating Marsh Pennywort
**Jatropha gossypiifolia* L.	C3 Management	Y	Cotton-leaf Physic-nut, Bellyache Bush
**Lantana camara* L.	C3 Management	Y	Wild Sage, White Sage, Red-flowered Sage, Largeleaf Lantana, Common Lantana
**Moraea flaccida* (Sweet) Steud.			One-leaf Cape Tulip

Taxon	Control categories	WoNS	Common name
**Moraea miniata* Andrews			Two-leaf Cape Tulip
**Onopordum acaulon* L.			Stemless Thistle
**Opuntia elata* Salm-Dyck	C3 Management	Y	Riverina Pear
**Opuntia elatior* Mill.	C3 Management	Y	Red-flower Prickly Pear
**Opuntia engelmannii* Salm-Dyck ex Engelm.	C3 Management	Y	Engelmann's Prickly Pear, Engelmann's Pear
**Opuntia ficus-indica* (L.) Mill.	C3 Management		Tuna Cactus, Sweet Prickly Pear, Spiny Pest Pear, Spineless Cactus, Prickly Pear, Mission Prickly Pear, Grootdoringturksvy, Indian Fig, Boereturksvy
**Opuntia microdasys* (Lehm.) Pfeiff.	C3 Management	Y	Teddy Bear Cactus, Golden Bristle Cactus, Bunny Ears
**Opuntia monacantha* Haw.	C3 Management	Y	Drooping Tree Pear
**Opuntia polyacantha* Haw.	C3 Management	Y	Plains Prickly Pear
**Opuntia puberula* Hort. Vindob. ex Pfeiff.	C3 Management	Y	Nopal de tortuga, Nopal de culebra
**Opuntia stricta* (Haw.) Haw.	C3 Management	Y	Erect Prickly Pear, Common Prickly Pear
**Opuntia tomentosa* Salm-Dyck	C3 Management	Y	Velvet Tree Pear, Velvet Pear
**Parkinsonia aculeata* L.	C3 Management	Y	*Parkinsonia*
**Pistia stratiotes* L.	C2 Eradication		Water Lettuce
**Prosopis glandulosa* Torr. x **Prosopis velutina* Wooton	C2 Eradication	Y	Mesquite
**Rubus anglocandicans* A. Newton	C3 Management	Y	Blackberry
**Rubus laudatus* A. Berger	C3 Management	Y	Early Blackberry
**Rubus rugosus* Sm.	C3 Management	Y	Keriberry, Himalayan Blackberry
**Rubus ulmifolius* Schott	C3 Management	Y	Elmleaf Blackberry, Thornfree, Loch Ness, Blacksatin
**Sagittaria platyphylla* (Engelm.) J. G. Sm.	C3 Management	Y	Sagittaria, Delta Arrowhead
**Senna alata* (L.) Roxb.			Seven-golden-candlesticks, Ringworm Shrub, Ringworm Bush, Ringworm Senna, Empress-candle-plant, Emperor's Candlesticks, Candlestick *Senna*, Candle Bush, Christmas-candle

Taxon	Control categories	WoNS	Common name
**Senna obtusifolia* (L.) H. S. Irwin & Barneby			Sicklepod *Senna*, Sicklepod, Coffeeweed, Javabean, Chinese *Senna*
**Silybum marianum* (L.) Gaertn.			Variegated Thistle, Milk Thistle, Blessed Milk Thistle
**Solanum elaeagnifolium* Cav.		Y	White Horsenettle, Silverleaf Nightshade
**Solanum linnaeanum* Hepper & P.-M. L. Jaeger			Apple of Sodom
**Tamarix aphylla* (L.) H. Karst.		Y	Tamarisk, Flowering Cypress, Athel Tree, Athel Tamarisk, Athel Pine, Athel
**Ulex europaeus* L.	C3 Management	Y	Gorse, Furze
**Xanthium spinosum* L.	C3 Management		Thorny Burweed, Spiny Cocklebur, Spiny Clotbur, Prickly Burweed, Piikkisappiruoho, Dagger Weed, Dagger Cocklebur, Burweed, Boetebos, Bathurst Burr
**Xanthium strumarium* L.	C3 Management		Sheepbur, Sea Burdock, Rough Cocklebur, Kra Chap, Karheasappiruoho, Kankerroos, Hedgehog Burweed, Heartleaf Cocklebur, Ditchbur, Common Cocklebur, Cocklebur, Clotbur, Buttonbur, Burweed, Abrojillo, Noogoora Burr, Bathurst Burr
**Zantedeschia aethiopica* (L.) Spreng.			Calla Lily, Arum lily
**Ziziphus mauritiana* Lam.	C3 Management		Saucunazi, Macaniqueira, M'sau, Indian Jujube, Chinese Apple

Control categories as listed under the Biosecurity and Agriculture Management Regulations 2013 (DPIRD, 2022c)

Category	Description
C1	Organisms which should be excluded from part or all of Western Australia.
C2	Organisms which should be eradicated from part or all of Western Australia.
C3	Organisms that should have some form of management applied that will alleviate the harmful impact of the organism, reduce the numbers or distribution of the organism or prevent or contain the spread of the organism.
Unassigned	Unassigned: Declared pests that are recognised as having a harmful impact under certain circumstances, where their subsequent control requirements are determined by a Plan or other legislative arrangements under the Act.

Appendix 5. Systematic Species List of Collected Flora

Family #	Family	Genus	Species	Conservation Significance
437	Acanthaceae	Rostellularia	adscendens	
364	Aizoaceae	Trianthema	triquetrum	
357	Amaranthaceae	Alternanthera	angustifolia	RE 160 km South-East
357	Amaranthaceae	Amaranthus	centralis	P3
357	Amaranthaceae	Ptilotus	aervoides	
357	Amaranthaceae	Ptilotus	helipteroides	
357	Amaranthaceae	Ptilotus	latifolius	
357	Amaranthaceae	Ptilotus	obovatus	
357	Amaranthaceae	Ptilotus	polystachyus	
357	Amaranthaceae	Ptilotus	sessilifolius	
357	Amaranthaceae	Ptilotus	xerophilus	
474	Apiaceae	Daucus	glochidiatus	
413	Apocynaceae	Vincetoxicum	lineare	
460	Asteraceae	Calotis	hispidula	
460	Asteraceae	Calotis	latiuscula	
460	Asteraceae	Calotis	plumulifera	
460	Asteraceae	Chrysocephalum	pterochaetum	
460	Asteraceae	Chrysocephalum	puteale	
460	Asteraceae	Lawrencella	davenportii	
460	Asteraceae	Leiocarpa	leptolepis	P1 status to be confirmed SOI (not on WA Census)
460	Asteraceae	Pluchea	dunlopii	RE 50 km South
460	Asteraceae	Pterocaulon	sphacelatum	
460	Asteraceae	Rhodanthe	citrina	RE 100 km East
460	Asteraceae	Rhodanthe	floribunda	
460	Asteraceae	Rhodanthe	stricta	
460	Asteraceae	Rutidosis	helichrysoides	
460	Asteraceae	Schoenia	ayersii	

Family #	Family	Genus	Species	Conservation Significance
460	Asteraceae	Schoenia	cassiniana	
460	Asteraceae	Senecio	eremicola	
460	Asteraceae	Streptoglossa	liatroides	RE 230 km East
460	Asteraceae	Vittadinia	eremaea	
415	Boraginaceae	Euploca	cunninghamii	
415	Boraginaceae	Euploca	tanythrix	
332	Brassicaceae	Lepidium	oxytrichum	
332	Brassicaceae	Lepidium	phlebopetalum	
332	Brassicaceae	Menkea	lutea	P1
332	Brassicaceae	Menkea	sphaerocarpa	
332	Brassicaceae	Stenopetalum	lineare var. lineare	
332	Brassicaceae	Stenopetalum	velutinum	
450	Campanulaceae	Wahlenbergia	tumidifructa	
229	Celastraceae	Stackhousia	clementii	P3
358	Chenopodiaceae	Atriplex	holocarpa	
358	Chenopodiaceae	Atriplex	vesicaria	
358	Chenopodiaceae	Dissocarpus	paradoxus	
358	Chenopodiaceae	Dysphania	cristata	
358	Chenopodiaceae	Einadia	nutans subsp. eremaea	
358	Chenopodiaceae	Enchylaena	tomentosa var. tomentosa	
358	Chenopodiaceae	Eremophea	spinosa	
358	Chenopodiaceae	Maireana	georgei	
358	Chenopodiaceae	Maireana	planifolia	
358	Chenopodiaceae	Maireana	pyramidata	RE 220 km East
358	Chenopodiaceae	Maireana	tomentosa var. tomentosa	
358	Chenopodiaceae	Maireana	triptera	
358	Chenopodiaceae	Rhagodia	eremaea	
358	Chenopodiaceae	Salsola	australis	
358	Chenopodiaceae	Sclerolaena	convexula	
358	Chenopodiaceae	Sclerolaena	cornishiana	

Family #	Family	Genus	Species	Conservation Significance
358	Chenopodiaceae	Sclerolaena	cuneata	RE 160 km North-East
358	Chenopodiaceae	Sclerolaena	eriacantha	
358	Chenopodiaceae	Sclerolaena	johnsonii	
331	Cleomaceae	Arivela	viscosa	
416	Convolvulaceae	Convolvulus	clementii	
416	Convolvulaceae	Evolvulus	alsinoides var. villosicalyx	
224	Cucurbitaceae	Citrullus	colocynthis	Weed
224	Cucurbitaceae	Cucumis	argenteus	
242	Euphorbiaceae	Euphorbia	australis var. erythrantha	
242	Euphorbiaceae	Euphorbia	drummondii	
242	Euphorbiaceae	Euphorbia	inappendiculata var. queenslandica	P3 RI 150 km
242	Euphorbiaceae	Euphorbia	parvicaruncula	P1
242	Euphorbiaceae	Euphorbia	tannensis subsp. eremophila	
201	Fabaceae	Acacia	aneura	
201	Fabaceae	Acacia	aptaneura	
201	Fabaceae	Acacia	ayersiana	
201	Fabaceae	Acacia	ayersiana (narrow phyllode variant)	
201	Fabaceae	Acacia	incurvaneura	
201	Fabaceae	Acacia	kempeana	
201	Fabaceae	Acacia	ligulata	
201	Fabaceae	Acacia	melleodora	
201	Fabaceae	Acacia	pachyacra	
201	Fabaceae	Acacia	paraneura	
201	Fabaceae	Acacia	pruinocarpa	
201	Fabaceae	Acacia	pteraneura	
201	Fabaceae	Acacia	sp. maroon branchlets	SOI
201	Fabaceae	Acacia	tetragonophylla	
201	Fabaceae	Acacia	victoriae subsp. victoriae	
201	Fabaceae	Indigofera	georgei	
201	Fabaceae	Rhynchosia	minima	

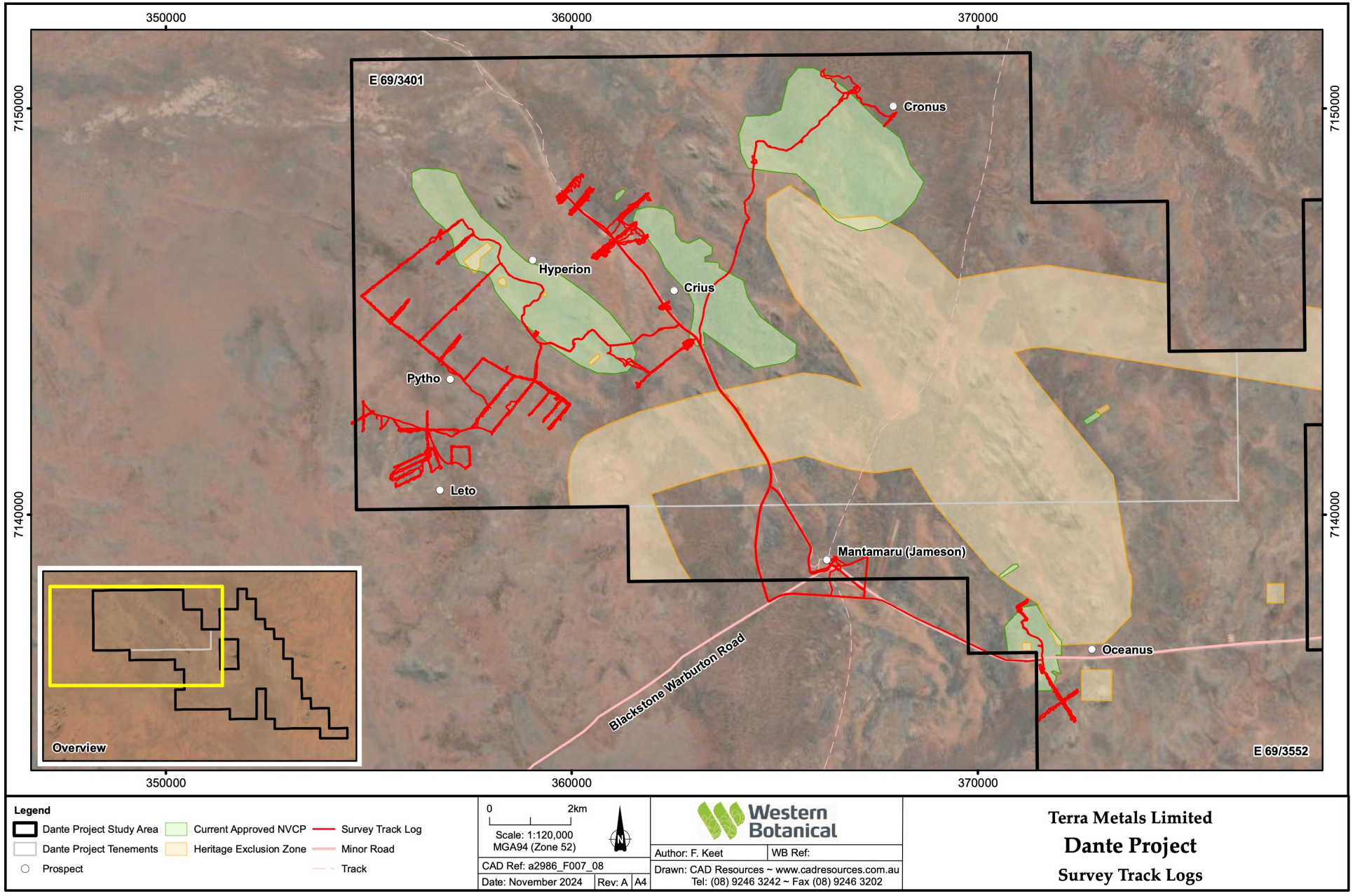
Family #	Family	Genus	Species	Conservation Significance
201	Fabaceae	Senna	artemisioides subsp. helmsii	
201	Fabaceae	Senna	artemisioides subsp. x artemisioides	
201	Fabaceae	Senna	artemisioides subsp. x petiolaris	
201	Fabaceae	Senna	cardiosperma subsp. microphylla	SOI (not on WA Census)
201	Fabaceae	Senna	glaucifolia	
201	Fabaceae	Senna	pleurocarpa var. pleurocarpa	
201	Fabaceae	Senna	sp. Billabong (J.D. Alonzo 721)	RI
201	Fabaceae	Swainsona	leeana	
201	Fabaceae	Swainsona	phacoides	
201	Fabaceae	Templetonia	egena	
201	Fabaceae	Tephrosia	sp. Central (P.K. Latz 17037)	P3
274	Geraniaceae	Erodium	carolinianum	
274	Geraniaceae	Erodium	crinitum	
458	Goodeniaceae	Goodenia	berardiana	
458	Goodeniaceae	Goodenia	triodiophila	
458	Goodeniaceae	Scaevola	parvifolia subsp. parvifolia	
458	Goodeniaceae	Scaevola	spinescens (broad leaf non-spiney form)	
432	Lamiaceae	Dicrastylis	doranii	
432	Lamiaceae	Teucrium	teucriiflorum	
339	Loranthaceae	Lysiana	murrayi	
309	Malvaceae	Abutilon	cryptopetalum	RI
309	Malvaceae	Abutilon	leucopetalum	
309	Malvaceae	Abutilon	malvifolium	RI
309	Malvaceae	Abutilon	otocarpum	
309	Malvaceae	Alyogyne	pinoniana	
309	Malvaceae	Hibiscus	burtonii	
309	Malvaceae	Hibiscus	solanifolius	
309	Malvaceae	Malvastrum	americanum	Weed
309	Malvaceae	Sida	calyxhymenia	
309	Malvaceae	Sida	cardiophylla	

Family #	Family	Genus	Species	Conservation Significance
309	Malvaceae	Sida	fibulifera	
309	Malvaceae	Sida	sp. L.	
309	Malvaceae	Sida	sp. Golden calyces pubescent (G.J. Leach 1966)	
374	Montiaceae	Calandrinia	balonensis	
374	Montiaceae	Calandrinia	eremaea	
374	Montiaceae	Calandrinia	ptychosperma	RE 100 km South
281	Myrtaceae	Aluta	maisonneuvei subsp. maisonneuvei	
281	Myrtaceae	Corymbia	opaca	
281	Myrtaceae	Eucalyptus	gamophylla	
367	Nyctaginaceae	Boerhavia	repleta	
5	Ophioglossaceae	Ophioglossum	lusitanicum	
247	Phyllanthaceae	Dendrophyllanthus	erwinii	
247	Phyllanthaceae	Synostemon	rhytidospermus	
427	Plantaginaceae	Plantago	drummondii	
163	Poaceae	Aristida	contorta	
163	Poaceae	Aristida	holathera var. holathera	
163	Poaceae	Aristida	latifolia	
163	Poaceae	Aristida	obscura	
163	Poaceae	Astrebla	pectinata	
163	Poaceae	Cenchrus	ciliaris	Weed
163	Poaceae	Cymbopogon	ambiguus	
163	Poaceae	Dactyloctenium	radulans	
163	Poaceae	Dichanthium	sericeum sub sp. Humilius	
163	Poaceae	Digitaria	brownii	
163	Poaceae	Enneapogon	avenaceus	
163	Poaceae	Enneapogon	caerulescens	
163	Poaceae	Enneapogon	polyphyllus	
163	Poaceae	Enneapogon	robustissimus	
163	Poaceae	Enteropogon	ramosus	
163	Poaceae	Eragrostis	eriopoda	

Family #	Family	Genus	Species	Conservation Significance
163	Poaceae	Eragrostis	leptocarpa	
163	Poaceae	Eragrostis	minor	Weed
163	Poaceae	Eragrostis	setifolia	
163	Poaceae	Eragrostis	xerophila	
163	Poaceae	Eriachne	aristidea	
163	Poaceae	Eriachne	helmsii	
163	Poaceae	Eriachne	mucronata (typical form)	
163	Poaceae	Iseilema	membranaceum	
163	Poaceae	Monachather	paradoxus	
163	Poaceae	Neurachne	muelleri	
163	Poaceae	Neurachne	munroi	
163	Poaceae	Panicum	decompositum	
163	Poaceae	Paractaenum	refractum	
163	Poaceae	Paspalidium	basicladum	
163	Poaceae	Poaceae	sp. Indet	SOI
163	Poaceae	Themeda	triandra	
163	Poaceae	Thyridolepis	mitchelliana	
163	Poaceae	Thyridolepis	xerophila	
163	Poaceae	Triodia	basedowii	
163	Poaceae	Triodia	longiceps	RE 340 km South-East
163	Poaceae	Triodia	pungens	
163	Poaceae	Tripogonella	loliiformis	
163	Poaceae	Triraphis	mollis	
345	Polygonaceae	Rumex	vesicaria	Weed
374	Portulacaceae	Portulaca	oleracea	
175	Proteaceae	Grevillea	juncifolia subsp. juncifolia	
175	Proteaceae	Hakea	lorea subsp. lorea	
29	Pteridaceae	Cheilanthes	sieberi subsp. sieberi	
409	Rubiaceae	Psydrax	suaveolens	
338	Santalaceae	Anthobolus	leptomerioides	

Family #	Family	Genus	Species	Conservation Significance
338	Santalaceae	Santalum	lanceolatum	
299	Sapindaceae	Dodonaea	viscosa subsp. spathulata	
428	Scrophulariaceae	Eremophila	battii	RE 150 km East
428	Scrophulariaceae	Eremophila	duttonii	
428	Scrophulariaceae	Eremophila	georgei	
428	Scrophulariaceae	Eremophila	gilesii subsp. gilesii	
428	Scrophulariaceae	Eremophila	latrobei subsp. glabra	
428	Scrophulariaceae	Eremophila	longifolia	
428	Scrophulariaceae	Eremophila	platythamnos	
428	Scrophulariaceae	Eremophila	serrulata	
428	Scrophulariaceae	Eremophila	willsii subsp. integrifolia	
417	Solanaceae	Nicotiana	occidentalis	
417	Solanaceae	Solanum	centrale	
417	Solanaceae	Solanum	cleistogamum	
417	Solanaceae	Solanum	lasiophyllum	
417	Solanaceae	Solanum	orbiculatum subsp. orbiculatum	
417	Solanaceae	Solanum	sp. Golden	SOI
199	Zygophyllaceae	Roepera	eichleri	
199	Zygophyllaceae	Tribulus	astrocarpus	
199	Zygophyllaceae	Tribulus	occidentalis	

Appendix 6. Survey Track Logs across Study Area



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Appendix C Basic and Targeted Vertebrate Fauna Survey (Terrestrial Ecosystems, 2024)

Basic and Targeted Vertebrate Fauna Survey

Dante Project

Prepared for: Terra Metals Pty Ltd

Version 1. October, 2024

RECORD OF DISTRIBUTION

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EXECUTIVE SUMMARY

Terra Metals proposes further exploration activity near the West Musgrave area about 140km west of the junction between the Western Australian, Northern Territory and South Australian borders. It has nominated the location of multiple drill pads and the drill rig access route to these drill holes.

Terrestrial Ecosystems completed a basic and targeted vertebrate fauna assessment of the project area. The following eight broad fauna habitats are in the project area: mixed shrubs over grass plains, mixed shrubs over spinifex on dunes, mixed shrubs over spinifex on rock, acacia shrub thicket, clay pan, grass plain, low stoney ridge, and rocky ridge. Because of the sparseness of trees and shrubs, the extent of bare ground, and the lack of leaf litter, the project area will likely have a limited vertebrate fauna assemblage.

There are no species of conservation significance likely to be significantly impacted by the proposed exploration drilling program. No referral is recommended under the *EPBC Act 1999*.

1. INTRODUCTION

1.1 BACKGROUND

Terra Metals Pty Ltd (Terra Metals) is proposing exploration activity near the West Musgrave area about 140km west of the junction between the Western Australian, Northern Territory and South Australian borders. It has nominated the location of multiple drill pads and the drill rig access route to these drill holes. The assessed project area is approximately 8km north-west of the Jameson Community and has an area of ~444ha (Figures 1 and 2).

1.2 PROJECT OBJECTIVES AND SCOPE OF WORKS

Terrestrial Ecosystems was commissioned by Terra Metals to undertake a Basic and Targeted vertebrate fauna risk assessment of the project area to support an exploration program. The methodology broadly follows that described in the Environmental Protection Authority's (EPA; 2020) *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*. A Basic fauna assessment involves undertaking a desktop review and reconnaissance site visit. The objectives of this fauna assessment were to:

- provide an indication of the vertebrate fauna assemblage (reptiles, amphibians, mammals and birds) in and near the project area, so that potential impacts on the fauna and fauna assemblage might be adequately assessed; and
- describe the major vertebrate fauna habitats present.

To achieve these objectives, Terrestrial Ecosystems:

- reviewed Terrestrial Ecosystems' database [includes Atlas of Living Australia] to identify potential vertebrate fauna within the areas;
- searched the Commonwealth Governments database of fauna of national environmental significance to identify species potentially occurring within the areas that are protected under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* or international migratory bird agreements (JAMBA/CAMBA);
- undertook a site reconnaissance survey, assessed fauna habitats and searched the area for conservation significant fauna and their habitat;
- reviewed previous fauna surveys conducted near the project area in similar habitat types; and
- discussed the likelihood of *EPBC Act 1999* and *Biodiversity Conservation (BC) Act 2016* listed species being present in the project area.

2. EXISTING ENVIRONMENT

2.1 LOCATION OF PROJECT AREA

The project area is within the Mann-Musgrave Block Interim Biogeographic Regionalisation of Australia (IBRA) subregion. This subregion is characterised by the sandplains that support low open woodlands of either Desert Oak or Mulga over *Triodia basedowii* hummock grasslands. Low open woodlands of Ironwood (*Acacia estrophiolata*) and Corkwoods (*Hakea* spp.) over tussock and hummock grasses often fringe ranges (Graham and Cowan 2001). The ranges support mixed wattle scrub or *Callitris glaucophylla* woodlands over hummock and tussock grasslands (Graham and Cowan 2001).

2.2 LAND USE HISTORY

The dominant land uses in this IBRA subregion and the Western Australian section are Aboriginal Reserve (94.33% of subregion area), grazing – freehold (0.03%), grazing – leasehold (1.36%), unallocated crown land and crown reserves (4.28%; Graham and Cowan 2001). To the south of the project area, a large BHP West Musgrave nickel-copper mine is in the early stages of development.

2.3 CLIMATE

The project area is characterised as arid. The Giles weather station, which is approximately 105km to the north, has an annual rainfall of approximately 290mm, although this varies considerably from year-to-year. The highest mean maximum and minimum temperatures in Giles are in December to February (Bureau of Meteorology 2023). The lowest mean daily maximum and minimum temperatures occur in July (Chart 1). Rainfall predominantly occurs between January and March from low pressure cells moving in from the north-west.

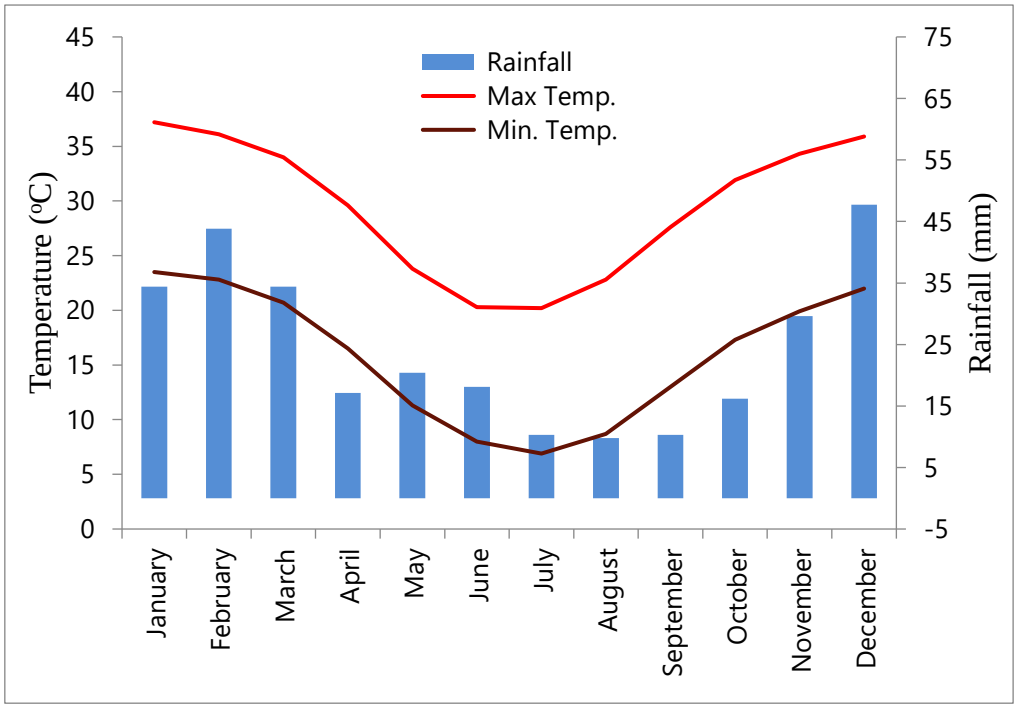

Chart 1. Climatic averages for Giles weather station

2.4 REGIONAL BIOLOGICAL FAUNA CONTEXT OF PROJECT AREA

The frogs, reptiles, mammals and birds in the vicinity of the project area have been surveyed for other environmental assessments and are therefore known. Fauna surveys and assessments undertaken in the vicinity of the project area that have been reviewed for this assessment include:

- Adaptive NRM (2021) *West Musgrave Copper and Nickel Project: Night Parrot Desktop Habitat Analysis*, unpublished report for OZ Minerals Ltd, Perth.
- Donato Environmental Services (2019) *Avian and microbat baseline characterisation associated with the proposed wind turbine electricity generators*, unpublished report for OZ Minerals Ltd, Perth.
- Jackett, N.A. and Leseberg, N.P. (2021) O*Z Minerals Ltd West Musgrave Copper and Nickel Project – Peer Review of Night Parrot assessments*, unpublished report for OZ Minerals Ltd, Perth.
- Ngaanyatjarra Council Land and Culture (2019) *Regional Habitat and Targeted Survey for Great Desert Skink* Liopholis kintorei *and Targeted Survey for* Petrogale lateralis *Warru*, Unpublished Report prepared for Oz Minerals and Cassini JV, Western Australia.
- OZ Minerals Ltd (2020) *Regional Habitat and Targeted Survey for Great Desert Skink and Targeted Survey for Petrogale lateralis (Warru)*, unpublished report for OZ Minerals Ltd, Perth.
- Pearson, D. and Turner, J. (2000) Marsupial moles pop up in the Great Victoria and Gibson Deserts, *Australian Mammalogy*, 22, 115-119.
- Terrestrial Ecosystems (2023) Basic and Targeted Vertebrate Fauna Survey of the West Musgrave Project Area. Unpublished report for Julimar Resources Pty Ltd, Perth.
- Western Wildlife (2020) *West Musgrave Copper and Nickel Project: Level 2 Vertebrate Fauna Survey 2018/2019*, unpublished report for OZ Minerals Ltd, Perth.
- Western Wildlife (2020) *West Musgrave Copper and Nickel Project: Targeted Great Desert Skink Survey 2018/2019*, unpublished report for OZ Minerals Ltd, Perth.

The most useful survey data are in the Western Wildlife (2020), Donato Environmental Services (2019) and Ngaanyatjarra Council Land and Culture (2019) reports that were used in the assessment of what is now the proposed BHP mining operation which is immediately south of the project area.

2.4.1 Fauna species at risk

An outdated report by Graham and Cowan (2001) indicated that the fauna species at risk in the IBRA subregion included Peregrine Falcon (*Falco peregrinus*), Grey Falcon (*Falco hypoleucos*), Major Mitchell's Cockatoo (*Cacatua leadbeateri*), Princess Parrot (*Polytelis alexandrae*), Scarlet-chested Parrot (*Neophema splendida*), Slender-billed Thornbill (*Acanthiza iredalei iredalei*), Malleefowl (*Leipoa ocellata*), Night Parrot (*Pezoporus occidentalis*), Bilby (*Macrotis lagotis*), Southern Marsupial Mole (*Notoryctes typhlops*), Mulgara (*Dasycercus cristicauda*), Black-footed Rock Wallaby (*Petrogale lateralis*), Great Desert Skink (*Liopholis kintorei*) and Woma (*Aspidites ramsayi*). Some of these species are either no longer on the threatened species list or have changed their classification, and additional species have been added to the list.

3. METHODOLOGY

3.1 DATABASE SEARCHES

A search of the *EPBC Act* online database of matters of national environmental significance (MNES) was undertaken to extract a list of conservation significant species that could potentially be in the project area (Appendix A). In addition, a desktop search of the Terrestrial Ecosystems' fauna survey database was used to develop an appreciation of the vertebrate fauna assemblages in relevant sections of the bioregion near the project area.

Other more general texts were also used to provide supplementary information on vertebrate fauna in the bioregion, including Tyler et al. (2000) for frogs; Storr et al. (1983, 1990, 1999, 2002) and Thompson and Thompson (2006) for reptiles; Johnstone and Storr (1998, 2004) for birds; and Van Dyck and Strahan (2008) for mammals.

Collectively, these sources of information were used to create lists of species that were expected to utilise the project area and broader subregion. It should be noted that these lists will include species that have been recorded in the general region but are possibly vagrants, and they will not generally be found in the project area due to a lack of suitable habitat (e.g. wetland and shore birds). Vagrants can be recorded almost anywhere. Many of the records are historical, and some species are no longer present in the areas (e.g., Bilby). Many bird, mammal, reptile and amphibian species have specific habitat requirements that may be present in the general area but not in the project area. Also, the ecology of many of these species is often poorly understood. It can sometimes be difficult to indicate species whose specific habitat requirements are absent in the project area. Therefore, many species will be included in the lists produced from database searches but will not be present in the actual project area.

There are errors in most databases, including Atlas of Living Australia and the WA Museum collection. These errors occur because of a misidentification of individuals, taxonomic name changes and incorrect coordinates entered into the database. Terrestrial Ecosystems could not verify the primary records, so it has used the information provided. Obvious errors have been removed, but readers should appreciate that species lists and fauna surveys reported in the appendices may include these errors.

3.2 SITE INSPECTION AND FAUNA HABITAT ASSESSMENT

The project area was assessed on 12-13 October 2023 and 2-4 September 2024. This assessment aimed to record fauna habitat types and conditions in the project area and to search for evidence of vertebrate fauna species of conservation significance. Specifically, the zoologists searched for the Great Desert Skink, Malleefowl, Bilby and Night Parrot habitat. The fauna habitat assessment had two foci:

- assessing fauna habitat types and their condition; and
- assessing the possible presence of and recording evidence of species of conservation significance.

This information included a description of the habitat structure, habitat condition, landform, soils and vegetation and time since last fire. The data in Table 1 were assessed at each location as part of the habitat assessment:

Table 1. Habitat assessment variables

Observer's Name:	
Coordinates of the location as UTM (GDA94):	
Fire history – options	
☐ > 5 years	
☐ 1-5 years	
☐ < 1 year	
Landform – options	
☐ Beach	☐ Lower slope
☐ Clay plain	☐ Mid slope
☐ Cliff	☐ Ridge
☐ Creek line	☐ River
☐ Dam	☐ Rocky outcrop / breakaway
☐ Drainage line	☐ Salt lake
☐ Dune crest	☐ Sand dune
☐ Dune slope	☐ Sand plain
☐ Dune swale	☐ Stony plain
☐ Escarpment	☐ Swamp
☐ Flat	☐ Undulating
☐ Gorge	☐ Upper slope
☐ Gully	☐ Wetland
☐ Intertidal / mangrove	☐ Water hole
☐ Lake / lake edge	
Habitat quality – options	
☐ *High quality fauna habitat* – These areas closely approximate the vegetation mix and quality that would have been in the area prior to any disturbance. The habitat has connectivity with other habitats and is likely to contain the most natural vertebrate fauna assemblage.	
☐ *Very good fauna habitat* - These areas show minimal signs of disturbance (e.g. grazing, clearing, fragmentation, weeds) and generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats and fauna assemblages in these areas are likely to be minimally effected by disturbance.	
☐ *Good fauna habitat* – These areas showed signs of disturbance (e.g. grazing, clearing, fragmentation, weeds) but generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats and fauna assemblages in these areas are likely to be affected by disturbance.	
☐ *Disturbed fauna habitat*– These areas showed signs of significant disturbance. Many of the trees, shrubs and undergrowth are cleared. These areas may be in the early succession and regeneration stages. Areas may show signs of significant grazing, containing weeds or have been damaged by vehicle or machinery. Habitats are fragmented or have limited connectivity with other fauna habitats. Fauna assemblages in these areas are likely to differ significantly from what might be expected in the area had the disturbance not occurred.	

Observer's Name:	
☐ *Highly degraded fauna habitat* – These areas often have a significant loss of vegetation, an abundance of weeds, and a large number of vehicle tracks or are completely cleared. Limited or no fauna habitat connectivity. Fauna assemblages in these areas are likely to be significantly different to what might have been in the area pre-disturbance.	
Soil colour - options	
☐ Black	☐ Red
☐ Brown	☐ White
☐ Grey	☐ Yellow
☐ Orange	
Surface stones – options	
☐ None	☐ Boulders (>250mm)
☐ Pebbles (0-50mm)	☐ Rocks
☐ Cobbles (51-250)	

3.2.1 Field work and reporting staff

Dr Scott Thompson and Simon Pitt undertook the site investigation and fauna habitat assessment. This assessment was carried out using a utility all-terrain vehicle (UTV), and all sections of the project area were covered. Dr Graham Thompson drafted this report, Dr Scott Thompson reviewed this report before it was sent to the client and Simon Pitt prepared the fauna habitat maps.

Senior scientists have appropriate relevant post-graduate qualifications, extensive experience in conducting fauna assessments, have published research articles on biodiversity, fauna assemblages, conservation significant species, trapping techniques and temporal variations in trapped fauna assemblages and are therefore appropriately trained and experienced for the task of preparing this assessment.

Dr Scott Thompson is the only environmental practitioner in Western Australia who has independent specialist certification (CEnvP – Ecology Specialist) in combination with post-graduate tertiary qualifications and is a licenced pest management technician (LPMT). This unique set of skills and qualifications ensures Scott undertakes fauna surveys, assessments and control programs to the highest standard and quality assurance. The qualifications and experience of the survey personnel are shown in Table 2.

Table 2. Project personnel and their qualifications

Name	Qualifications	Experience	Role
Dr Scott Thompson	BSc. (Env. Sc.), MSc. (Env. Mngt.), PhD (Env. Sc./Mngt); Cert III (Vert Pest Mng); Cert IV (WHS); CEnvP (Ecology Specialist)	> 20 years	Survey coordinator and Principal zoologist; October 2023 fieldwork, fauna habitat mapping and report review.
Dr Graham Thompson	Post Grad. Dip. (Zool.), PhD (Zoology); Cert III (Vert Pest Mng);	> 20 years	Principal zoologist; report preparation
Simon Pitt	BSc (NRM); Cert III (Rural and Env Pest Mng);	>15 years	Fieldwork (October 2023 and September 2024), fauna habitat mapping and report preparation.
Brody Altus	BSc (Zoology); MSc (Zoology); Cert III (Rural and Env Pest Mng);	>3 years	Fieldwork (September 2024) and fauna habitat mapping.

3.3 TAXONOMY AND NOMENCLATURE

Taxonomy and nomenclature for fauna species used in this report are generally based on the WA Museum species list. Terrestrial Ecosystems has presumed that the identifications referred to in the appendices or in reports used to provide local and regional comparative data are correct, and we have only corrected obvious records where the nomenclature was known to be incorrect.

3.4 LIMITATIONS

This Basic vertebrate fauna risk assessment is based on information contained in the Commonwealth Government database and other published and unpublished fauna survey data for the bioregion and a site visit. It is acknowledged that multiple surveys conducted in different seasons, repeated over several years and different seasonal conditions are necessary to appreciate the fauna assemblage in the project area fully.

The EPA's (2020) *Technical Guidance - Terrestrial vertebrate fauna surveys for environmental impact assessment* suggested that many variables may limit fauna surveys. Limitations associated with each of these variables are assessed in Table 3.

Table 3. Fauna survey limitations and constraints

Possible limitations	Constraint	Comment
Availability of data and information	Yes, negligible	Vertebrate fauna survey data are available for similar habitats immediately south of the project area. These data were the basis of the EPA's assessment of potential impacts on the mine, which is now in the early stages of development.
Competency/experience of the survey team, including experience in the bioregion surveyed	No	The authors of this report have appropriate graduate and postgraduate qualifications, have undertaken multiple surveys and assessments, published a book and multiple refereed journal articles based on fauna surveys, and are familiar with the vertebrate fauna in this bioregion.
Scope of the survey, e.g. where faunal groups were excluded from the survey	N/A	Although no trapping surveys were undertaken during the site assessment, fauna survey data from Western Wildlife (2020), Donato Environmental Services (2019) and Ngaanyatjarra Council Land and Culture's (2019) surveys are adequate to represent the vertebrate fauna in the project area.
Timing, weather and season	No	The weather was suitable for a site visit.
Disturbance that may have affected results, e.g. fire, flood	No	Disturbances in the project area have been factored into this assessment.
The proportion of fauna identified, recorded or collected	N/A	
Adequacy of the survey intensity and proportion of survey achieved, e.g. the	No	Basic survey requirements were met.

Possible limitations	Constraint	Comment
extent to which the area was surveyed		
Access problems	No	The site was accessible using UTV.
Problems with data and analysis, including sampling biases	N/A	

N/A = not applicable, Significant = major impact on the assessment outcome, Moderate = impacted parts of the assessment, Negligible = almost no effect on the assessment.

4. RESULTS

4.1 FAUNA HABITAT

Six hundred and three habitat assessments were completed in the project area (Appendix D). The following eight fauna habitats were identified:

- mixed shrubs over grass plains (Plates 1 and 2);
- mixed shrubs over spinifex on dunes (Plates 3 and 4);
- mixed shrubs over spinifex on rock (Plates 5 and 6);
- acacia shrub thicket (Plates 7 and 8);
- clay pan (Plates 9 and 10);
- grass plain (Plates 11 and 12);
- Low stoney ridge (Plates 13 and 14); and
- Rocky ridge (Plates 15 and 16).

In addition, there are disturbed areas (i.e. tracks and exploration areas) that typically have no or very few vertebrate fauna other than those that are crossing from one habitat to another.

Plate 1. Mixed shrubs over grass plains

Plate 2. Mixed shrubs over grass plains

Plate 3. Mixed shrubs over spinifex on dunes

Plate 4. Mixed shrubs over spinifex on dunes

Plate 5. Mixed shrubs over spinifex on rock

Plate 6. Mixed shrubs over spinifex on rock

Plate 7. Acacia shrub thicket

Plate 8. Acacia shrub thicket

Plate 9. Clay pan

Plate 10. Clay pan

Plate 11. Grass plain

Plate 12. Grass plain

Plate 13. Low stoney ridge

Plate 14. Low stoney ridge

Plate 15. Rocky ridge

Plate 16. Rocky ridge

4.1.1 Feral and pest fauna

The field survey recorded evidence of camels (Plate 17), wild dogs (Plate 18), rabbits (Plate 19) and feral cats (Plate 20) in the project area.

Plate 17. Camel tracks

Plate 18. Wild dog

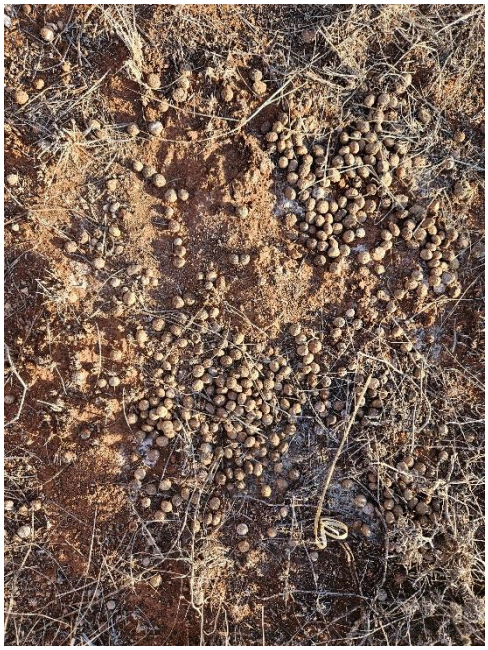

Plate 19. Rabbit scats

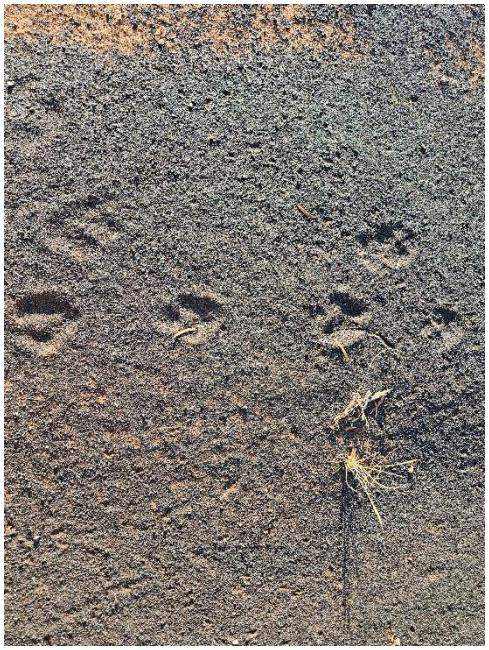

Plate 20. Cat tracks

4.2 BIOREGIONAL VERTEBRATE FAUNA ASSEMBLAGE

Appendix B provides a summary of the fauna survey data that are available near the project area. There are appreciable differences in the recorded fauna assemblages within and among fauna surveys shown in Appendix B. These differences are partially due to the varying survey effort deployed by some of the surveys and they also reflect variations in soils and vegetation as well as temporal variations in the fauna assemblages.

Tables 3-6 provide a list of vertebrate species potentially found near the project area that have been compiled based on the fauna survey report results shown in Appendix B.

Table 4. Birds potentially found near the project area

Family	Species	Common name
Casuariidae	*Dromaius novaehollandiae*	Emu
Columbidae	*Phaps chalcoptera*	Common Bronzewing
	Ocyphaps lophotes	Crested Pigeon
Cuculidae	*Cacomantis pallidus*	Pallid Cuckoo
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew
Turnicidae	*Turnix velox*	Little Buttonquail
Otididae	*Ardeotis australis*	Australian Bustard
Accipitridae	*Elanus axillaris*	Black-shouldered Kite
	Hamirostra melanosternon	Black-breasted Buzzard
	Aquila audax	Wedge-tailed Eagle
	Circus assimilis	Spotted Harrier
	Haliastur sphenurus	Whistling Kite
Tytonidae	*Tyto alba*	Barn Owl
Alcedinidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher
Meropidae	*Merops ornatus*	Rainbow Bee-eater
Falconidae	*Falco cenchroides*	Nankeen Kestrel
	Falco longipennis	Australian Hobby
	Falco berigora	Brown Falcon
Cacatuidae	*Eolophus roseicapilla*	Galah
	Nymphicus hollandicus	Cockatiel
Psittaculidae	*Neopsephotus bourkii*	Bourke's Parrot
	Barnardius zonarius	Australian Ringneck
	Psephotus varius	Mulga Parrot
	Melopsittacus undulatus	Budgerigar
Ptilonorhynchidae	*Chlamydera guttata*	Western Bowerbird
Maluridae	*Amytornis oweni*	Sandhill Grasswren
	Stipiturus ruficeps	Rufous-crowned Emuwren
	Malurus assimilis	Purple-backed Fairywren
	Malurus splendens	Splendid Fairywren
	Malurus leucopterus	White-winged Fairywren
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater
	Purnella albifrons	White-fronted Honeyeater
	Manorina flavigula	Yellow-throated Miner
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater
	Gavicalis virescens	Singing Honeyeater
	Ptilotula plumula	Grey-fronted Honeyeater
	Epthianura tricolor	Crimson Chat
	Epthianura aurifrons	Orange Chat
Pardalotidae	*Pardalotus rubricatus*	Red-browed Pardalote
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat
	Acanthiza apicalis	Inland Thornbill
	Acanthiza uropygialis	Chestnut-rumped Thornbill
	Acanthiza robustirostris	Slaty-backed Thornbill
	Smicrornis brevirostris	Weebill
	Aphelocephala leucopsis	Southern Whiteface
	Aphelocephala nigricincta	Banded Whiteface

Family	Species	Common name
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler
Campephagidae	*Coracina maxima*	Ground Cuckooshrike
	Coracina novaehollandiae	Black-faced Cuckooshrike
	Lalage tricolor	White-winged Triller
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella
Psophodidae	*Psophodes occidentalis*	Chiming Wedgebill
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird
Pachycephalidae	*Colluricincla harmonica*	Grey Shrikethrush
	Pachycephala rufiventris	Rufous Whistler
Artamidae	*Artamus cinereus*	Black-faced Woodswallow
	Cracticus nigrogularis	Pied Butcherbird
	Gymnorhina tibicen	Australian Magpie
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail
Monarchidae	*Grallina cyanoleuca*	Magpie-lark
Corvidae	*Corvus orru*	Torresian Crow
Petroicidae	*Petroica goodenovii*	Red-capped Robin
	Melanodryas cucullata	Hooded Robin
Locustellidae	*Cincloramphus cruralis*	Brown Songlark
	Cincloramphus mathewsi	Rufous Songlark
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow
Estrildidae	*Taeniopygia guttata*	Zebra Finch
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit

Table 5. Amphibians potentially found near the project area

Family	Species	Common name
Limnodynastidae	*Notaden nichollsi*	Desert Spadefoot

Table 6. Mammals potentially found near the project area

Family	Species	Common name
Bovidae	*Bos taurus*	Cow
Camelidae	*Camelus dromedarius*	Dromedary
Canidae	*Canis* sp.	Wild dog
	Vulpes vulpes	Red Fox
Felidae	*Felis catus*	Cat
Molossidae	*Austronomus australis*	White-striped Freetail Bat
	Mormopterus petersi	Inland Free-tail Bat
Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat
	Nyctophilus geoffroyi	Lesser Long-eared Bat
Dasyuridae	*Dasycercus blythi*	Brush-tailed Mulgara
	Ningaui ridei	Wongai Ningaui
	Pseudantechinus macdonnellensis	Fat-tailed False Antechinus
	Sminthopsis hirtipes	Hairy-footed Dunnart
	Sminthopsis ooldea	Ooldea Dunnart
	Sminthopsis youngsoni	Lesser Hairy-footed Dunnart
Macropodidae	*Lagorchestes hirsutus*	Rufous Hare-wallaby
	Osphranter robustus	Euro
	Petrogale lateralis	Black-flanked Rock-wallaby
Leporidae	*Oryctolagus cuniculus*	Rabbit
	Notoryctes typhlops	Southern Marsupial Mole
Equidae	*Equus caballus*	Horse
Muridae	*Mus musculus*	House Mouse
	Notomys alexis	Spinifex Hopping Mouse
	Pseudomys desertor	Desert Mouse
	Pseudomys hermannsburgensis	Sandy Inland Mouse

Table 7. Reptiles potentially found near the project area

Family	Species	Common name
Agamidae	*Ctenophorus clayi*	Black-collared Dragon
	Ctenophorus graafi	Ring-tailed Dragon
	Ctenophorus isolepis	Central Military Dragon
	Ctenophorus nuchalis	Central Netted Dragon
	Ctenophorus reticulatus	Western Netted Dragon
	Gowidon longirostris	Long-nosed Dragon
	Moloch horridus	Thorny Devil
	Pogona minor	Western Bearded Dragon
Carphodactylidae	*Nephrurus levis*	Three-lined Knob-tail
Diplodactylidae	*Diplodactylus conspicillatus*	Fat-tailed Gecko
	Diplodactylus laevis	Desert Fat-tailed Gecko
	Lucasium stenodactylum	Crowned Gecko
	Rhynchoedura ornata	Beaked Gecko
	Strophurus ciliaris	Spiny-tailed Gecko
	Strophurus elderi	Jewelled Gecko
	Strophurus intermedius	Southern Spiny-tailed Gecko
	Strophurus strophurus	Western Spiny-tailed Gecko
Elapidae	*Brachyurophis fasciolatus*	Narrow-banded Burrowing Snake
	Demansia psammophis	Yellow-faced Whipsnake
	Suta monachus	Hooded Snake
	Pseudechis australis	Mulga Snake
	Pseudonaja mengdeni	Western Brown Snake
	Pseudonaja modesta	Ringed Brown Snake
	Simoselaps anomalus	Desert Banded Snake
Gekkonidae	*Gehyra montium*	Centralian Dtella
	Gehyra purpurascens	Purplish Dtella
	Gehyra variegata	Variegated Gehyra
	Heteronotia binoei	Bynoe's Gecko
Pygopodidae	*Delma butleri*	Unbanded Delma
	Delma desmosa	Banded Delma
	Delma nasuta	Sharp-snouted Delma
	Lialis burtonis	Burton's Legless Lizard
	Pygopus nigriceps	Western Hooded Scaly-foot
Pythonidae	*Antaresia stimsoni*	Stimson's Python
	Aspidites ramsayi	Woma
Scincidae	*Ctenotus brooksi*	Brooks Ctenotus
	Ctenotus calurus	Blue-tailed Finesnout Ctenotus
	Ctenotus helenae	Clay-soil Ctenotus
	Ctenotus inornatus	Bar-shouldered Ctenotus
	Ctenotus leonhardii	Leonhardi's Ctenotus
	Ctenotus nasutus	Nasute Finsnout Ctenotus
	Ctenotus pantherinus	Leopard Ctenotus
	Ctenotus piankai	Coarse Sands Ctenotus
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus
	Ctenotus schomburgkii	Barred Wedgesnout Ctenotus
	Cyclodomorphus melanops	Spinifex Slender Blue-tongue
	Egernia eos	Central Pygmy Spiny-tailed Skink
	Eremiascincus pallidus	Western Sand-swimming Skink
	Eremiascincus richardsonii	Broad-banded Sand-swimmer
	Lerista bipes	North-western Sandslider
	Lerista desertorum	Central Desert Robust Slider
	Lerista labialis	Southern Slider
	Lerista taeniata	Ribbon Slider
	Lerista timida	Timid Slider
	Liopholis inornata	Desert Skink
	Liopholis kintorei	Great Desert Skink
	Liopholis striata	Nocturnal Desert Skink
	Menetia greyii	Common Dwarf Skink

Family	Species	Common name
	Morethia ruficauda	Lined Fire-tailed Skink
	Notoscincus ornatus	Ornate Soil-crevice Skink
	Tiliqua multifasciata	Central Blue-tongue
	Tiliqua occipitalis	Western Blue-tongued Lizard
Typhlopidae	*Anilios endoterus*	Interior Blind Snake
	Anilios grypus	Long-beaked Blind Snake

Family	Species	Common name
Varanidae	*Varanus acanthurus*	Spiny-tailed Monitor
	Varanus brevicauda	Short-tailed Pygmy Monitor
	Varanus eremius	Pygmy Desert Monitor
	Varanus giganteus	Perentie
	Varanus gilleni	Pygmy Mulga Monitor
	Varanus gouldii	Gould's Goanna
	Varanus tristis	Black-headed Monitor

4.3 CONSERVATION SIGNIFICANT FAUNA

Fauna species of conservation significance are protected by the Commonwealth *EPBC Act 1999*, and this list includes species covered by international treaties such as the Japan-Australia Migratory Bird Agreement (JAMBA) and China-Australia Migratory Bird Agreement (CAMBA) and the Western Australia (WA) *BC Act 2016*. The *BC Act 2016* provides for publishing the *Wildlife Conservation (Specially Protected Fauna) Notice* that lists species under multiple categories. In addition, DBCA maintains a list of fauna that require monitoring under four priorities based on the current knowledge of their distribution, abundance and threatening processes. The *EPBC Act 1999* and *BC Act 2016* imply legislative requirements for managing anthropogenic impacts to minimise the effects of disturbances on species and their habitats. Priority species have no statutory protection, other than the DBCA wishes to monitor potential impacts on these species. Environmental consultants and proponents of developments are encouraged to avoid and minimise impacts on these species. Definitions of the significant fauna under the *BC Act 2016* are provided in Appendix C. The fauna species that have special status in either State or Commonwealth government legislation or are on the DBCA Priority species list and are potentially present in the vicinity of the project area are listed in Table 8. Although they were recorded in the search of the MNES online database, migratory waders and shorebirds that typically would be found around the edge of salt lakes, clay pans, estuaries and marshes have been excluded from Table 8 as there is no suitable habitat nearby.

The following is an assessment of the likelihood of each of the species listed in Table 8 being found in the project area.

Table 8. assessment of the potential presence of a conservation significant fauna species in the project area

Species	BC Act / DBCA priority species	EPBC Act	Comment on the potential to be in the project area
Sandhill Dunnart *Sminthopsis psammophila*	Endangered	Endangered	Not present due to a lack of suitable habitat
Red Goshawk *Erythrotriorchis radiatus*	Vulnerable	Endangered	Not present due to a lack of suitable habitat
Night Parrot *Pezoporus occidentalis*	Endangered	Critically endangered	Not present due to a lack of suitable habitat
Southern Whiteface *Aphelocephala leucopsis*		Vulnerable	Not present due to a lack of suitable habitat
Ghost Bat *Macroderma gigas*	Vulnerable	Vulnerable	Not present due to a lack of suitable habitat
Great Desert Skink Liopholis kintorei	Vulnerable	Vulnerable	Not present due to a lack of suitable habitat
Grey Falcon *Falco hypoleucos*	Vulnerable	Vulnerable	Not present due to a lack of suitable habitat
Malleefowl *Leipoa ocellata*	Vulnerable	Vulnerable	Not present due to a lack of suitable habitat
Greater Bilby *Macrotis lagotis*	Vulnerable	Vulnerable	Not present due to a lack of suitable habitat
Central Australian Rock-wallaby *Petrogale lateralis centralis*	Vulnerable	Vulnerable	Not present due to a lack of suitable habitat
Princess Parrot *Polytelis alexandrae*	Vulnerable	Vulnerable	Not present due to a lack of suitable habitat
Brush-tailed Mulgara *Dasycercus cristicauda*	P4		Not present due to a lack of suitable habitat
Woma *Aspidites ramysayi*	P4		Not present due to a lack of suitable habitat
Marsupial Mole *Notoryctes typhlops*	P4		Not present due to a lack of suitable habitat

Sandhill Dunnart (*Sminthopsis psammophila*) – Endangered under the *BC Act 2016* and *EPBC Act 1999*

The Sandhill Dunnart is a small (30-45g) arid adapted dasyurid that is found in the eastern part of the Western Australian section of the Great Victoria Desert, eastern Goldfields and the western and southern parts of South Australia. Recent surveys undertaken for the Great Victoria Desert Trust have increased their geographic range in the Great Victoria Desert and into the eastern Goldfields.

Riley (2020) and Riley et al. (2021) indicated that the Sandhill Dunnart typically uses Stages 4 and 5 hummocks, and occasionally Stage 3, with Stage 4 being an open hummock ring with soft, dead leaves centrally and Stage 5 is where the hummock breaks apart and continues spreading. The larger parts remain as suitable shelter for the dunnart.

The habitat in the project area is not suitable for this dunnart, and there are no records of the Sandhill Dunnart near the project area in the Atlas of Living Australia. The Sandhill dunnart is not present in the project area.

Red Goshawk (*Erythrotriorchis radiatus*) – Endangered under the *BC Act 2016* and *EPBC Act 1999*

Johnstone and Storr (1998) and the Atlas of Living Australia indicate the Red Goshawk's geographic distribution is confined to the Kimberley area, so it is highly improbable that it would be recorded in the project area.

Night Parrot (*Pezoporus occidentalis*) - Critically Endangered under the *BC Act 2016* and Endangered under the *EPBC Act 1999*

The Night Parrot is a small, arid-adapted, nocturnal, ground-feeding parrot (Johnstone and Storr 1998, Threatened Species Scientific Committee 2016). Its length is 22-25cm with a body mass of approximately 104g (Threatened Species Scientific Committee 2016), although it was suggested that they were semi-nomadic, the Night Parrots in south-western Queensland appear to be sedentary (Murphy 2015).

The Night Parrot was probably originally distributed over much of semi-arid and arid Australia (Garnett et al. 1993, Threatened Species Scientific Committee 2016). Records in north-west and western Queensland in the early 1990-2000s were in a broad cross section of the habitats available (Garnett et al. 1993, Cupitt and Cupitt 2008, Boles et al. 2016). There have been recent sightings in the Pilbara in 1980, 2005 and 2017, central WA in 1979, north-eastern South Australia in 1979, western Queensland (including Pullen-Pullen-Mt Windsor-Diamantina population) in 1980, 1990, 1993, 2006 and 2013-17 (Davis and Metcalf 2008, Garnett et al. 2011, Charalambous 2016, Pickrell 2016, AG staff 2017, Palaszxzuk and Miles 2017, Rykers 2017, AG staff 2018), Pilbara in 2017 (Jones 2017) and the northern Goldfields (Jackett et al. 2017). Garnett *et al*. (2011) suggested that 50-250 mature individuals were in less than 5% of its previous range.

Wilson's (1937) summary of observations provided information on the early records of Night Parrots' preferred habitat and breeding sites. Recent information indicates its preferred habitat appears to be in *Triodia* grasslands, chenopod shrublands, shrubby samphire and floristically diverse habitats dominated by large-seeded species (Threatened Species Scientific Committee 2016, McCarthy 2017, Murphy et al. 2017b). At Pullen Pullen Reserve it nests in large, more or less ring-shaped *Triodia*, and the nest consists of a tunnel (25-30^{o} and 0^{o} to the ground; 20-33cm long) through an apron of dead spinifex leaves that leads to a chamber under a live hummock, with a shallow depression (3-4cm) excavated into the gravelly/sandy soil (Murphy et al. 2017a). In the northern Goldfields the nest was again in a spinifex hummock, it was circular, with an excavated depression (~1.5-2.0cm) in sandy substrate (Hamilton et al. 2017, Jackett et al. 2017). The entrance tunnel was 62cm long, and was downward sloping (27^{o}) with the entrance 28cm above the ground (Hamilton et al. 2017). It has clutches of two to four sub-elliptical, white eggs with a lustrous appearance (Murphy et al. 2017a). Breeding followed significant rains in March for the observations in Pullen-Pullen Reserve and in April in the northern Goldfields (Hamilton et al. 2017, Murphy et al. 2017a), but it is thought that breeding generally occurs between April and October (Murphy et al. 2017a).

Night Parrots establish long-term stable roost sites in long unburnt *Triodia* sp. and these sites typically support a pair or small group of Night Parrots, with individual roosts spread across an area up to several hectares (Adaptive NRM 2021). These roost sites are in open landscapes (Jackett et al. 2017, Murphy et al. 2017a) with some scattered shrubs or isolated trees, although they are predominantly treeless. Night Parrot's perceived lower visual acuity may compromise its capacity to fly in treed areas, so it selects sites to reduce potential collisions when flying (Iwaniuk et al. 2020). The Department of Parks and Wildlife (2017) described localised Night Parrot habitat as 'roosting and nesting sites in clumps of dense vegetation, primarily old and large spinifex clumps (often >50 years unburnt), especially ring-forming hummocks. These may be in expanses or isolated patches but are sometimes associated with other vegetation types, such as dense chenopod shrubs.

Spinifex hummocks that are collapsed (i.e. less than about 40-50 cm in height) are not likely to provide adequate shelter'.

Night Parrots forage on seeds in areas of higher productivity. Murphy *et al*. (2017b) placed a GPS tag on two Night Parrots and reported that the birds called at dusk from their diurnal roosts among spinifex hummocks. They then flew to more floristically diverse habitats dominated by large-seeded, prolifically seeding species to feed.

Flyways are the connecting areas between where Night Parrots forage and roost and could include areas of low mixed grassland, shrubs, herbs and chenopods with bare gibber (Cupitt and Cupitt 2008, Boles et al. 2016). Murphy et al. (2017b) reported Night Parrots fly tens of kilometres when moving between foraging and perhaps drinking water, and probably traverse a variety of habitat types.

Donata Environmental Services (2019) investigated the avian and microbat fauna in the West Musgrave mining project area, which is immediately to the south of the project area and Jackett and Leseberg (2021) peer reviewed this report. No evidence of Night Parrots were recorded by Donata Environmental Services (2019) survey, however, the Jackett and Leseberg's (2021) assessment indicated the survey and assessment was inadequate and Night Parrot habitat was present in the project area.

There are no substantive mature spinifex hummocks in the project area and numerous feral fauna. As the preferred roosting and nesting sites for Night Parrots is not present and there is a significant threatening process for the species in the area (i.e. wild dogs and feral cats), Terrestrial Ecosystems assess that the Night Parrot is not present in the project area.

Southern Whiteface (*Aphelocephala leucopsis*) - Vulnerable under the *EPBC Act 1999*

The Southern Whiteface is a recent addition to the *EPBC Act* listing of vulnerable species. It is a small bird found in the arid and semi-arid interior from the WA coast near Hamelin Bay through the Great Victoria Desert into the arid areas of South Australia, Victoria, NSW and Queensland (Johnstone and Storr 2004, Department of Climate Change Energy 2023).

It is found in open woodlands and shrublands with an understorey of grasses and low shrubs (Department of Climate Change Energy 2023). It forages on the ground, feeding on insects, spiders and seeds, mostly found in the leaf-litter (Johnstone and Storr 2004, Department of Climate Change Energy 2023).

The Atlas of Living Australia records Southern Whiteface in multiple locations around the project area, so in a suitable habitat, it could be present. This small bird is potentially found in areas more densely vegetated with shrubs; however, the proposed exploration drilling program will not impact this species as it will readily move.

Ghost Bat (*Macroderma gigas*) - Vulnerable under the *EPBC Act 1999* and *BC Act 2016*

Armstrong and Anstee (2000), in their summary of the geographic distribution of *M. gigas* in the Pilbara, reported that they had been present in the Abydos Plain, Chichester Plateau, Gascoyne Ranges, George Ranges, Hamersley Plateau and Oakover Valley. However, more recently McKenzie and Bullen (2009) reported it as being more common in the Pilbara than previously thought despite detectability constraints caused by its cryptic call. Its preferred habitat in the Hamersley Ranges was caves beneath bluffs of low rounded hills composed of Marra Mamba geology and granite rock piles in the eastern Pilbara (Armstrong and Anstee 2000). Armstrong and Anstee (2000) reported that while the Marra Mamba iron formation was a good predictor of the occurrence of *M. gigas* in the Hamersley Range, essentially, any cave beneath a bluff with sufficient depth could be considered a potential roost. It is highly unusual to find this bat in a spinifex plain unless it is near a rocky area containing suitable roosting caves.

The Atlas of Living Australia has records of this bat just inside the NT and SA border in a similar latitude to the project area. This bat requires specific retreat or roosting sites, which do not exist in the project area. This bat was not recorded in Donato Environmental Services (2019) or Western Wildlife (2020) surveys, so it is highly improbable that it is present in the project area.

Great Desert Skink (*Liopholis kintorei*) - Vulnerable under the *BC Act 2016* and *EPBC Act 1999*

The Great Desert Skink is a large burrowing skink found in the sandy and gravelly habitats of the central and western deserts, where it lives in small colonies. Its distribution is widespread yet patchy, with evidence of pronounced genetic differentiation in some subpopulations throughout its range (Dennison et al. 2015). The Great Desert Skink primarily lives in spinifex dominated sandplains adjacent to dunes (Ridley et al. 2020). Pearson et al. (2001) reported Great Desert Skinks in the Gibson Desert in undulating sandplain of deep red sands with a surface cover of fine laterite and vegetated with spinifex grass. This habitat is not present in the project area.

The Great Desert Skink lives in social colonies from which young breeding males disperse to adjacent colonies; although the distance of dispersal is not well understood (Ridley 2015). Colonies consist of up to 10 individuals living in subterranean burrow networks of up to 10m in diameter (Ridley et al. 2020). The burrow system may be a single entrance tunnel or multiple entrances. Long-used burrows are often large and complex. The local skink community will have established a latrine site(s), which for old burrow complexes, is often quite large and visible.

Habitat critical to their survival is typically hummock grass sandplains and some adjacent dunefield swales, often associated with paleodrainage channels, however, they have been recorded in open Mulga woodland in South Australia (McAlpin 2001).

Ngaanyatjarra Council Land and Culture (2019) undertook surveys in the area around the proposed West Musgrave mining operations and recorded multiple active Great Desert Skink burrows.

The Great Desert Skink is not present in the project area due to a lack of suitable habitat and no burrows were found in the site investigation.

Grey Falcon (*Falco hypoleucos*) - Vulnerable species under the *EPBC Act 1999* and *BC Act 2016*

The Grey Falcon is a moderately large raptor mostly found in the northern half of Western Australia, mainly in lightly wooded, coastal or riverine areas.

There are multiple records of the Grey Falcon in the Pilbara, but very few in the Goldfields and the central desert areas around the project area. They are mostly recorded along the drainage lines and around the permanent or semi-permanent pools.

It is highly unlikely that the Grey Falcon is in the project area.

Malleefowl (*Leipoa ocellata*) - Vulnerable under the *BC Act 2016* and *EPBC Act 1999*

Malleefowl are large, ground-dwelling birds that rarely fly unless alarmed or are perching for the night. Historically, Malleefowl have been found in mallee regions of southern Australia from approximately the 26th parallel of latitude southwards. Prior to vegetation clearing for agriculture, Malleefowl were abundant in the WA Wheatbelt. Vegetation clearing for agriculture also opened adjacent bushland to predators, and in the south-west of WA, Malleefowl often only persist in isolated remnant patches of native vegetation. Sheep and other herbivores (e.g. goats, kangaroos) grazing in remnant vegetation removes or thins the undergrowth, and they also compete with Malleefowl for herbaceous foods and can cause changes to the structure and floristic diversity of foraging habitats (Benshemesh 2007).

Malleefowl and their eggs are vulnerable to predation by foxes, and newly hatched chicks are vulnerable to foxes, cats and raptors (Priddel and Wheeler 1990, Benshemesh and Burton 1999, Benshemesh 2007, Lewis and Hines 2014). Their abundance in the Goldfields is low and they are sparsely distributed, favouring those areas that are more densely vegetated. Malleefowl build distinctive nests that comprise a large mound of soil/rock covering a central core of leaf litter. These nest mounds range in diameter but can span more than five metres and may be up to one metre high. Malleefowl are generally monogamous, and once breeding commences, they typically pair for life. The presence of nest mounds provides an indication of the presence of Malleefowl in the area.

Malleefowl have been observed in the bioregion, however, there are no recent records of active breeding mounds in the vicinity of the project area. No Malleefowl, their tracks or mounds were present in the project area during the site visit, and the habitat was not suitable. So, they are not present in the project area.

Bilby (*Macrotis lagotis*) – Vulnerable under the *EPBC Act 1999* and *BC Act 2016*

This nocturnal, medium sized, omnivorous, burrow dwelling marsupial was once wide-spread in Australian arid and semi-arid areas. Its geographical distribution has now contracted to a few small populations in southern Northern Territory, south-eastern Queensland, the Pilbara and sandy deserts of Western Australia. Bilby distribution is now largely restricted to two broad habitat types: mulga woodlands with lateritic red earth and spinifex grasslands with high fire frequency, again with red earth (Johnson 1989, Southgate 1990). Its distribution appears limited by access to suitable burrowing habitats and areas of high plant and food production. Southgate et al. (2007) reported that the distribution of Bilbies in the Tanami Desert was related to substrate type, which is probably also true for around the project area in the Little Sandy Desert.

There are scattered old records for Bilby in the vicinity of the project area in the Atlas of Living Australia, but it and its burrows, scats, and diggings were not recorded during the site visit, so they are not present in the project area.

Central Australian Rock-wallaby (*Petrogale lateralis centralis*) – Vulnerable under the *EPBC Act 1999* and the *BC Act 2016*

The black-flanked rock-wallaby is endemic to Western Australia. It shelters in shaded rocky areas such as caves, cliffs, screes and rockpiles during the day and feeds at night on grasses, forbs, shrubs and occasionally seeds and fruits.

This rock-wallaby's distribution in the central desert is centred at the Macdonnell Ranges and extends into the Central Ranges, the Murchison Ranges and Indulkana Range. The closest known population was at Pilpirrin, a small rock outcrop north-west of the Cavanagh Range, but Ngaanyatjarra Council Land and Culture (2019) indicated that it was no longer present in this location.

Scat searches and camera traps recorded no evidence of the Rock-Wallaby in the nearby Cavanagh and Tomkinson Ranges (Ngaanyatjarra Council Land and Culture 2019). There is no suitable habitat for this wallaby in the project area, so, they are not present in the project area.

Crest-tail Mulgara (*Dasycercus cristicauda*) and Brush-tailed Mulgara (*Dasycercus blythi*) - Priority 4 with the DBCA

Woolley (2005) recognises two species of 'Mulgara'; *Dasycercus blythi* and *D. cristicauda*. *Dasycercus blythi* has a non-crested tail, two upper premolars and six nipples; *D. cristicauda* has a crested tail, three upper premolars and eight nipples. Both species potentially have overlapping distributions in arid Australia, but it is thought that *D. cristicauda* does not currently exist in Western Australia, although there are old records indicating its presence. Woolley (2005) suggested the common names for these two species be Brush-tailed Mulgara for *D.*

blythi and Crest-tailed Mulgara for *D. cristicauda*. These two species can be sympatric in places, but probably utilise different parts of the habitat on a local scale when they are recorded in the same area. Currently, there are insufficient data to separate the spatial ecology, burrows and reproductive biology of these two species. Information that follows is based on what is known for 'Mulgara' without distinguishing between the species.

The reported distribution of Mulgara includes much of the inland spinifex covered sandy desert and spinifex vegetated areas in the Pilbara and northern goldfields. Within these areas their distribution is patchy and it is most frequently confined to mature spinifex dominated habitat (Gibson and Cole 1992, Masters 1998, Masters et al. 2003, Thompson and Thompson 2008). In some areas, their relative abundance is positively associated with rainfall in the previous 12 to 24 months (Gibson and Cole 1992, Masters 1998, Dickman et al. 2001, Letnic and Dickman 2005) and recent burning of the spinifex does not seem to be sufficient to shift Mulgara out of an area (Thompson and Thompson 2007). Mulgara are generally sedentary in contrast with some other small dasyurids and have high site fidelity and a low propensity for dispersal once a home range has been established (Masters 1998, Dickman et al. 2001).

According to Newman-Martin (2023), there were two species of Mulgara potentially present near the project area; *D. blythi* and the now extinct *D. hillieri* with *D. cristicauda* being found to the north of the project area.

The lack of substantial spinifex habitat in the project area would suggest that Mulgara are not present in the project area.

Princess Parrot (*Polytelis alexandrae*) - Vulnerable under the *EPBC Act 1999* and a Priority 4 species with DBCA

The Princess Parrot is found mostly in the inland arid areas of Australia, and Western Australia in the Gibson, Little Sandy and Great Victoria Deserts (Johnstone and Storr 1998, Pavey et al. 2014). They are also occasionally found in lightly wooded areas adjacent to the sandy deserts (Moriarty 1972).

Very little is known about the Princess Parrot, and the exact extent of its geographical distribution is poorly understood. It is thought to be nomadic within the central desert regions of Australia, occupying arid shrub lands, particularly those dominated by Mulga, Desert Oak and spinifex. Due to the paucity of information on the species, accurate estimates of its conservation significance are difficult to make, however, this species is probably threatened by habitat loss to agricultural practices and changes in fire regimes.

There were very few trees in the project area, so the habitat is generally not suitable for this species, so it is highly unlikely to be present in the project area.

Fork-tailed Swift (*Apus pacificus*) - Migratory species under the *EPBC Act 1999* and *BC Act 2016*

This species breeds in northeast and mid-east Asia and winters in Australia and southern New Guinea. It is a visitor to most parts of Western Australia, beginning to arrive in the Kimberley in late September, in the Pilbara in November and in the southwest land division in mid-December, and leaving by late April. The Fork-tailed swift is almost exclusively an aerial species, foraging and sleeping on the wing. It rarely comes to earth, usually only for breeding. It is common in the Kimberley, uncommon to moderately common near northwest, west and southeast coasts and rare to scarce elsewhere. It is rarely seen in the Goldfields (Plate 21).

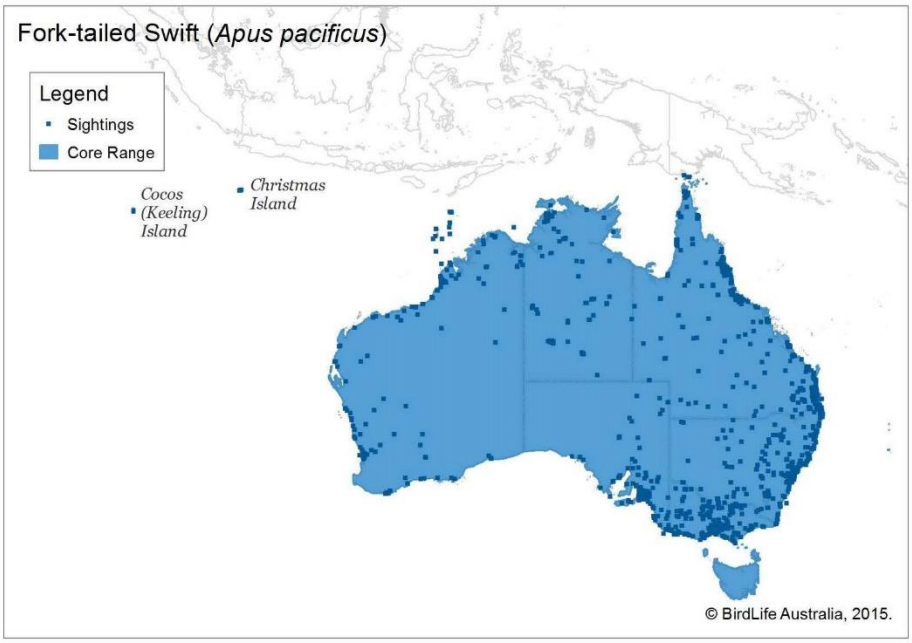

Plate 21. Range and actual reported sightings of the Fork-tailed Swift

(taken from http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds)

The Fork-tailed Swift may very infrequently be seen in the region. However, any proposed exploration activity is unlikely to significantly impact on this species as it is an aerial species and will move away to other areas if it is disturbed.

Grey Wagtail (*Motacilla cinerea*) - Migratory under the *EPBC Act 1999* and *BC Act 2016*

The Grey Wagtail is a small yellow breasted bird with a grey back and head. Johnstone and Storr (2004) reported this migratory species as breeding in Palearctic from western Europe and north-west Africa to eastern Asia and wintering in Africa, south-east Asia, Indonesia, the Philippines, New Guinea and Australia. Its preferred habitat in Australia is banks and rocks in fast-running fresh water including rivers, streams and creeks where it feeds on insects.

The Atlas of Living Australia records two sightings on the south-coast of Western Australia and none around the project area (Plate 22). The Grey Wagtail is highly unlikely to be seen in the project area due to a lack of records and suitable habitat.

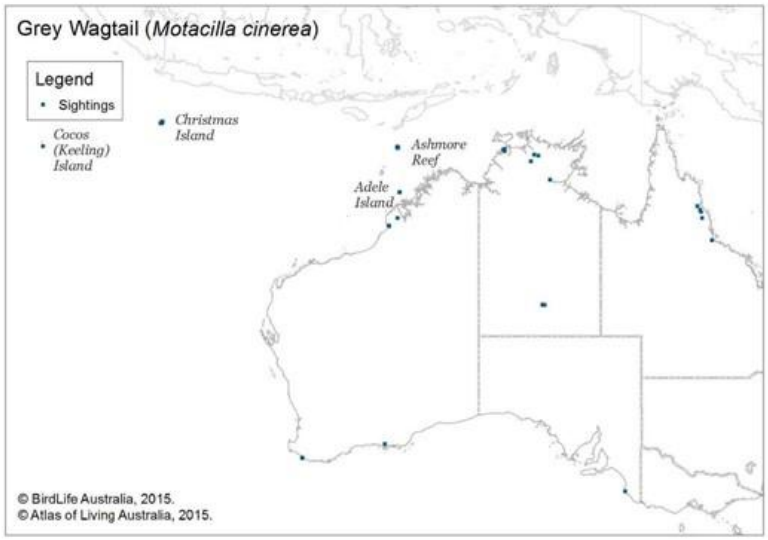

Plate 22. Reported sightings of the Grey Wagtail

(taken from http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds)

Yellow Wagtail (*Motacilla flava*) - Migratory under the *EPBC Act 1999* and *BC Act 2016*

The Yellow Wagtail is found in the millions in the northern hemisphere and the Atlas of Living Australia records multiple records of this bird in Australia in the coastal areas (Plate 23). There are no records for this species in inland Western Australia near the project area, therefore it is highly unlikely to be impacted by the proposed development.

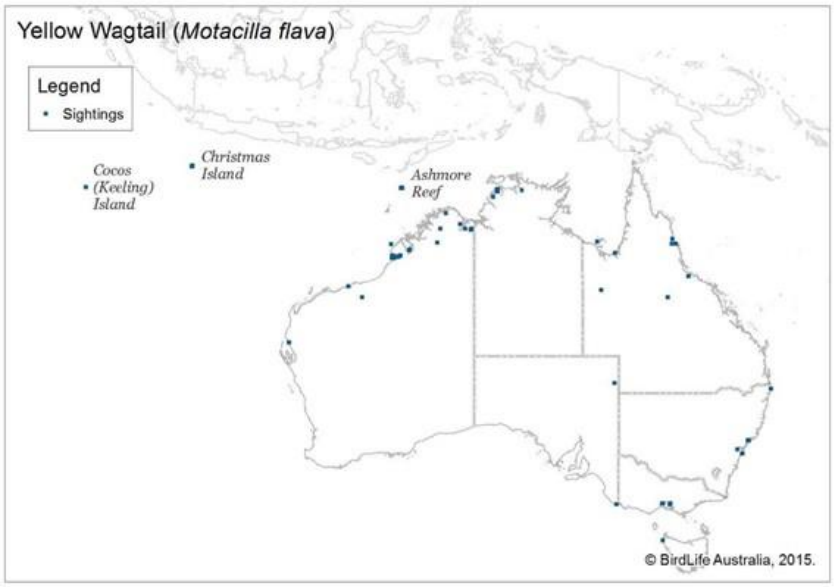

Plate 23. Reported sightings of the Yellow Wagtail

(taken from http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds)

Peregrine Falcon (*Falco peregrinus*) – Otherwise specially protected under the *BC Act 2016*

The Peregrine Falcon is uncommon, although widespread throughout much of Australia excluding the extremely dry areas and has a wide and patchy distribution. It shows habitat preference for areas near cliffs along coastlines, rivers and ranges and within woodlands along watercourses and around lakes. Nesting sites include ledges along cliffs, granite outcrops and quarries, hollow trees near wetlands and old nests of other large bird species. There is no evidence to suggest any change in status in the last 50 years.

The Atlas of Living Australia has records of this species in the vicinity of the project area, however, it is unlikely to be seen on the sparsely vegetated plains in the project area.

Long-tailed Dunnart *(Antechinomys longicaudatus)* - Priority 4 species with DBCA.

Burbidge *et al*. (2008) summarised the Long-tailed Dunnart geographic distribution as widely scattered in arid zone where it inhabits rugged rocky areas. They suggested that its striated footpads, long tail and behaviour in captivity indicated that it was an active and capable climber. Specimens have been recorded in several rocky ranges in the Gibson Desert, West MacDonnell National Park, Murchison, Carnarvon Basin and the Pilbara. All previous capture sites for Long-tailed Dunnarts are within rugged rocky landscapes that support a low open woodland or shrubland of Acacias (especially mulga) with an understorey of spinifex hummocks and (occasionally) also perennial grasses and cassias.

Long-tailed Dunnarts are typically found on banded ironstone formations (BIFs), rocky hills and ridges or the adjacent areas in much lower numbers (Department of Environment and Conservation 2007, Harewood 2014). They are typically found in low abundance when trapped in rocky areas and much lower abundance in adjacent areas. The vegetation is often low open woodland or shrubland of *Acacia* sp. (especially mulga) with an understorey of spinifex hummocks, and (occasionally) perennial grasses and cassias.

There are scattered records of this dunnart in the vicinity of the project area, but it was not recorded by Western Wildlife (2020) in its survey of the West Musgrave mining area. There was no suitable habitat for this dunnart in the project area, as the rocky ridges were far too small to support a population of this dunnart, so it is highly unlikely to be present.

Woma (*Aspidites ramsayi*) - Priority 1 species with DBCA

The southern Woma python was once recorded in a crescent shaped geographic distribution from Shark Bay to Kitchener in WA and the central sandy desert areas. However, the southern population is now mostly only found on the two extremes of this distribution, with a small population east of the Wheatbelt in relatively dense shrubs on a sandy substrate.

In Western Australia it is found in arid woodland or shrubland areas, typically on sand plains. Western Wildlife record (2020) recorded an individual on the Western Access Road into the West Musgrave mining area, so they are found in the sandy areas with some vegetation cover. It is highly improbable that they are in the project area due to a lack of suitable habitat and the presence of predators (e.g. wild dogs and cats).

Southern Marsupial Mole (*Notoryctes typhlops*) – Priority 4 with DBCA

The Southern Marsupial Mole is one of two marsupial moles in Australia. It is a blind, fossorial, mammal that has no external ears, heavily keratinised snout, a very reduced tail and dense silky, golden-brown to pale cream fur, and a rear facing pouch in females (Threatened Species Scientific Committee 2015). Its very short and powerful front limbs with long claws are used to dig its way through sandy soil.

Its geographic range includes the Great Victoria Desert, extending east to the western half of the Simpson Desert in South Australia and southern Northern Territory. Western Wildlife (2020) recorded multiple burrows that they believed belonged to marsupial moles, but no moles.

The hard sandy-clay soils and lack of dunes in the project area strongly suggest that it isn't present there.

Oriental Plover (*Charadrius veredus*) - Migratory species under the *EPBC Act 1999* and *BC Act 2016*

A migrant species with patchy distribution in Australia, the Oriental Plover is sparsely distributed across arid and semi-arid Australia but avoids truly desert regions. Its preferred habitat is dry plains. It was not recorded in other fauna surveys undertaken near the project area. The species is threatened by habitat reduction due to agriculture and changing fire regimes.

It was not recorded during the Western Wildlife (2020) or Donato Environmental Services (2019) surveys of the West Musgrave proposed mining area. The habitat is potentially suitable in the project area, but it is unlikely to be impacted by an exploration program, as it will readily move to adjacent areas if disturbed.

4.4 FAUNA SURVEY DATA FOR FAUNA HABITATS REPRESENTED IN THE PROJECT AREA

The EPA's (2020) *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* indicated that the level of fauna assessment should be determined considering the following criteria:

- level of existing regional knowledge;
- type and comprehensiveness of recent local surveys;
- degree of existing disturbance or fragmentation at the regional scale;
- extent, distribution and significance of habitats;
- significance of species likely to be present;
- sensitivity of the environment to the proposed activities; and
- scale and nature of impact.

Western Wildlife's (2020) report in conjunction with Donato Environmental Services (2019) avian and bat survey and Ngaanyatjarra Council Land and Culture's (2019) targeted survey for the Great Desert Skink were adequate for the West Musgrave mining operations to receive approval, and the Julimar Resources project is very much smaller, in an adjacent area, with very little terrestrial fauna and is only for the purposes of an exploration program. Any additional surveys are unlikely to provide fauna data that would affect the impact assessment on the vertebrate fauna for the project area.

4.5 AMPHIBIANS

A single frog species (i.e. *Notaden nichollsi*) was recorded in the Western Wildlife (2020) survey of the West Musgrave mining project area (Table 5). *Notaden nichollsi* lives in sandy areas, and it is able to burrow to over 2m into the soil to find a moisture layer sufficient to stop it desiccating (Thompson et al. 2005). This habitat was not present in the project area.

4.6 REPTILES

The regional reptile data provided in Table 7 provides an indication of the diversity of herpetofauna in this part of the inland desert. However, the sparseness of the vegetation, the lack of ground leaf litter, the hard sandy clay soils mean that there are very few reptiles in the project area. The only conservation significant reptile

potentially in the project area is the Woma, however, it is highly unlikely to be present due to a lack of suitable habitat. Exploration activity is unlikely to significantly impact on the reptile assemblage.

4.7 BIRDS

The number of birds and bird species in the northern Goldfields and semi-arid areas fluctuates based on seasons and recent rainfall (Craig and Chapman 2003). Semi-arid and arid areas of inland Australia support a diverse range of transient and nomadic species that move through large areas in search of available resources. Heavy rain that is followed by flowering and seeding of many plant species is often sufficient to draw many of these nomadic species to the general area. These species move on to other areas once the resource is depleted or better resources are available in adjacent areas.

The project area is likely to support a very depleted avifauna assemblage due to the sparseness of the trees. There is a low possibility that the Southern Whiteface, Peregrine Falcon, Princess Parrot and Oriental Plover are occasionally visitors to the project area, but they will readily move if disturbed.

There was no evidence to indicate that Malleefowl are in the area and the habitat is unsuitable for this mostly terrestrial large-bodied bird.

Exploration activity is unlikely to have a significant impact of the avifauna in the area.

4.8 NON-VOLANT MAMMALS

All the terrestrial mammals potentially in the survey area, would be present in the many square kilometres of similar habitat in adjacent areas. The only mammal species of conservation significance potentially near the project area is the Long-tailed Dunnart, typically found on the rocky ridges, outcrops and breakaways. The rocky ridges in the project area are small and isolated, so it is improbable that they would support the Long-tailed Dunnart. The habitat is not suitable for the Southern Marsupial Mole.

4.9 BATS

All the bats likely to be recorded in the project area are common throughout the semi-arid parts of Western Australia and none are of conservation significance. Western Wildlife (2020) recorded Findlayson's Cave Bat (*Vespadelus findlaysoni*) and the Lesser Long-eared Bat (*Nyctophilus geoffroyi*) in the proposed West Musgrave mining area. These are a cave and tree roosting species and given the lack of nearby caves and the scarcity of trees, it would be surprising for either species to be recorded in the project area.

Exploration activity will not significantly impact the bat fauna when considered in a bioregional context.

4.10 BIODIVERSITY VALUE

An ecological assessment of a site should consider its biodiversity value at the genetic, species and ecosystem levels, and its ecological functional value at the ecosystem level. There are inadequate data to assess the ecological value at the genetic level.

The fauna habitat types represented in the project area are abundant and in similar condition in adjacent areas. Therefore, the fauna assemblage that is present in the project area will also be present and abundant in the adjacent areas. The site assessment indicated that project area has low biodiversity value.

4.10.1 Ecological functional value at the ecosystem level

The project area has few trees, sparely vegetated shrubs and drying grasses with a lot of bare ground. It has very little ecological functional value.

4.10.2 Maintenance of threatened ecological communities

No threatened ecological fauna communities were identified in the project area.

4.10.3 Condition of fauna habitat

The fauna habitat in the project area is undisturbed, but depleted of trees, sparsely vegetated with shrubs, a lot of drying grasses, small patches of spinifex hummocks and a lot of bare ground. The habitat in the project area is mostly undisturbed and in good condition.

4.10.4 Ecological linkages

The project area does not support an ecological linkage or pathway that is not already available in the region.

4.10.5 Size and scale of the proposed disturbance

The project area assessed is dispersed as it consists of drill rig access routes and multiple drill pads, with a total area of approximately ~441ha. This represents a very small fraction of similar fauna habitat found in the adjacent area and bioregion. Exploration activity is unlikely to significantly impact the vertebrate fauna in a bioregional context.

4.10.6 Abundance and distribution of similar habitat in the adjacent areas

Fauna habitats present in the project area are abundant in adjacent areas. It is, therefore, likely that the fauna assemblage in the project area is like that in the many square kilometres of similar habitat in adjacent areas and the bioregion.

4.10.7 Potential impacts on ecosystem function

It is probable that a very small number of trees and shrubs will be cleared for exploration activity, because there are so few of them in the project area. The drill rig and associated vehicles and equipment will simply drive across the landscape along the designed routes from one drill pad to the next. It is improbable that there will be a significant impact on fauna species of conservation significance or the existing fauna assemblage in the project area.

5. POTENTIAL ENVIRONMENTAL IMPACTS

Exploration activity in the project area will potentially result in the death or injury of fauna during vehicle movements for exploration, and a small quantity of vegetation will be lost.

However, given the small area for exploration activity, the spareness of the trees and shrubs, and most of the dry grass will have disappeared by the end of summer, potential impacts on the vertebrate fauna will be minimal in a bioregional context, given the availability of similar habitat in adjacent areas.

5.1 DIRECT IMPACTS

5.1.1 Animal deaths during the clearing process and displacement of fauna

Clearing vegetation and activities associated with the development will result in the loss of some small fauna that retreat to burrows, such as reptiles and mammals. Nocturnal species are unlikely to be active when most of the land clearing and construction work is taking place, which may result in these individuals being adversely impacted when they attempt to escape. This loss of vegetation is unlikely to have a significant impact when considered in a bioregional context. Larger terrestrial animals and avian species will most often move to adjacent areas. These species will be required to establish new activity areas and home ranges, which could result in the temporary displacement of resident species.

Clearing linear corridors and other areas increases fauna habitat edges. Small mammals can respond both positively and negatively to edges depending on their ecological traits (Laurance 1991, 1994, Goosem and Marsh 1997, Goosem 2000). Edge and disturbance effects can lead to altered and most often higher levels of predation, restricting or increasing fauna movements and altering assemblage structure (Oxley et al. 1974, Paton 1994, Baker et al. 1998, Temple 1998, Luck et al. 1999, Goosem et al. 2001). Goldingay and Whelan (1997) and Clarke and Oldland (2007) reported that edge effects can extend up to 150-200m from the edge for some species, meaning the impact area on vertebrate fauna is likely to be larger than the cleared footprint.

Edge effects can lead to the disruption of ecological processes such as predation and dispersal, animal movements and can change assemblage structure. The consequence is that the impact area will always be much larger than the cleared area.

5.1.2 Reduction or loss of activity areas and closure of burrows

Clearing vegetation and associated development activities are likely to destroy reptile and mammal burrows or foraging habitat that are currently in use or that could be used again. Clearing vegetation that forms part of the activity area of individuals has the potential to force these animals into adjacent areas. These areas may offer fewer resources placing individuals under survival pressure. It could also cause individuals to move into the territories of other individuals increasing competition for resources. Forced relocations could increase the possibility of predation.

5.2 INDIRECT IMPACTS

In addition to the obvious impact of vegetation clearing there can be an equally significant or greater impact in the adjacent areas because of 'edge effects'. Edge effects can lead to the disruption of ecological processes such as predation and dispersal, animal movements and can change assemblage structure. The consequence is that the impact area will always be much larger than the cleared area. Vehicle tracks also have the propensity to develop weed infestations which can impact on natural fauna habitats. Cleared corridors can also provide

improved predator access to areas, enhance the invasion of pest species into areas and may act as inhibitors or disrupt fauna migration and movement patterns.

There are numerous potential threats associated with vegetation clearing and development that could have an impact on the vertebrate fauna in the project area. Some of these are discussed below.

5.2.1 Habitat fragmentation

In addition to the direct impacts of vegetation clearing, infrastructure, including tracks, has the potential to fragment habitat. Cleared linear tracks of land are 'unnatural' in much of the habitat. These linear structures partition existing activity areas, isolate sections of established communities and may alter long and medium-term movement patterns around established home ranges, particularly for small mammals and reptiles. A reduction in the population because of this development would be difficult to detect, given our current knowledge of the spatial ecology of most of the small mammals in the area. The project area contains sparse vegetation and existing vehicle tracks. The impacts of habitat fragmentation due to additional vehicle tracks would, therefore, be quite low.

5.2.2 Introduced fauna and weeds

Increased habitat fragmentation and human activity often results in an increase in the abundance of introduced species such as the house mouse (*Mus musculus*), fox (*Vulpes vulpes*), feral cat (*Felis catus*) and wild dogs (*Canis lupus*). This increase may be due to a decline in habitat health, increased road kills, poor disposal of waste and easier access to areas via tracks.

House mice, cats and wild dogs are known to be established in the area, and based on the tracks, scats and fauna observed during the field investigations, there is a reasonable density of feral cats and wild dogs in the project area. In many situations, they have become a 'naturalised' species in the Australian bush. Increases in wild dog or cat numbers can harm native fauna because they predate on and compete with native species, severely disrupting the natural balance. The feral cat is a particularly damaging predator of native fauna, and any increase in their numbers could have a detrimental effect on local native fauna (Kinnear 1993, Bamford 1995, Woinarski et al. 2017, Woinarski et al. 2018, Murphy et al. 2019); hence it is important to ensure that populations of the feral predators, such as cats are under control.

Infrastructure known to support feral species, such as rubbish disposal sites and bins, and permanent water, should be managed to minimise increases in these populations.

Introduced plant species can successfully and rapidly invade areas of cleared native vegetation or otherwise disturbed by humans. Introduced plant species may replace native species that provide shelter or foraging areas for native fauna. Major changes to vegetation structure will alter the fauna habitat and consequently may influence fauna species composition. Preparing and implementing a weed management plan will reduce their threat to native fauna species.

5.2.3 Road fauna deaths

An increase in road fauna deaths is likely to occur where new roads/tracks are constructed or upgraded affecting kangaroos, nocturnal birds, and ground dwelling large carnivorous predators. Species such as goannas and raptors are attracted to carrion on road verges, and as a result, there is an increased propensity for these species to be killed by vehicles. Given that this project area is being used to construct new roads, these impacts must be mitigated.

5.2.4 Fire

Increased human activity is often associated with an altered fire regime leading to a degradation of natural ecosystems. Fire has been identified as one of the threatening processes for some fauna species of conservation significance as numerous small mammal and bird species rely on long, unburnt vegetation.

Due to the sparse vegetation, large and widespread fires are unlikely to significantly threaten native fauna species in and adjacent to the project area.

5.2.5 Anthropogenic activity

Unnatural noises, vibrations, artificial light sources, and vehicle and human movement in an area may be sufficient to force individuals or fauna species to move from adjacent areas or alter their activity periods. This disturbance will likely occur during the initial vegetation clearing and when development activity commences. The overall impact is likely confined to a relatively small area and is unlikely to be significant.

5.2.6 Dust

Dust generated from shifting topsoil and increased vehicle traffic can potentially degrade surrounding vegetation, reducing its ability to absorb sunlight, and influencing photosynthetic rates. Degradation of these areas may potentially render the habitat unsuitable for fauna. Dust suppression and management programs are essential to minimising impacts on fauna in areas adjacent to the mine and along access roads. An effective dust management and monitoring program is required.

6. VERTEBRATE FAUNA RISK ASSESSMENT

6.1 RISK ASSESSMENT

Fauna surveys to support disturbance applications are part of the environmental risk assessment undertaken to consider what potential impacts exploration activity might have on the biodiversity on a particular area and region. Potential impacts on fauna from the proposed development are identified and briefly described above. Tables 9, 10 and 11 summarise the risk assessment associated with this project.

Any risk assessment is a product of the likelihood of an impact occurring and the consequences of that impact. Likelihood and consequences are categorised and described below. The assessed risk level (likelihood x consequences) is then calculated as the overall risk for the development. This is followed by an assessment of the acceptability of the risk associated with each of the impacts. Disturbances and vegetation clearing impact the fauna at multiple scales – site, local, landscape and regional. Each of these is considered in the risk assessment. This assessment should be considered in the context of the summary in Table 11.

Table 9. Fauna impact risk assessment descriptors

Likelihood		
Level	Description	Criteria
A	Rare	The environmental event may occur, or one or more conservation significant species may be present in exceptional circumstances.
B	Unlikely	The environmental event could occur, or one or more conservation significant species could be present at some time.
C	Moderate	The environmental event should occur, or one or more conservation significant species should be present at some time.
D	Likely	The environmental event will probably occur, or one or more conservation significant species will be present in most circumstances.
E	Almost certain	The environmental event is expected to occur, or one or more conservation significant species is expected be present in most circumstances.
Consequences		
Level	Description	Criteria
1	Insignificant	Insignificant impact on fauna of conservation significance or regional biodiversity, and the loss of individuals will be insignificant in the context of the availability of similar fauna or fauna assemblages in the area.
2	Minor	Impact on fauna localised and no significant impact on species of conservation significance in the project area. Loss of species at the local scale.
3	Moderate	An appreciable loss of fauna in a regional context or a limited impact on species of conservation significance in the project area.
4	Major	Significant impact on conservation significant fauna or their habitat in the project area and/or regional biodiversity and/or a significant loss in the biodiversity at the landscape scale.
5	Catastrophic	Loss of species at the regional scale and/or a significant loss of species categorised as 'vulnerable' or 'endangered' under the EPBC Act (1999) at a regional scale.
Acceptability of Risk		
Level of risk	Management Action Required	
Low	No action required.	
Moderate	Avoid if possible, routine management with internal audit and review of monitoring results annually.	
High	Externally approved management plan to reduce risks, monitor major risks annually with external audit and review of management plan outcomes annually. May a referral to the Commonwealth under the EPBC Act 1999.	
Extreme	Unacceptable, project should be redesigned or not proceed.	

Table 10. Levels of acceptable risk

		Likelihood				
		Rare or very low (A)	Unlikely or low (B)	Moderate (C)	Likely (D)	Almost certain (E)
Consequence	Insignificant (1)	Low	Low	Low	Low	Low
	Minor (2)	Low	Low	Low	Moderate	Moderate
	Moderate (3)	Low	Moderate	Moderate	High	High
	Major (4)	Moderate	Moderate	High	High	Extreme
	Catastrophic (5)	Moderate	High	High	Extreme	Extreme

Table 11. A risk assessment of the impact of ground disturbance activity on fauna

			Before management				With management		
	Potential impacts		Inherent risk			Risk controls	Residual risk		
Factor			Likelihood	Consequence	Significance		Likelihood	Consequence	Significance
Fauna survey data	Inadequate vertebrate fauna survey data to adequately assess the risks	Unknown loss of fauna, fauna of conservation significance, and fauna assemblages, and an incomplete fauna assessment.	A	1	Low				
Clearing vegetation	Loss of fauna habitat – local scale	Loss of terrestrial fauna in the project area.	E	2	Mod.				
	Loss of fauna habitat – landscape scale	Loss of some fauna during vegetation clearing.	B	1	Low				
	Loss of fauna habitat – regional scale	Small loss of some fauna from the region.	B	1	Low				
	Loss of a threatened ecological fauna community	Loss of an undetected threatened ecological fauna community.	A	2	Low				
	Habitat fragmentation	Fauna movement restricted resulting in the death of fauna and a loss of biodiversity.	A	2	Low				
Death or loss of conservation significant fauna	Loss of a unique terrestrial fauna ecosystem	Loss of an ecosystem containing fauna with high species richness, high abundance and numerous top of the food chain predators.	A	2	Low				
	Oriental Plover	Death or reduced viability of this species.	A	2	Low				
	Princess Parrot	Death or reduced viability of this species.	A	2	Low				
	Southern Whiteface	Death or reduced viability of this species.	A	2	Low				
	Peregrine Falcon	Death or reduced viability of this species.	A	2	Low				
Human impacts	Increase or spread of weeds	Changed vegetation and a resulting loss of fauna habitat.	E	2	Mod.				
	Road kills	Animals being killed by vehicles as they cross roads	E	1	Low				

6.2 NATIVE VEGETATION CLEARING PRINCIPLES AS THEY PERTAIN TO VERTEBRATE FAUNA

The *Environmental Protection Act 1986* outlines 10 principles that are to be used in the assessment of native vegetation clearing permit applications which are also applicable for other assessments and approvals (Table 12). Where possible, native vegetation should not be cleared if any of the following principles are comprised.

Table 12. Assessment of impact using the native vegetation clearing principles

Principle	Response
It comprises a high level of biological diversity.	Clearing vegetation will not comprise a high level of biodiversity. It is improbable that any conservation significant vertebrate fauna are in the project area and will be significantly impacted by exploration activity.
It comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	Exploration activity in the project area will not result in the loss of significant habitat for indigenous fauna.
It includes, or is necessary for the continued existence or, rare flora.	N/A
It comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.	The area does not contain a threatened ecological fauna community.
It is significant as a remnant of native vegetation in an area that has been extensively cleared.	The area is not a remnant.
It is growing in, or in association with, an environment associated with a watercourses or wetland.	The area does not contain a natural wetland.
The clearing of the vegetation is likely to cause appreciable land degradation.	N/A
The clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	Exploration activity in the project area is unlikely to impact on conservation areas in the region.
The clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	N/A
The clearing of the vegetation is likely to cause or exacerbate the incidence of flooding.	N/A

6.3 REFERRAL UNDER THE EPBC ACT

Exploration drilling in the project area is unlikely to significantly impact on a conservation significant vertebrate fauna species, so a referral under the *EPBC Act 1999* is not recommended.

7. SUMMARY

Terra Metals proposes further exploration activity near the West Musgrave area about 140km west of the junction between the Western Australian, Northern Territory and South Australian borders. It has nominated the location of multiple drill pads and the drill rig access route to these drill holes.

Terrestrial Ecosystems completed a basic and targeted vertebrate fauna assessment of the project area. The following eight broad fauna habitats are in the project area: mixed shrubs over grass plains, mixed shrubs over spinifex on dunes, mixed shrubs over spinifex on rock, acacia shrub thicket, clay pan, grass plain, low stoney ridge, and rocky ridge. Because of the sparseness of trees and shrubs, the extent of bare ground, and the lack of leaf litter, the project area will likely have a limited vertebrate fauna assemblage.

There are no species of conservation significance likely to be significantly impacted by the proposed exploration drilling program. No referral is recommended under the *EPBC Act 1999*.

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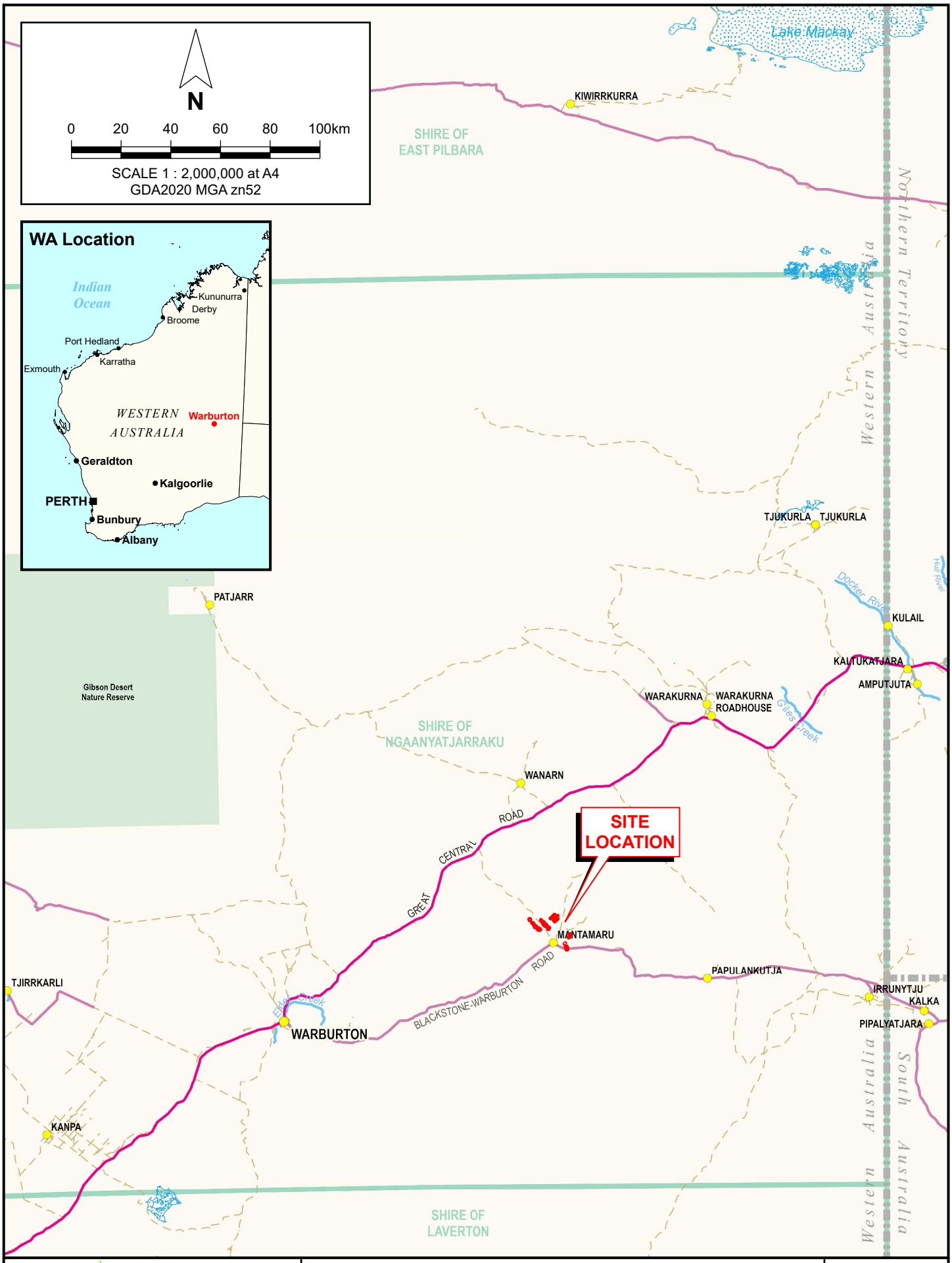
Figures

Basic and Targeted Vertebrate Fauna Survey
Dante Project



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TERRESTRIAL ECOSYSTEMS

Terra Metals Ltd
BASIC AND TARGETED VERTEBRATE FAUNA SURVEY
DANTE PROJECT

Figure 1

REGIONAL LOCATION

Drawn: G. Thompson

Date: 13 Nov 2024

Job: 2024-0095

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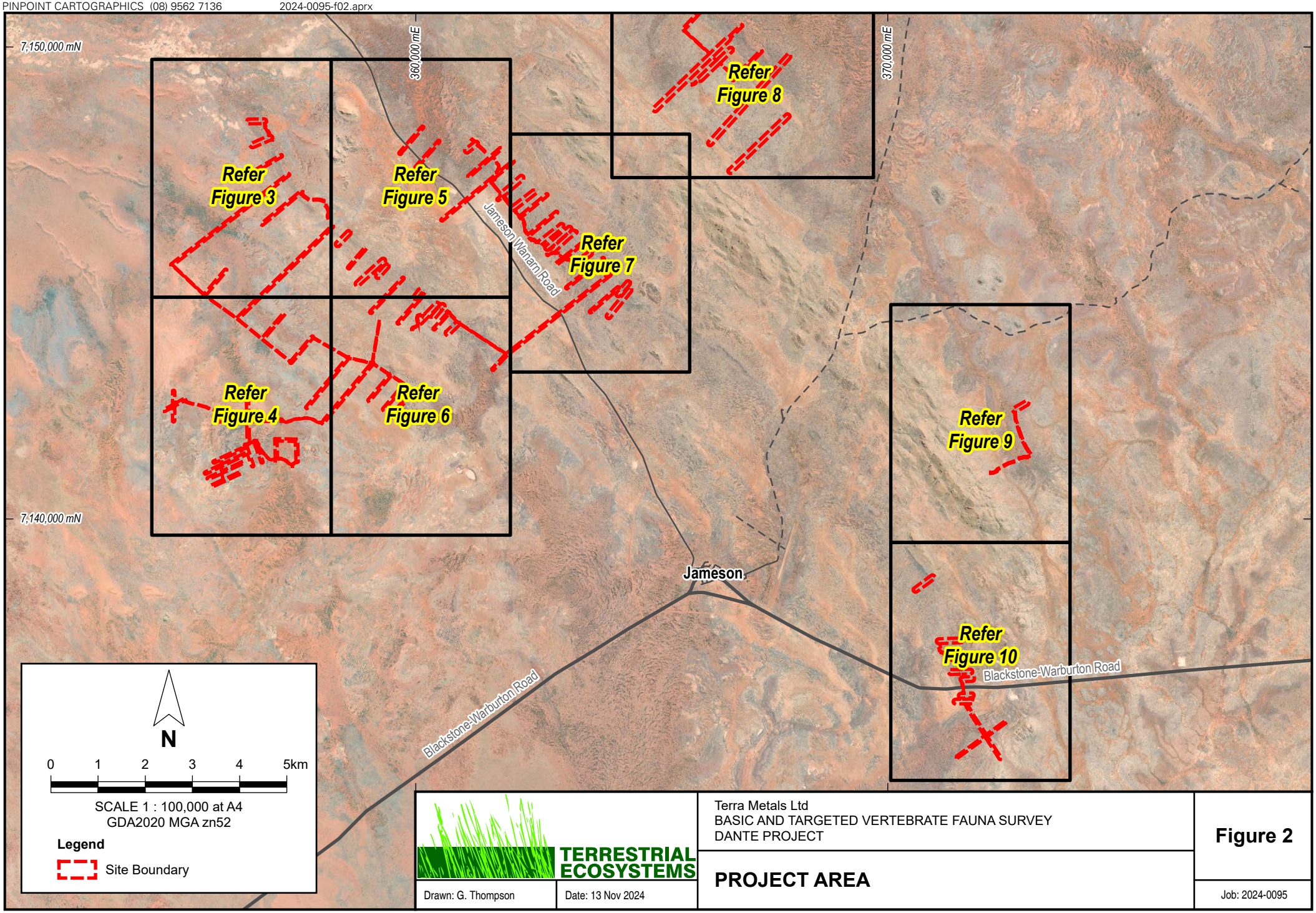


TERRESTRIAL ECOSYSTEMS

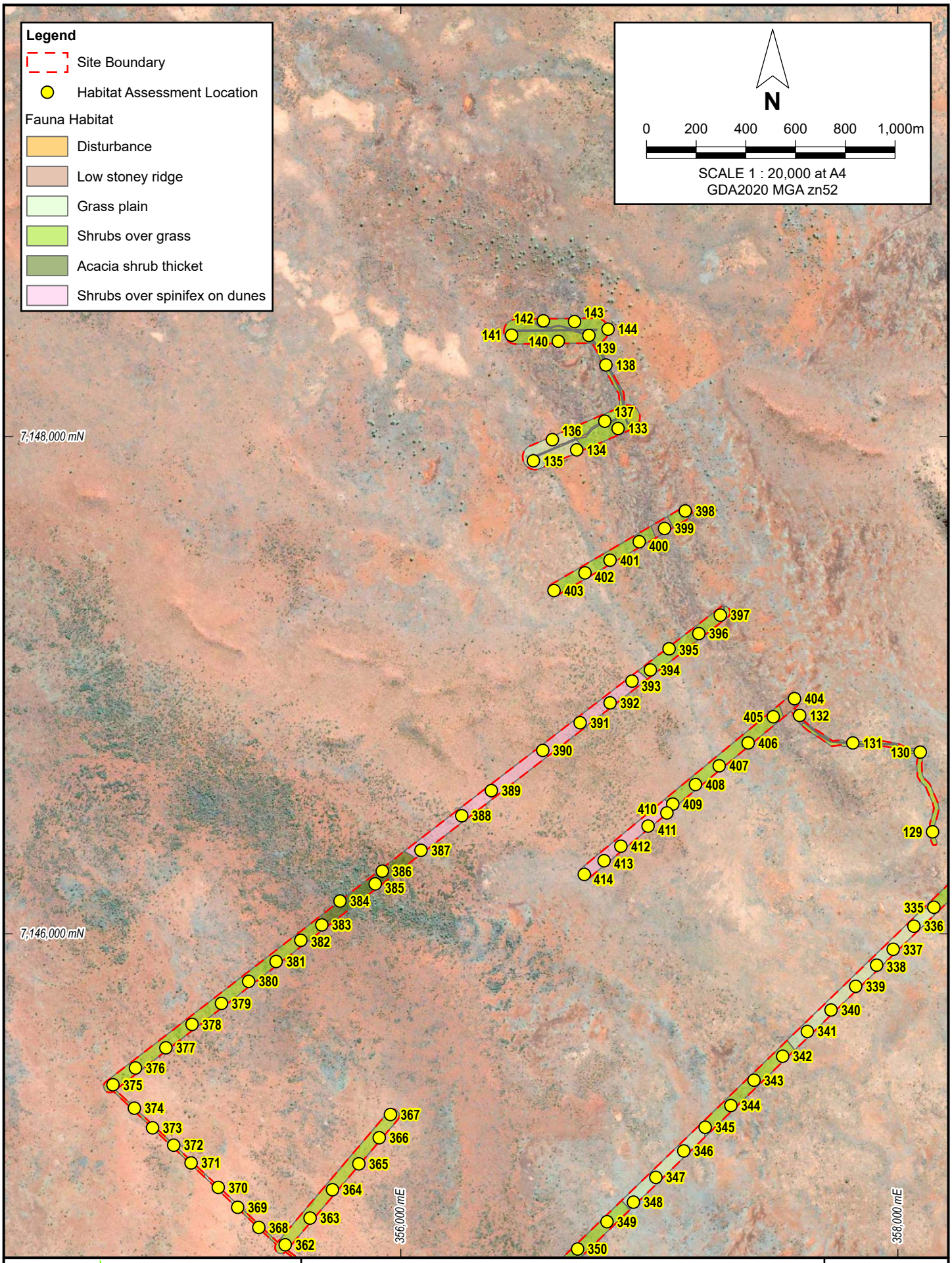
Drawn: G. Thompson | Date: 13 Nov 2024

Terra Metals Ltd
BASIC AND TARGETED VERTEBRATE FAUNA SURVEY
DANTE PROJECT

PROJECT AREA

Figure 2

Job: 2024-0095



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TERRESTRIAL ECOSYSTEMS

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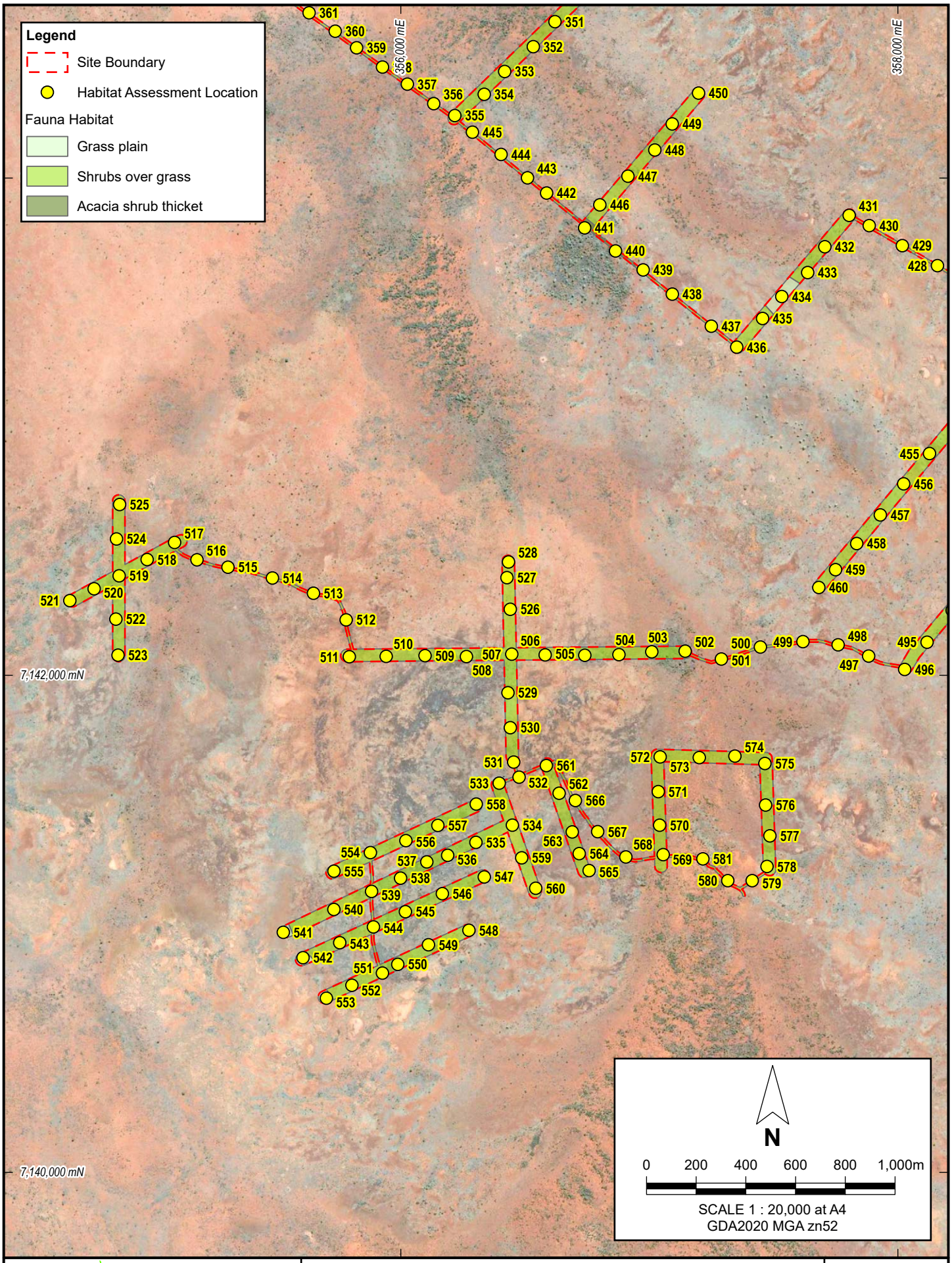
BASIC AND TARGETED VERTEBRATE FAUNA SURVEY
DANTE PROJECT

FAUNA HABITATS AND HABITAT ASSESSMENT LOCATIONS

Figure 3

Job: 2024-0095



TERRESTRIAL ECOSYSTEMS

Terra Metals Ltd
BASIC AND TARGETED VERTEBRATE FAUNA SURVEY
DANTE PROJECT

FAUNA HABITATS AND HABITAT ASSESSMENT LOCATIONS

Figure 4

Drawn: G. Thompson | Date: 13 Nov 2024 | Job: 2024-0095

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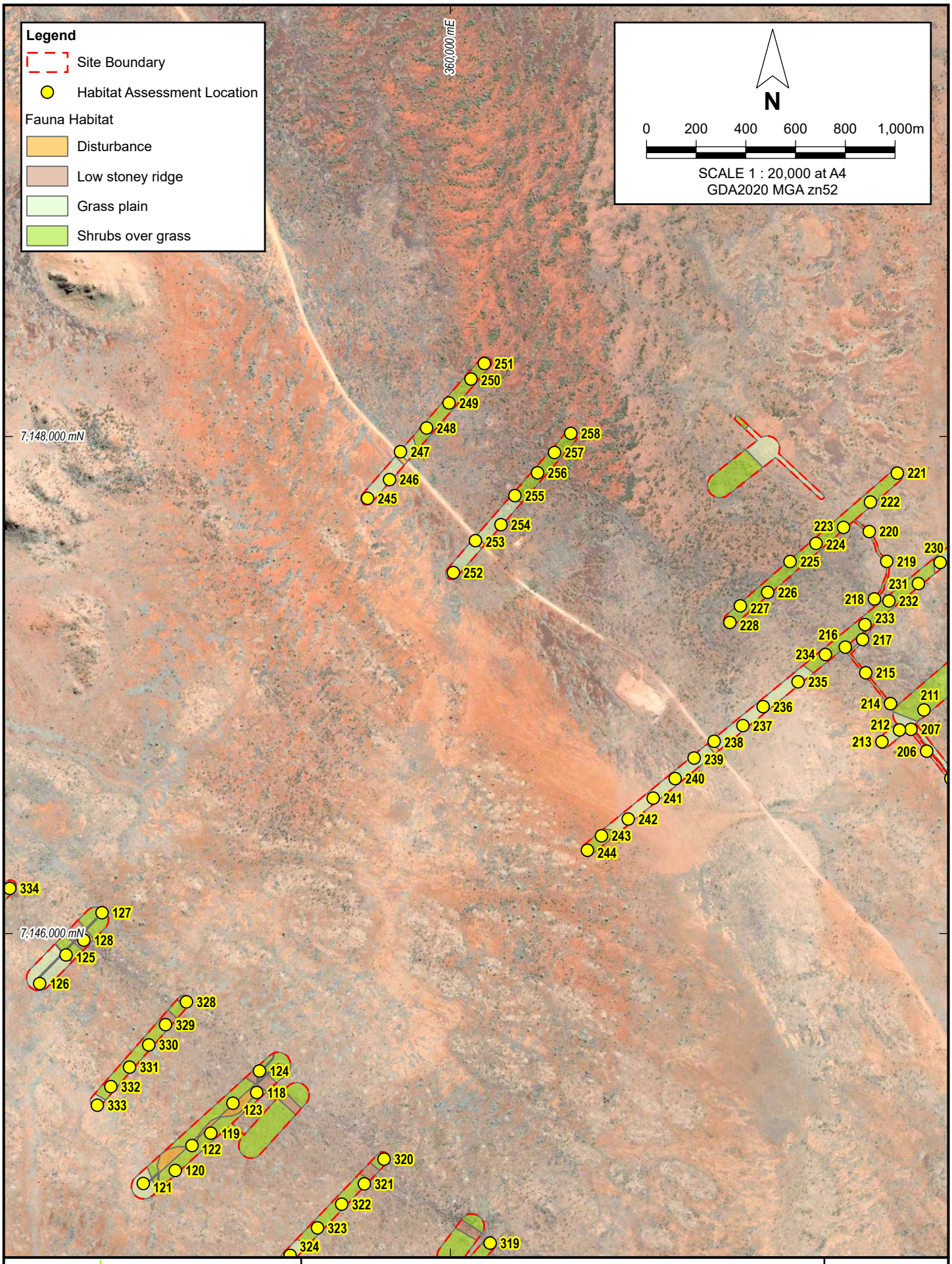

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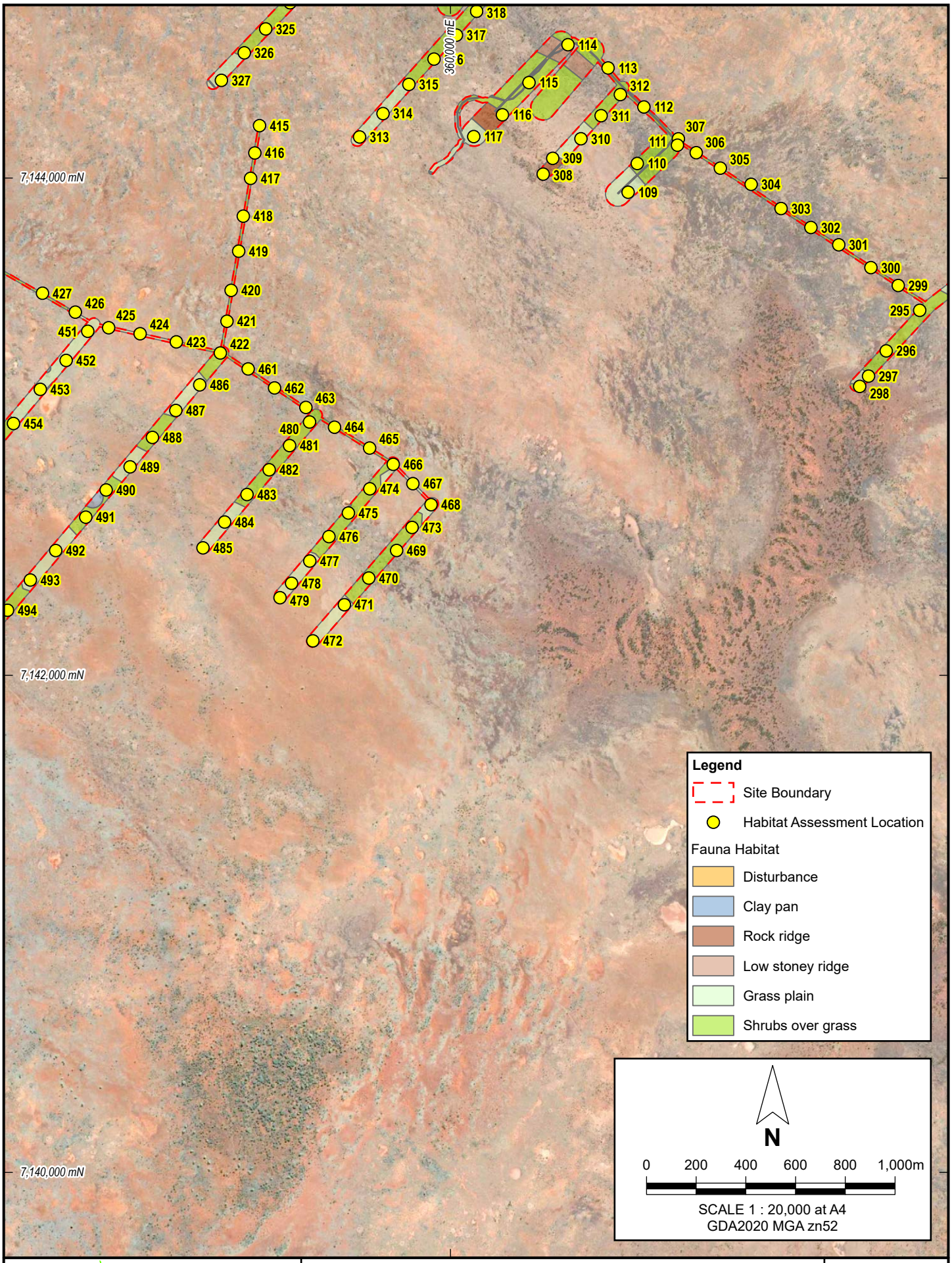
TERRESTRIAL ECOSYSTEMS

Terra Metals Ltd
BASIC AND TARGETED VERTEBRATE FAUNA SURVEY
DANTE PROJECT

FAUNA HABITATS AND HABITAT ASSESSMENT LOCATIONS

Figure 5

Drawn: G. Thompson | Date: 13 Nov 2024 | Job: 2024-0095



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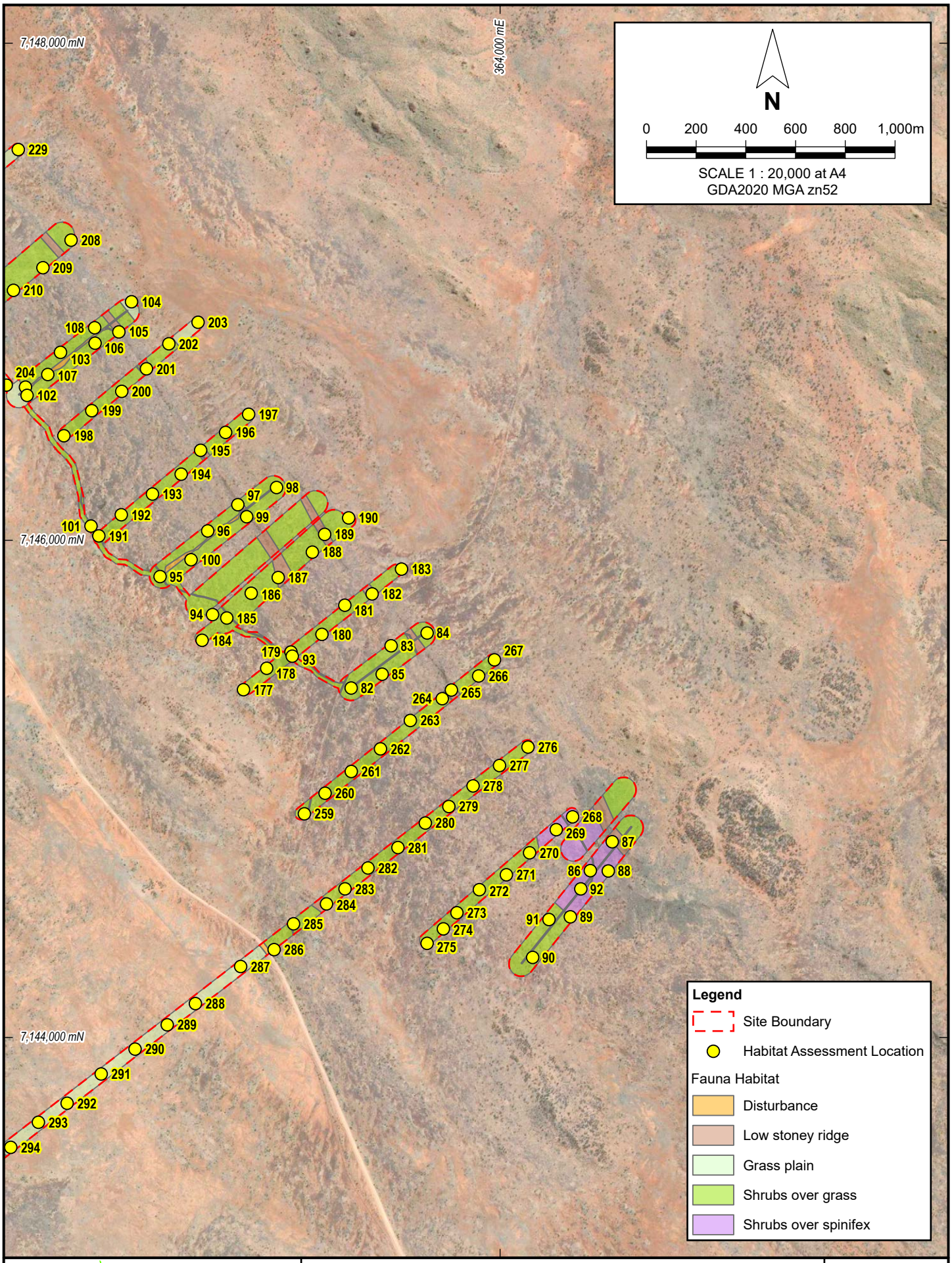
TERRESTRIAL ECOSYSTEMS

Terra Metals Ltd
BASIC AND TARGETED VERTEBRATE FAUNA SURVEY
DANTE PROJECT

FAUNA HABITATS AND HABITAT ASSESSMENT LOCATIONS

Figure 6

Drawn: G. Thompson | Date: 13 Nov 2024 | Job: 2024-0095



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TERRESTRIAL ECOSYSTEMS

Terra Metals Ltd
BASIC AND TARGETED VERTEBRATE FAUNA SURVEY
DANTE PROJECT

FAUNA HABITATS AND HABITAT ASSESSMENT LOCATIONS

Figure 7

Drawn: G. Thompson | Date: 13 Nov 2024 | Job: 2024-0095

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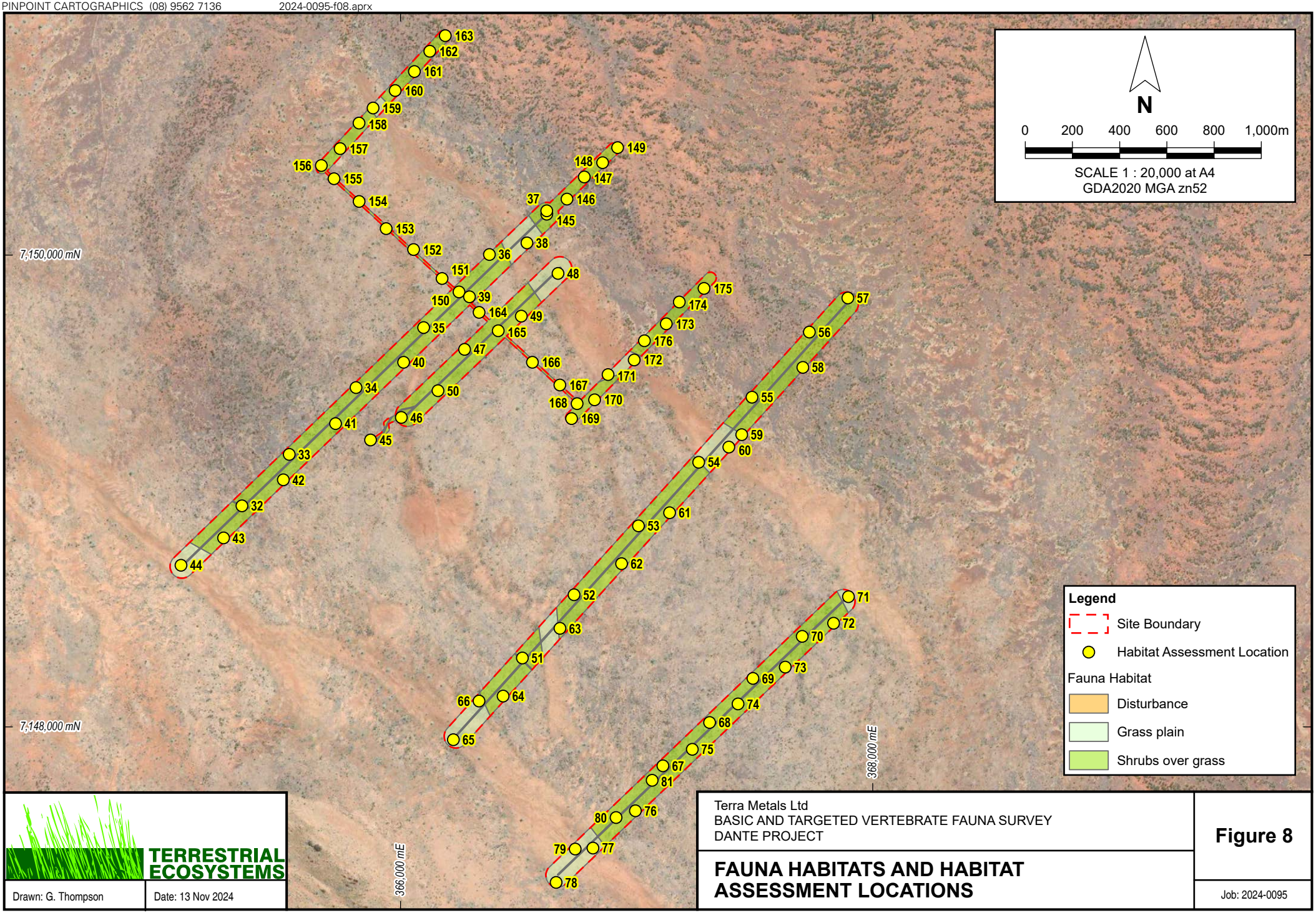


TERRESTRIAL ECOSYSTEMS

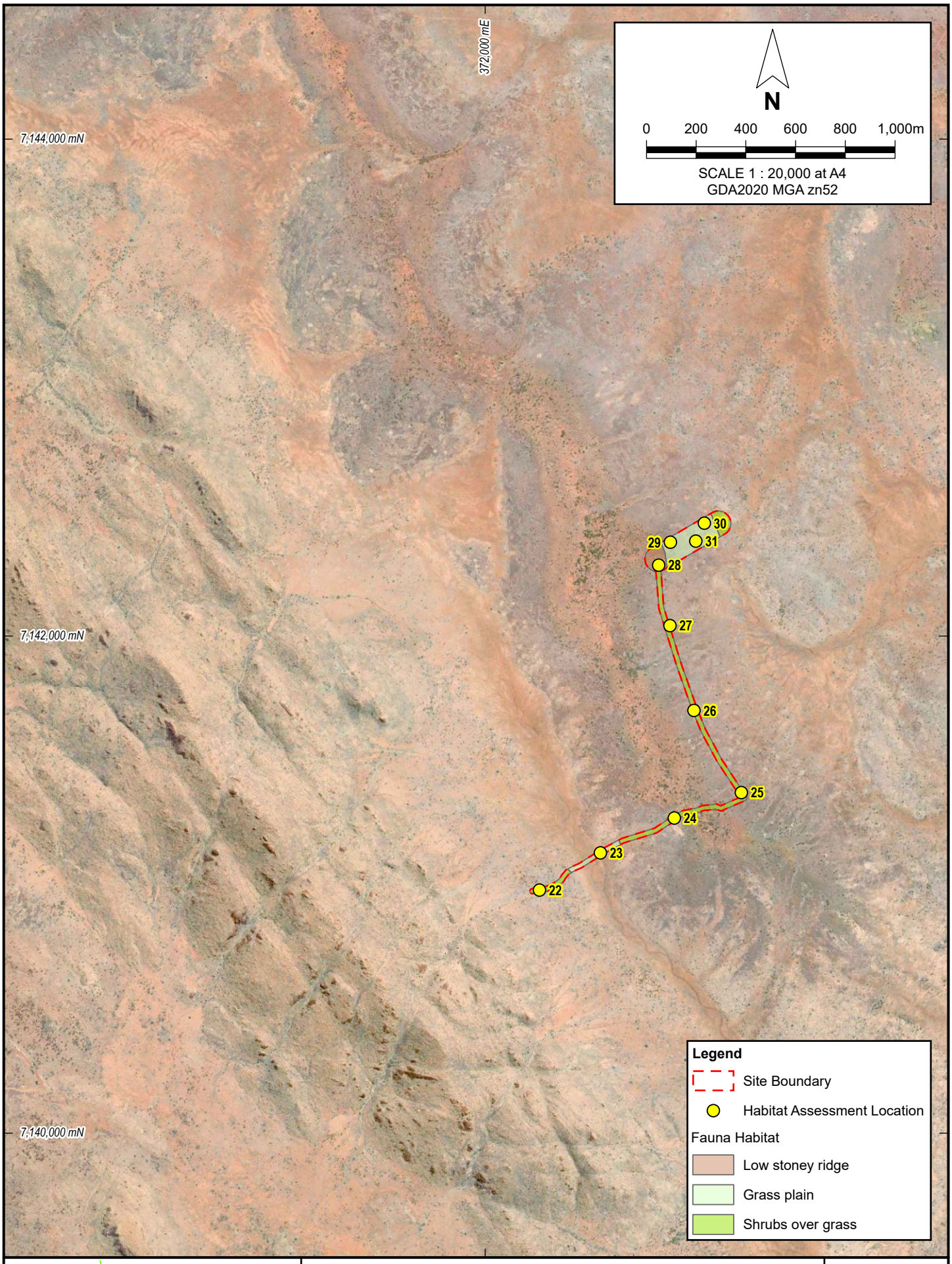
Drawn: G. Thompson | Date: 13 Nov 2024

Terra Metals Ltd
BASIC AND TARGETED VERTEBRATE FAUNA SURVEY
DANTE PROJECT

FAUNA HABITATS AND HABITAT ASSESSMENT LOCATIONS

Figure 8

Job: 2024-0095



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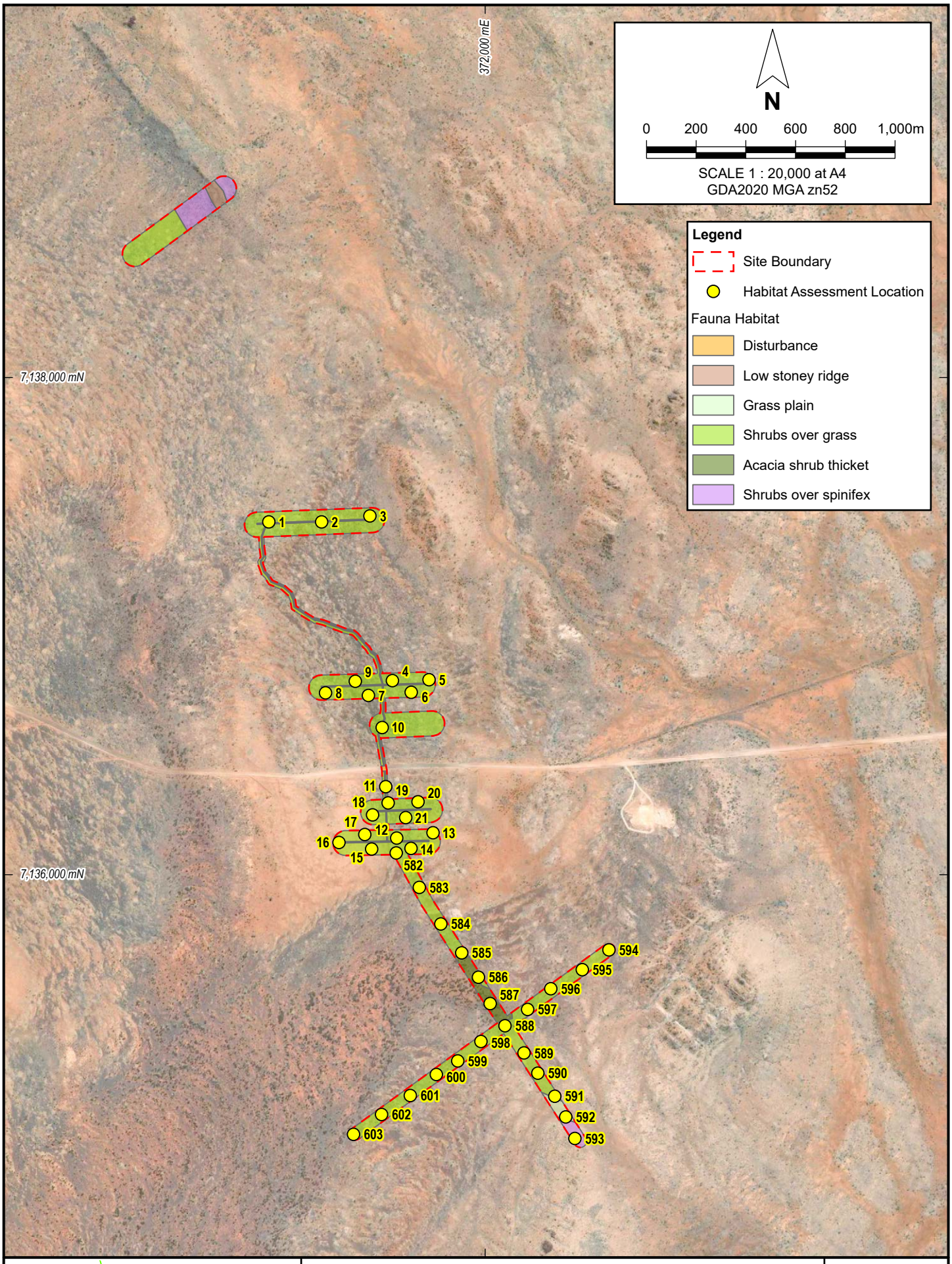
TERRESTRIAL ECOSYSTEMS

Terra Metals Ltd
BASIC AND TARGETED VERTEBRATE FAUNA SURVEY
DANTE PROJECT

FAUNA HABITATS AND HABITAT ASSESSMENT LOCATIONS

Figure 9

Drawn: G. Thompson | Date: 13 Nov 2024 | Job: 2024-0095



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TERRESTRIAL ECOSYSTEMS

Drawn: G. Thompson

Date: 13 Nov 2024

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BASIC AND TARGETED VERTEBRATE FAUNA SURVEY
DANTE PROJECT

FAUNA HABITATS AND HABITAT ASSESSMENT LOCATIONS

Figure 10

Job: 2024-0095

Appendix A.
EPBC search data

Basic and Targeted Vertebrate Fauna Survey
Dante Project

Appendix B. Regional Vertebrate Fauna Survey Data

Basic and Targeted Vertebrate Fauna Survey
Dante Project

B.1 REGIONAL VERTBRATE FAUNA SURVEY DATA

		Surveys	A	B																			C
Taxa	Species	Common name		WM Site 1	WM Site 2	WM Site 3	WM Site 4	WM Site 5	WM Site 6	WM Site 7	WM Site 8	WM Site 9	WM Site 10	WM Site 11	WM Site 12	Bat recorder	Camera traps	Spotlighting	Targeted	Transect	Transect	Elliotts	
Amphibians																							
Limnodynastidae	*Notaden nichollsi*	Desert Spadefoot																1					
Reptiles																							
Agamidae	*Ctenophorus clayi*	Black-collared Dragon	X																				
	Ctenophorus graafi	Ring-tailed Dragon	X																				
	Ctenophorus isolepis	Central Military Dragon	X							X			X	X	X			1	6	9	23		
	Ctenophorus nuchalis	Central Netted Dragon	X			X													1				
	Ctenophorus reticulatus	Western Netted Dragon	X																				
	Gowidon longirostris	Long-nosed Dragon																	1				
	Moloch horridus	Thorny Devil	X																	2	6		
	Pogona minor	Western Bearded Dragon				X								X				1					
Carphodactylidae	*Nephrurus levis*	Three-lined Knob-tail			X		X			X								1			2		
Diplodactylidae	*Diplodactylus conspicillatus*	Fat-tailed Gecko			X			X					X	X	X			2					
	Diplodactylus laevis	Desert Fat-tailed Gecko				X				X	X							2			1		
	Lucasium stenodactylum	Crowned Gecko					X				X	X						2			2		
	Rhynchoedura ornata	Beaked Gecko	X	X	X	X			X		X							1					
	Strophurus ciliaris	Spiny-tailed Gecko																4			1		
	Strophurus elderi	Jewelled Gecko	X		X								X					1	2		1		
	Strophurus intermedius	Southern Spiny-tailed Gecko	X															1					
	Strophurus strophurus	Western Spiny-tailed Gecko												X			1	1			2		
Elapidae	*Brachyurophis fasciolatus*	Narrow-banded Burrowing Snake	X																				
	Demansia psammophis	Yellow-faced Whipsnake	X					X							X								
	Suta monachus	Hooded Snake																1					
	Pseudechis australis	Mulga Snake								X								1					
	Pseudonaja mengdeni	Western Brown Snake										X	X							1			
	Pseudonaja modesta	Ringed Brown Snake	X															1					
	Simoselaps anomalus	Desert Banded Snake		X			X	X				X						1					
Gekkonidae	*Gehyra montium*	Centralian Dtella	X																				
	Gehyra purpurascens	Purplish Dtella	X	X	X	X	X	X	X	X		X	X					2	5		2		
	Gehyra variegata	Variegated Gehyra	X	X					X									1	4		2		
	Heteronotia binoei	Bynoe's Gecko	X		X	X	X		X	X			X	X	X				1				
Pygopodidae	*Delma butleri*	Unbanded Delma																	1				
	Delma desmosa	Banded Delma						X															

		Surveys	A	B																				C
Taxa	Species	Common name		WM Site 1	WM Site 2	WM Site 3	WM Site 4	WM Site 5	WM Site 6	WM Site 7	WM Site 8	WM Site 9	WM Site 10	WM Site 11	WM Site 12	Bat recorder	Camera traps	Spotlighting	Targeted	Transect	Transect	Elliotts	
	Delma nasuta	Sharp-snouted Delma	X																					
	Lialis burtonis	Burton's Legless Lizard					X			X								1	6					
	Pygopus nigriceps	Western Hooded Scaly-foot	X		X																1			
Pythonidae	*Antaresia stimsoni*	Stimson's Python																1						
	Aspidites ramsayi	Woma																			1			
Scincidae	*Ctenotus brooksi*	Brooks Ctenotus					X					X						1						
	Ctenotus calurus	Blue-tailed Finesnout Ctenotus																		1	3			
	Ctenotus helenae	Clay-soil Ctenotus		X			X					X												
	Ctenotus inornatus	Bar-shouldered Ctenotus									X													
	Ctenotus leonhardii	Leonhardi's Ctenotus	X	X		X			X		X									1				
	Ctenotus nasutus	Nasute Finsnout Ctenotus					X						X											
	Ctenotus pantherinus	Leopard Ctenotus	X	X				X		X			X	X	X				1		3			
	Ctenotus piankai	Coarse Sands Ctenotus								X														
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus	X	X			X					X		X						1	1			
	Ctenotus schomburgkii	Barred Wedgesnout Ctenotus	X																					
	Cyclodomorphus melanops	Spinifex Slender Blue-tongue	X									X							4					
	Egernia eos	Central Pygmy Spiny-tailed Skink	X																					
	Eremiascincus pallidus	Western Sand-swimming Skink		X			X					X						1						
	Eremiascincus richardsonii	Broad-banded Sand-swimmer																1						
	Lerista bipes	North-western Sandslider	X	X	X	X	X	X	X	X	X	X	X	X	X				2					
	Lerista desertorum	Central Desert Robust Slider	X																2					
	Lerista labialis	Southern Slider	X	X	X	X			X		X	X												
	Lerista taeniata	Ribbon Slider			X								X						1					
	Lerista timida	Timid Slider	X																					
	Liopholis inornata	Desert Skink	X		X		X	X					X	X					1	2				
	Liopholis kintorei	Great Desert Skink	X															1	5	1	38	X		
	Liopholis striata	Nocturnal Desert Skink			X	X												1		5	18			
	Menetia greyii	Common Dwarf Skink	X	X		X	X	X		X	X								4					
	Morethia ruficauda	Lined Fire-tailed Skink		X	X		X	X					X	X					2					
	Notoscincus ornatus	Ornate Soil-crevice Skink								X			X											
	Tiliqua multifasciata	Central Blue-tongue													X		2			1	1			
	Tiliqua occipitalis	Western Blue-tongued Lizard															3	1						
Typhlopidae	*Anilios endoterus*	Interior Blind Snake		X	X		X	X				X						1						
T	*Anilios grypus*	Long-beaked Blind Snake																1						
Varanidae	*Varanus acanthurus*	Spiny-tailed Monitor																1						
	Varanus brevicauda	Short-tailed Pygmy Monitor						X						X				1						
	Varanus eremius	Pygmy Desert Monitor	X					X		X							2	1		1	2			

		Surveys	A	B																				C
Taxa	Species	Common name		WM Site 1	WM Site 2	WM Site 3	WM Site 4	WM Site 5	WM Site 6	WM Site 7	WM Site 8	WM Site 9	WM Site 10	WM Site 11	WM Site 12	Bat recorder	Camera traps	Spotlighting	Targeted	Transect	Transect	Elliotts	
	Varanus giganteus	Perentie																1						
	Varanus gilleni	Pygmy Mulga Monitor							X									1			2			
	Varanus gouldii	Gould's Goanna									X	X					8	1		16	4			
	Varanus tristis	Black-headed Monitor																1						
Birds																								
Casuariidae	*Dromaius novaehollandiae*	Emu								X			X						2		2			
Columbidae	*Phaps chalcoptera*	Common Bronzewing																1						
	Ocyphaps lophotes	Crested Pigeon		X	X	X	X	X	X	X	X	X	X	X	X		1		2		9			
Cuculidae	*Cacomantis pallidus*	Pallid Cuckoo		X																				
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar															1				1			
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew																	1					
Turnicidae	*Turnix velox*	Little Buttonquail					X	X		X					X		5	3	1	1	17			
Otididae	*Ardeotis australis*	Australian Bustard							X	X			X					1	1	6	3			
Accipitridae	*Elanus axillaris*	Black-shouldered Kite																1						
	Hamirostra melanosternon	Black-breasted Buzzard		X																				
	Aquila audax	Wedge-tailed Eagle			X					X								1			1			
	Circus assimilis	Spotted Harrier			X										X			1			2			
	Haliastur sphenurus	Whistling Kite																1						
Tytonidae	*Tyto alba*	Barn Owl																1						
Alcedinidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher						X				X												
Meropidae	*Merops ornatus*	Rainbow Bee-eater						X				X					1	1						
Falconidae	*Falco cenchroides*	Nankeen Kestrel			X				X					X				1	2		4			
	Falco longipennis	Australian Hobby											X					1	1		2			
	Falco berigora	Brown Falcon		X		X		X	X									1	2		5			
Cacatuidae	*Eolophus roseicapilla*	Galah		X			X		X				X		X		1		1		5			
	Nymphicus hollandicus	Cockatiel		X															1					
Psittaculidae	*Neopsephotus bourkii*	Bourke's Parrot																1	1		1			
	Barnardius zonarius	Australian Ringneck						X					X											
	Psephotus varius	Mulga Parrot																	1					
	Melopsittacus undulatus	Budgerigar		X	X	X	X	X	X	X	X	X	X		X		2	1	4		9			
Ptilonorhynchidae	*Chlamydera guttata*	Western Bowerbird															1				2			
Maluridae	*Amytornis oweni*	Sandhill Grasswren						X		X							3	1	1	1	16			
	Stipiturus ruficeps	Rufous-crowned Emuwren																	1		7			
	Malurus assimilis	Purple-backed Fairywren		X	X		X			X		X		X				1	5	1	16			
	Malurus splendens	Splendid Fairywren																1			1			
	Malurus leucopterus	White-winged Fairywren	X		X		X	X		X		X	X	X			1	1			19			
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater	X										X											

		Surveys	A	B																				C
Taxa	Species	Common name		WM Site 1	WM Site 2	WM Site 3	WM Site 4	WM Site 5	WM Site 6	WM Site 7	WM Site 8	WM Site 9	WM Site 10	WM Site 11	WM Site 12	Bat recorder	Camera traps	Spotlighting	Targeted	Transect	Transect	Elliotts	
	Purnella albifrons	White-fronted Honeyeater	X															1			11		
	Manorina flavigula	Yellow-throated Miner		X	X	X		X	X	X	X	X	X				1	1	4		28		
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	X									X							3		6		
	Gavicalis virescens	Singing Honeyeater	X	X	X	X	X	X	X	X	X	X	X	X	X		1	1	12	1	39		
	Ptilotula plumula	Grey-fronted Honeyeater						X	X				X				1		1		8		
	Epthianura tricolor	Crimson Chat	X														1	1			1		
	Epthianura aurifrons	Orange Chat																			1		
Pardalotidae	*Pardalotus rubricatus*	Red-browed Pardalote									X	X							2		1		
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat					X														2		
	Acanthiza apicalis	Inland Thornbill					X														1		
	Acanthiza uropygialis	Chestnut-rumped Thornbill						X	X												1		
	Acanthiza robustirostris	Slaty-backed Thornbill				X													3		5		
	Smicrornis brevirostris	Weebill																1			1		
	Aphelocephala leucopsis	Southern Whiteface		X		X															3		
	Aphelocephala nigricincta	Banded Whiteface			X				X	X								1			1		
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler	X	X														1	1		3		
Campephagidae	*Coracina maxima*	Ground Cuckooshrike				X					X							1					
	Coracina novaehollandiae	Black-faced Cuckooshrike			X	X		X										1	2		3		
	Lalage tricolor	White-winged Triller																1					
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella																			1		
Psophodidae	*Psophodes occidentalis*	Chiming Wedgebill	X																				
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird	X	X		X			X	X		X	X	X			2		4		9		
Pachycephalidae	*Colluricincla harmonica*	Grey Shrikethrush		X																			
	Pachycephala rufiventris	Rufous Whistler		X															5		8		
Artamidae	*Artamus cinereus*	Black-faced Woodswallow	X	X		X		X	X	X	X	X		X	X		2	1	7		43		
	Cracticus nigrogularis	Pied Butcherbird	X	X	X	X	X		X	X	X	X	X				4	1	3		6		
	Gymnorhina tibicen	Australian Magpie	X	X	X	X			X	X	X	X			X		4	1	1		4		
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	X	X		X	X	X		X	X	X	X	X			7	1	5		13		
Monarchidae	*Grallina cyanoleuca*	Magpie-lark			X	X					X												
Corvidae	*Corvus orru*	Torresian Crow		X	X	X		X	X	X	X			X			3	1	2		2		
Petroicidae	*Petroica goodenovii*	Red-capped Robin	X														1		1		3		
	Melanodryas cucullata	Hooded Robin	X						X									1			1		
Locustellidae	*Cincloramphus cruralis*	Brown Songlark	X			X																	
	Cincloramphus mathewsi	Rufous Songlark									X												
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow										X			X				2		3		
Estrildidae	*Taeniopygia guttata*	Zebra Finch	X	X	X	X	X	X	X	X		X	X	X	X		3	1	7		27		
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit	X			X	X				X							1	2		1		

		Surveys	A	B																				C
Taxa	Species	Common name		WM Site 1	WM Site 2	WM Site 3	WM Site 4	WM Site 5	WM Site 6	WM Site 7	WM Site 8	WM Site 9	WM Site 10	WM Site 11	WM Site 12	Bat recorder	Camera traps	Spotlighting	Targeted	Transect	Transect	Elliotts	
Mammals																								
Bovidae	*Bos taurus*	Cow		X																				
Camelidae	*Camelus dromedarius*	Dromedary		X			X	X	X	X	X	X	X	X	X		9	1	16	19	59			
Canidae	*Canis* sp.	Wild dog		X	X				X	X	X	X	X	X	X		21		6	1	37			
	Vulpes vulpes	Red Fox															14			2	1			
Felidae	*Felis catus*	Cat		X	X		X	X	X	X	X		X	X			15	1	3	8	23			
Molossidae	*Austronomus australis*	White-striped Freetail Bat														2		2						
	Mormopterus petersi	Inland Free-tail Bat														1								
Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat														2								
	Nyctophilus geoffroyi	Lesser Long-eared Bat																2						
Dasyuridae	*Dasycercus blythi*	Brush-tailed Mulgara					X			X		X					4	1	1	5	54			
	Ningaui ridei	Wongai Ningaui		X	X		X	X		X		X	X	X	X									
	Pseudantechinus macdonnellensis	Fat-tailed False Antechinus	X																					
	Sminthopsis hirtipes	Hairy-footed Dunnart					X																	
	Sminthopsis ooldea	Ooldea Dunnart		X																				
	Sminthopsis youngsoni	Lesser Hairy-footed Dunnart											X											
Macropodidae	*Lagorchestes hirsutus*	Rufous Hare-wallaby	X															1						
	Osphranter robustus	Euro	X																					
	Petrogale lateralis	Black-flanked Rock-wallaby	X																					
Potoroidae	*Bettongia lesueur*	Burrowing Bettong																			2			
Leporidae	*Oryctolagus cuniculus*	Rabbit															1	2	2	1	2			
Notoryctidae	*Notoryctes* sp.	Marsupial Mole sp.																						1
	Notoryctes typhlops	Southern Marsupial Mole	X															1						
Equidae	*Equus caballus*	Horse																	1					
Muridae	*Mus musculus*	House Mouse	X	X	X	X		X	X	X	X	X	X	X	X									
	Notomys alexis	Spinifex Hopping Mouse	X	X			X	X		X		X	X				26	1	5		31			
	Pseudomys desertor	Desert Mouse			X			X		X		X	X											
	Pseudomys hermannsburgensis	Sandy Inland Mouse	X		X			X		X	X	X	X	X	X									

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B Western Wildlife (2020) *West Musgrave Copper and Nickel Project: Level 2 Vertebrate Fauna Survey 2018/2019*, unpublished report for OZ Minerals Ltd, Perth.

C Pearson, D. and Turner, J. (2000) Marsupial moles pop up in the Great Victoria and Gibson Deserts, *Australian Mammalogy*, 22, 115-119.

Appendix C. Definitions of Significant Fauna under the WA Biodiversity Conservation Act 2016 and Priority Species

Basic and Targeted Vertebrate Fauna Survey
Dante Project

ATTACHMENT C
DEFINITIONS OF SIGNIFICANT FAUNA UNDER THE WA BIODIVERSITY CONSERVATION ACT 2016

Threatened, Extinct and Specially Protected fauna or flora[1] are species[2] which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such. The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*. Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T Threatened Species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species

Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

[1] The definition of flora includes algae, fungi and lichens

[2] Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

EN Endangered species

Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

VU Vulnerable species

Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Extinct Species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW Extinct in the wild species

Species that "*is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the pwild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially Protected Species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI Migratory birds protected under an international agreement

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD Species of special conservation interest (conservation dependant fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations

P1 Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

P2 Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

P3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

P4 Priority 4: Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Appendix D.
Fauna habitat assessment data

Basic and Targeted Vertebrate Fauna Survey
Dante Project


DETECTION DOG

Appendix D Aboriginal Cultural Heritage Inquiry System (ACHIS) Report

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Register

Search Criteria

4 Aboriginal Cultural Heritage (ACH) Register in Mining Tenement - E 69/3401

Disclaimer

Aboriginal heritage holds significant value to Aboriginal people for their social, spiritual, historical, scientific, or aesthetic importance within Aboriginal traditions, and provides an essential link for Aboriginal people to their past, present and future. In Western Australia Aboriginal heritage is protected under the *Aboriginal Heritage Act 1972*.

All Aboriginal cultural heritage in Western Australia is protected, whether or not the ACH has been reported or exists on the Register.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Planning, Lands and Heritage by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you provide the details to the Department via https://achknowledge.dplh.wa.gov.au/ach-enquiry-form and we will make every effort to rectify it as soon as possible.

Copyright

Terminology

ID: ACH on the Register is assigned a unique ID by the Department of Planning, Lands and Heritage using the format: ACH-00000001. For ACH on the former Register the ID numbers remain unchanged and use the new format. For example the ACH ID of the place Swan River was previously '3536' and is now 'ACH-00003536'.

Access and Restrictions:

- **Boundary Reliable (Yes/No):** Indicates whether to the best knowledge of the Department, the location and extent of the ACH boundary is considered reliable.
- **Boundary Restricted = No:** Represents the actual location of the ACH as understood by the Department..
- **Boundary Restricted = Yes:** To preserve confidentiality the exact location and extent of the place is not displayed on the map. However, the shaded region (generally with an area of at least 4km²) provides a general indication of where the ACH is located. If you are a landowner and wish to find out more about the exact location of the place, please contact the Department of Planning, Lands and Heritage.
- **Culturally Sensitive = No:** Availability of information that the Department of Planning, Lands and Heritage holds in relation to the ACH is not restricted in any way.
- **Culturally Sensitive = Yes:** Some of the information that the Department of Planning, Lands and Heritage holds in relation to the ACH is restricted if it is considered culturally sensitive information. This information will only be made available if the Department of Planning, Lands and Heritage receives written approval from the people who provided the information. To request access please contact via https://achknowledge.dplh.wa.gov.au/ach-enquiry-form.
- **Culturally Sensitive Nature:**
  - **No Gender / Initiation Restrictions:** *Anyone* can view the information.
  - **Men only:** Only *males* can view restricted information.
  - **Women only:** Only *females* can view restricted information.

Status:

- **Register:** Aboriginal cultural heritage places that are assessed as meeting Section 5 of the *Aboriginal Heritage Act 1972*.
- **Lodged:** Information which has been received in relation to an Aboriginal cultural heritage place, but is yet to be assessed under Section 5 of the *Aboriginal Heritage Act 1972.*
- **Historic:** Aboriginal heritage places assessed as not meeting the criteria of Section 5 of the *Aboriginal Heritage Act 1972*. Includes places that no longer exist as a result of land use activities with existing approvals.

Place Type: The type of Aboriginal cultural heritage place. For example an artefact scatter place or engravings place.

Legacy ID: This is the former unique number that the former Department of Aboriginal Sites assigned to the place.

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Register

ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
2998	ILINTJI	Yes	No	Yes	No Gender / Initiation Restrictions	Register	Creation / Dreaming Narrative	*Registered Knowledge Holder names available from DPLH	W00226
2999	KIRI-TJITJI	Yes	No	Yes	No Gender / Initiation Restrictions	Register	Creation / Dreaming Narrative	*Registered Knowledge Holder names available from DPLH	W00227
3000	WARANJU	Yes	No	Yes	No Gender / Initiation Restrictions	Register	Creation / Dreaming Narrative	*Registered Knowledge Holder names available from DPLH	W00228
3001	PUNKULA-UKU-WANI	Yes	No	Yes	No Gender / Initiation Restrictions	Register	Creation / Dreaming Narrative	*Registered Knowledge Holder names available from DPLH	W00229

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