Ecological Existing Conditions - Nangaanya-ku Country

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Laverton Non-Defence Training Area, Western Australia

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Ecological Existing Conditions - Nangaanya-ku Country

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Executive summary

The Department of Defence (Defence) requires land to support high priority activities in accordance with the recent Government Defence Strategic Review. A proposed area has been identified in the Shire of Laverton, Western Australia (WA) covering approximately 24,000 km^2, referred to as the Laverton Non-Defence Training Area (Laverton NDTA; the proposed action). This area must be temporarily declared a "Defence Area" (DA, the proposed action area) by the Minister for Defence during specified activity periods to provide Defence with exclusive use for safety purposes. During declared period(s) public access will be prohibited. Exercises undertaken during the DA declaration will require projectiles to be fired at 'impact sites' within the DA (the proposed action area). Jacobs (Jacobs Group (Australia) Pty Ltd) has been engaged by Defence to undertake an environmental assessment of the DA. .

Disturbance within the DA will be contained to impact sites, working accommodation sites and an access track connecting the working accommodation and impact sites to Great Central Road (the disturbance footprint). Working accommodation sites will house temporary accommodation and offices, self-contained ablutions, stores, equipment, communications and vehicles. Impact sites represent the target locations for the projectiles. These impact sites will not contain any infrastructure and will be located more than 10 km, and possibly up to 30 km, from the boundary of the DA to allow for a safety perimeter to be established.

Jacobs undertook a desktop study where potential environmental constraints were identified followed by a field survey (14-16 July 2024) in order to map and describe vegetation communities and habitats at proposed sites. This report includes the findings of the desktop study and field survey.

Proposed impact sites, working accommodation sites and access track alignments are located in sandy interdune swales dominated by *Triodia spp.* (Spinifex) hummock grassland with variable cover of tall and medium shrubs and emergent *Eucalyptus youngiana* (Ooldea Mallee) and *E. gongylocarpa* (Marble Gum). Other broad vegetation communities within the BPAC portion of the DA include sandy depressions with *Acacia aneura* (Mulga)/*A aptaneura* (Narrow-leaf Mulga) low open shrubland and low sand dunes with mixed shrubs over *Triodia spp.* hummock grassland.

All areas surveyed were in excellent condition with very low disturbance levels and only light browsing from feral camels recorded. The vegetation communities within the project footprint provide habitat for a range of species of fauna including several species listed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* and Western Australian *Biodiversity Conservation Act 2016*.

The findings of this report inform a separate Environment Report that considers the potential impacts and relevant legislative approvals.

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Acronyms and abbreviations

AHD	Australian Height Datum
BC Act	*Biodiversity Conservation Act 1999*
DA	Defence Area
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEPAC	Defence Directorate of Environmental Planning, Assessment and Compliance
DWER	Department of Water and Environmental Regulation
EP Act	*Environmental Protection Act 1986*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
GIS	Geographic Information System
GVD	Great Victoria Desert
IBRA	Interim Biogeographic Regionalisation for Australia
km	Kilometres
LPS	Local Planning Scheme
m	Metres
mm	Millilitres
MNES	Matters of National Environmental Significance
PMST	Protected Matters Search Tool
UCL	Unallocated Crown Land
WA	Western Australia

1. Introduction

1.1 Background

The Department of Defence (Defence) requires land to support high priority activities in accordance with the recent Government Defence Strategic Review. A proposed area has been identified in the Shire of Laverton, Western Australia (WA) covering approximately 24,000 km^2, referred to as the Laverton Non-Defence Training Area (Laverton NDTA; the proposed action). This area must be temporarily declared a "Defence Area" (DA, the proposed action area) by the Minister for Defence during specified activity periods to provide Defence exclusive use for safety purposes. During declared period(s) public access will be prohibited. Exercises undertaken during the DA declaration will require projectiles to be fired at 'impact sites' within the DA (the proposed action area).

Defence is not seeking to acquire the land and the DA will only be active during specific periods of limited duration. The DA will be required for a period of 30 days for each exercise with first use expected in mid-2026. It is anticipated that the area will be used up to four times between mid-2026 and the end of 2028.

Defence activities and the associated disturbance to vegetation and soils is expected to be contained within impact sites, working accommodation sites (e.g. accommodation and equipment) and the development of an access track to access these sites. This report considers five impact sites and three working accommodation sites within the Nangaanya-ku (Part A) Native Tile Claim area.

Vegetation clearing and ground disturbance is required to provide safe working areas for Defence personnel, enable monitoring of projectile impacts and to minimise the risk of bushfire resulting from projectile impacts (due to friction/heat) as far as reasonably practicable. The impact sites must be located more than 10 km and possibly up to 30 km from the boundary of the DA to allow for a safety perimeter to be established.

This Ecological Existing Conditions Assessment has been prepared for Defence by Jacobs (Jacobs Group (Australia) Pty Ltd) for the Laverton NDTA, specifically for the area of the DA that intersects with the Nangaanya-ku (Part A) Native Tile Claim area.

1.2 Location and tenure

The DA is located within the Great Victoria Desert (GVD) region of Western Australia, within the Shire of Laverton, approximately 173 km northeast of Laverton. It is bounded by the Great Central Road in the west, Parallel No. 2 Road in the north, Connie Sue Road in the east and Neale Junction Road (also known as the Anne Beadell Highway) in the south, encompassing an area of approximately 24,000 km^2 (Figure 1-1).

Land tenure within the DA is predominantly Unallocated Crown Land (UCL). Lake Yeo Nature Reserve and Neale Junction Nature Reserve are located in the southwestern and southern eastern extents of the DA respectively.

There are two Native Title holders within the DA, Nangaanya-ku in the west, and Ngaanyatjarra in the east (Figure 1-2). This report focusses on the Nangaanya-ku Native Title area in the west, and for the purposes of this report this area is referred to as the BPAC portion of the DA. The Prescribed Body Corporate (PBC) for Nangaanya-ku is Barra Parrapi (Aboriginal Corporation) Registered Native Title Body Corporate (RNTBC).

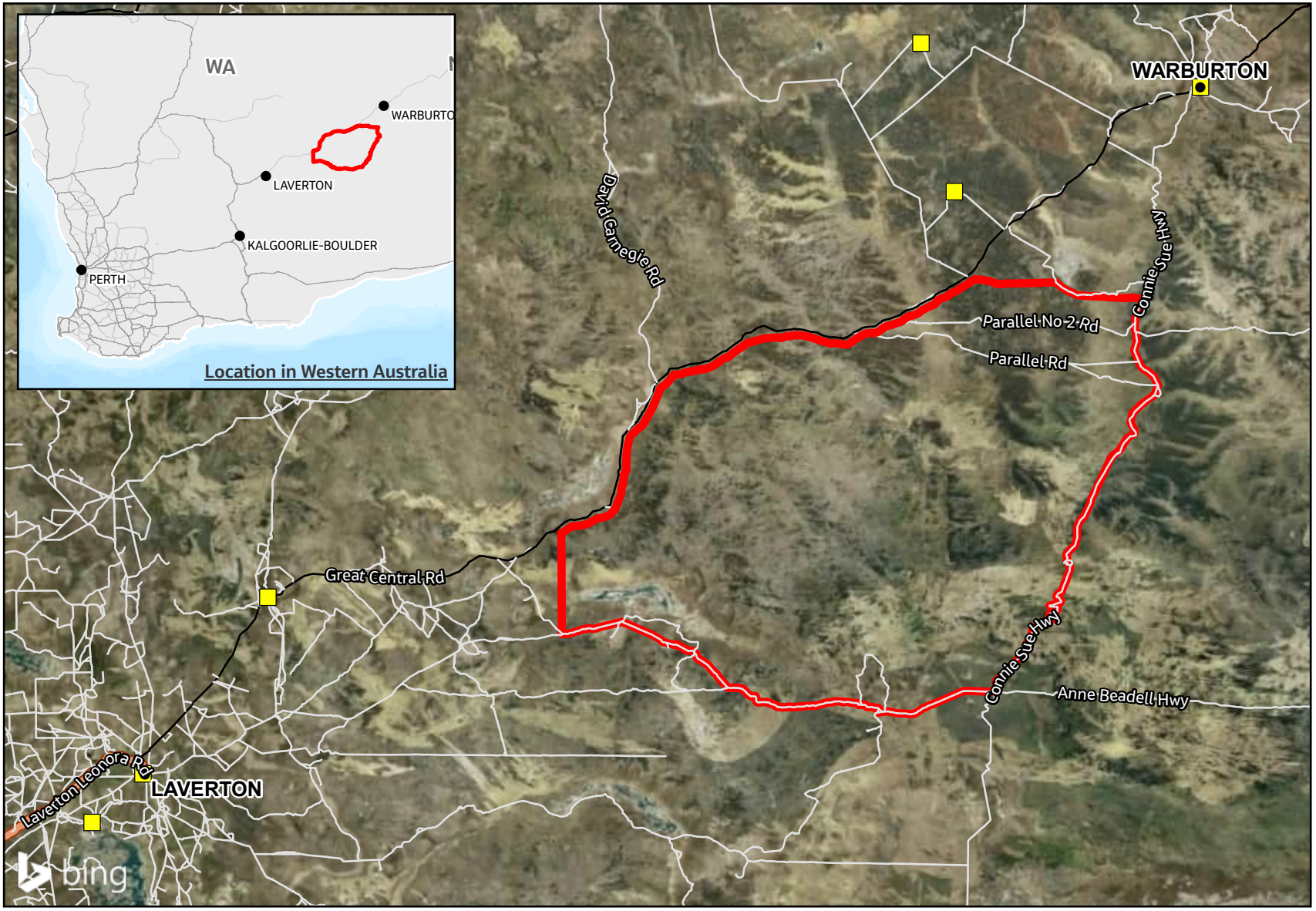


Figure 1-1: Location of the proposed action

Data Sources: Geosciences Australia (2006); Aboriginal Communities and Town Reserves - DPLH; Mining Tenements - DMIRS; Nature Reserves - DBCA. Imagery Sources: ESRI Online Imagery Services
\\ausyd0vs01\GISDefence\IS489800_Laverton_NTDA\Apps\ArcPro\Figures\IS489800_FIGURES_ER.aprx/IS489800_HER_1_ProjectLocation_A4L_RevA | Date: 30/08/2024

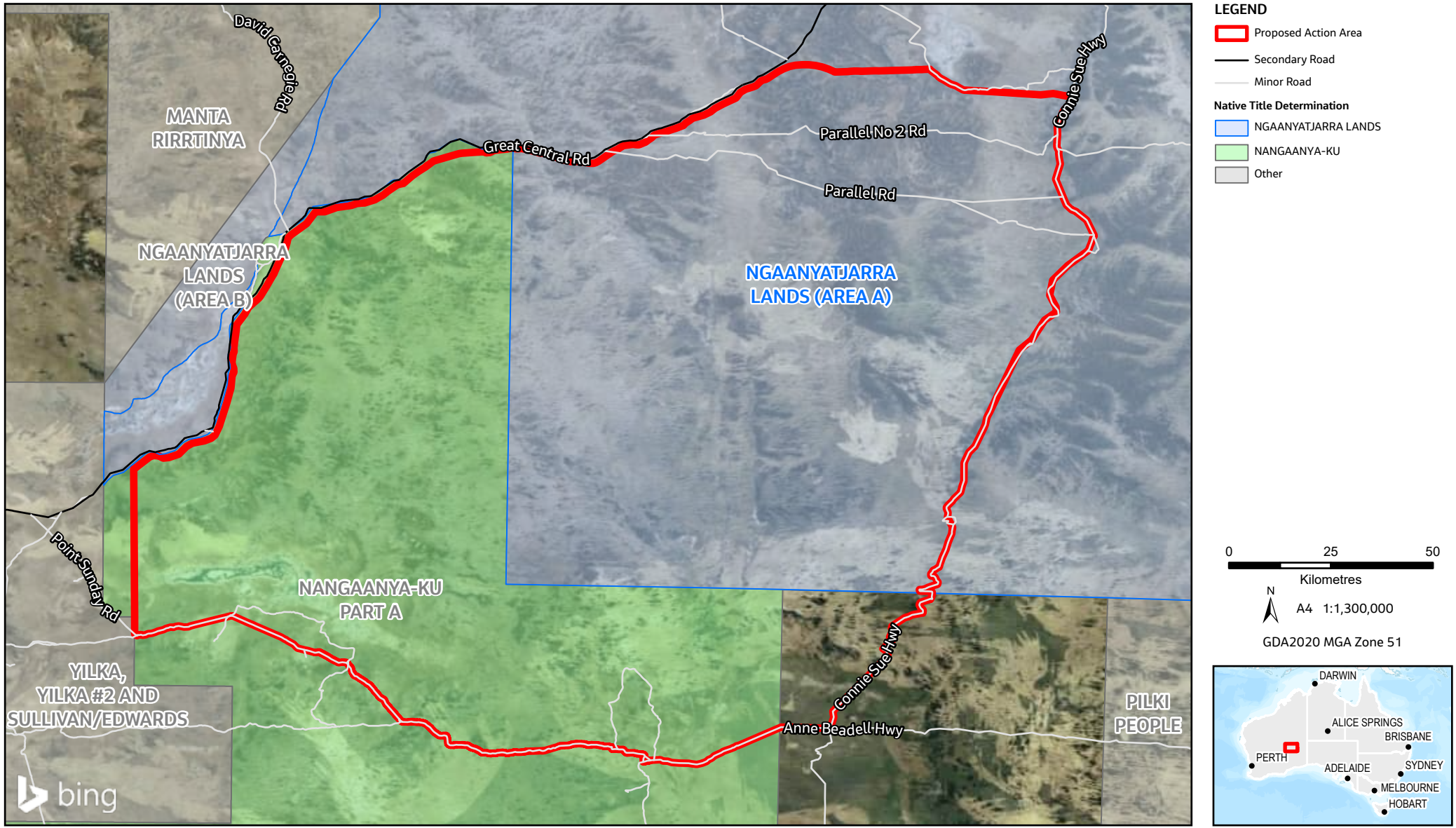


Figure 1-2: Native Title determinations of the DA

Data Sources: Geosciences Australia (2006); Native Title Determination - Landgate. Imagery Sources: ESRI Online Imagery Services
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1.3 Proposed action – sites and access

Disturbance within the DA will be contained within impact sites, working accommodation sites and an access track connecting the working accommodation and impact sites to Great Central Road (the disturbance footprint).The proposed action includes the following:

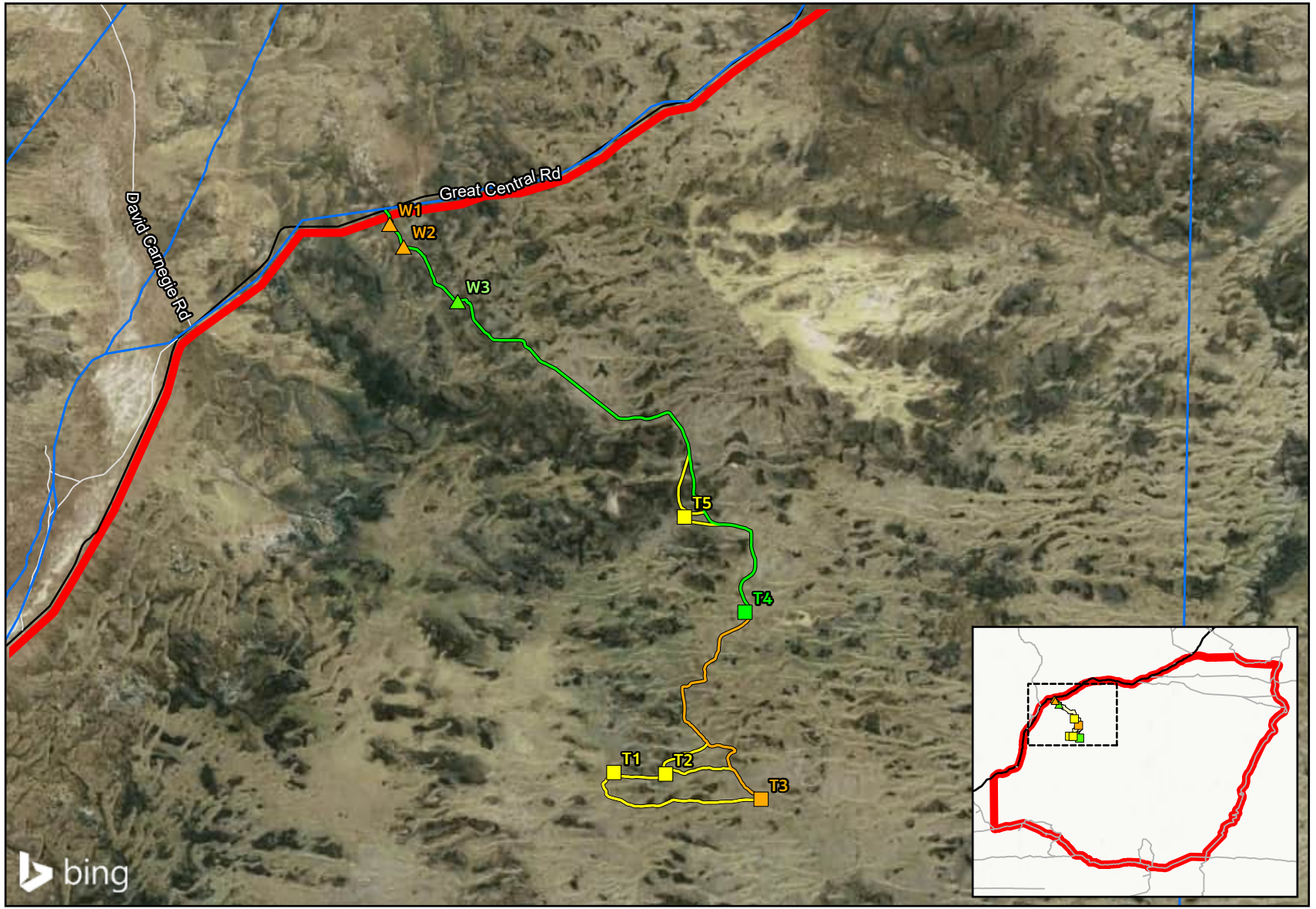
- Working accommodation sites will house temporary accommodation and offices, messing and recreational facilities, self-contained ablutions, stores, equipment, communications, vehicle parking, and workshop areas. Workshops are required for minor servicing of vehicles, generators and UAVs, assembly/disassembly of equipment and fuelling/de-fuelling. Diesel generators will be used to supply power. Areas of the sites required for building pads and establishment of infrastructure will be cleared, topsoil removed, and the site levelled. It is recommended that removed topsoil and vegetation is stockpiled (separately) at the edge of the area cleared to allow for respread as part of site rehabilitation.
- Impact sites represent the target locations for the projectiles. These sites will not contain any permanent infrastructure and must be located more than 10 km and possibly up to 30 km from the boundary of the proposed action area to allow for a safety perimeter to be established. It is anticipated that small areas within the overall impact site(s) will have vegetation removed through back-burning operations undertaken by Traditional Owners. This will assist in retaining the root mass within the soil and reduce the potential for erosion. All projectiles will be recovered unless they are buried at a significant depth where the impact of retrieving is considered greater than the impact of leaving the projectile in situ.
- The access track will consist of:
  - a two-way, all-weather portion from the perimeter of the proposed action area to the working accommodation sites, suitable for use by large trucks required to deliver deployable infrastructure to the working accommodation sites.
  - A single lane access track between the working accommodation site and the impact site(s) suitable for use by trucks required to deliver instrumentation to site, equipment required to enable recovery of projectiles and to bring recovered projectiles back to the working accommodation. This portion of the access may be able to be downgraded to be four-wheel drive (4WD) accessible only, however this remains uncertain.
- An access control point (road block) will be established on the new access track, close to the perimeter of the DA, to prevent non-activity participants from accessing the area via road during activities.
- A high-risk exclusion zone of 10 km will surround the impacts site(s). This does not require any works, clearing of vegetation or other intrusive works. No fencing will be undertaken. The safety perimeter will be established using surveillance and monitoring equipment to keep non-Defence personnel out of area during activities.

Due to the early planning stage of the proposed action, a number of sites have been included. The sites and access are detailed in Table 1-1 and shown in Figure 1-3. The sites are identified as follows:

- **Preferred sites**: locations that will be established unless site conditions or Defence requirements at the time prohibit this.
- **Secondary sites**: locations that may be established either where preferred sites are unavailable or should additional areas for working accommodation or to meet Defence objectives for an exercise are required.
- **Alternate sites**: sites may not be developed but have been included in the event that the identified preferred and secondary sites are not available/suitable, such as through a change to Defence requirements or objectives.

Table 1-1. Site details

Survey area	Name	Size
Working Accommodation Site W1	Yilah (Close)	200 x 200 m
Working Accommodation Site W2	Warta Thungurni (Little Tree)	200 x 200 m
Working Accommodation Site W3	Warta Tjerwarl (Little Fire Wood for Starters)	200 x 100 m
Impact Site T1	Tali Kuthu (Sand Hill 1)	500 x 500 m
Impact Site T2	Tali Kutharra (Sand Hill 2)	500 x 500 m
Impact Site T3	Tali Marnkurrpa (Sand Hill 3)	500 x 500 m
Impact Site T4	Tali Munu Kakarra (Sand Hill Long Way)	500 x 500 m
Impact Site T5	Tali Wiya (No More Sand Hill)	500 x 500 m
Access Track	Yiwarra Turrkulpa (Road to Big Hit)	Approximately 50 km



LEGEND

- Proposed Action Area
- Native Title Boundary
- Secondary Road
- Minor Road

Site Options

- Impact Site - Preferred
- Working Site - Preferred
- Impact Site - Secondary
- Working Site - Secondary
- Impact Site - Alternate
- Working Site - Alternate

Access Options

- Preferred
- Secondary
- Alternate

0 5 10
Kilometres

N

A4 1:320,000

GDA2020 MGA Zone 51



Figure 1-3: Proposed site and access options

Data Sources: Geosciences Australia (2006). Imagery Sources: ESRI Online Imagery Services
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1.4 Previous assessments

A Rapid Constraints Assessment (Jacobs 2024a) was undertaken, which involved a high-level desktop assessment to identify environmental and heritage constraints within the DA. The assessment also presented recommended 'No-Go' areas to be avoided in siting of the required project footprint, subject to confirmation with Defence.

A Detailed Site Assessment technical memorandum (Jacobs 2024b) was subsequently completed using a Multi-Criteria Analysis (MCA) process via a spatially enabled platform to automate the analysis. This assessment was used to identify areas of least environmental and heritage constraint where the impact sites, working accommodation sites and access track(s) may be located. This enabled the selection of options for the proposed work areas, which subsequently became the focus of the field assessment completed as part of this current assessment.

1.5 Assessment purpose

The purpose of this assessment is to understand the existing ecological values present at the impact sites, working accommodation sites and access track alignments, and to identify Defence's responsibilities regarding the avoidance and management of ecological values. It intends to assist Defence in the siting of impact sites, working accommodation sites and the access track within the BPAC portion of the DA. This assessment provides recommended areas to be used for the works, based on the presence, and potential impact to ecological values.

2. Legislative context

As Defence are not proposing to acquire the land subject to the DA declaration, State and Commonwealth legislation and regulations will apply to the project. Key legislation relevant to this assessment are described below and presented in Appendix A.

2.1 Commonwealth legislation

The *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) is the overarching environment legislation governing Defence activities. Defence is required to comply with the EPBC Act to ensure protection of the environment. As the project is being conducted by a Commonwealth agency (Defence) the applicable sections of the EPBC Act are:

- Part 3, Division 1: Requirements relating to Matters of National Environmental Significance (MNES):
  - World heritage areas;
  - National heritage places;
  - Wetlands of international importance (listed under the Ramsar Convention);
  - Listed threatened species and ecological communities;
  - Listed migratory species (protected under international agreements);
  - Commonwealth marine areas;
  - Great Barrier Reef Marine Park;
  - Nuclear actions (including uranium mines); and
  - A water resources (that relate to coal seam gas development and large coal mining development).
- Section 28: Requirement for approval of activities undertaken by Commonwealth agencies. Activities by the Commonwealth or a Commonwealth agency must be approved under Section 28 of the EPBC Act. Approval under Section 28 requires a detailed assessment of impact to the whole of the environment and not just MNES.

Defence follows a self-assessment process, whereby the Defence Directorate of Environmental Planning, Assessment and Compliance (DEPAC) reviews the environmental risk and significant impact assessment against the EPBC Act and determines whether there is a significant impact on MNES and a whether a referral under the EPBC Act is required.

2.2 State legislation

The primary State legislation related to environmental protection and regulation is the *Environmental Protection Act 1986* (EP Act). Part IV of the EP Act sets out the requirements for approval of Proposals that are likely to have a significant impact on the environment. These significant Proposals must be referred to the Western Australian Environmental Protection Authority (EPA) under Section 38 of the EP Act and must assess potential impacts to a range of environmental factors, where relevant, covering all aspects including ocean processes and marine life, terrestrial flora, fauna and vegetation, landforms and soils, waterways and wetlands, air quality, heritage and amenity.

Part V of the EP Act is administered by the Department of Water and Environmental Regulation (DWER) and sets out additional approvals and permits that may be required including:

- Native Vegetation Clearing Permits
- Works Approval and Prescribed Premises Licencing.

The *Biodiversity Conservation Act 1999* (BC Act) is the primary legislation that provides protection to Western Australia's biodiversity. Flora and fauna species as well as ecological communities may be listed as Threatened under the BC Act. In addition, the Department of Biodiversity, Conservation and Attractions (DBCA) maintains a list of "Priority" species and communities that are not eligible for listing as threatened but are near threatened or otherwise of concern.

3. Methodology

3.1 Desktop assessment

The desktop assessment completed as part of this Ecological Existing Conditions Assessment builds upon the database search and literature review completed as part of the previous Rapid Constraints Assessment (Jacobs (2024a). The desktop completed as part of the Rapid Constraints Assessment involved a review of the following:

- Existing reports and studies associated with previous assessments undertaken for the DA and/or nearby developments.
- Relevant data layers relating to environmental, physical and heritage attributes.
- Species-specific management plans pertaining to the broader area around the study area.
- Historical and recent aerial imagery and photographs.
- Search results from the EPBC Act Protected Matters Search Tool (PMST) to identify potential Matters of National Environmental Significance for the DA using a 10 km buffer radius.
- Search results from the Department of Biodiversity, Conservation and Attractions (DBCA) threatened and priority flora, fauna, and communities databases. A buffer of 100 km was applied to the search due to the remoteness of the DA and expected scarcity of survey effort and records in the area.

3.2 Field assessment

A field assessment was conducted by two Jacobs ecologists on 14 to 16 July 2024 to inform site selection of the impact sites, working accommodation sites and access track. Due to the expansive BPAC portion of the DA, helicopter surveys were initially used to inform site selection, particularly the siting of the access track, followed by on ground field surveys. Eight sites were surveyed (five impact sites and three working accommodation sites) within the BPAC portion of the DA.

The vegetation assessment methodology is based on the WA EPA Technical Guidance for Vegetation Surveys (EPA, 2016) with the exception of the quadrat size recommended for the Bioregion (50m x 50m) rather than the 100m x 100m employed in our survey. It was considered that the larger quadrat size better captured the floristic heterogeneity of the vegetation communities present at the sites and the quadrat size used conforms with the quadrat size recommended for rangelands in other jurisdictions, such as South Australia.

The following tasks were completed as part of the on-ground field surveys:

- Installation of flora assessment quadrats (100 m x 100 m) approximately located in site centre, with the following data collected:
  - Description of landform, soils and surface strew
  - Flora species present with cover/abundance score, regeneration observations
  - Classification of vegetation assemblage/community
- Ground truthing of vegetation within the greater site plot (500 m x 500 m):
  - Disturbance levels: fire, grazing, weeds
  - Wildlife observations and habitat assessment
  - Mapping trees >20cm diameter at breast height

Habitat assessment and wildlife observations included a pedestrian survey by two ecologists of the 500 m x 500 m site for a duration of 40 minutes, during which opportunistic fauna sightings/calls were recorded and searches for burrows/warrens, tracks, nesting or denning habitat (e.g. tree hollows, ground structures, habitat

complexity) were carried out. An assessment of total grazing pressure was undertaken focussing on the level of grazing on palatable perennials. The age structure of perennial species was also recorded as an indicator of long-term recruitment trends.

Two additional flora assessment quadrats, a sand dune site and a Mulga woodland site were assessed to assist with mapping and describing vegetation communities traversed by the proposed access tracks.

3.3 Limitations

Information presented in this report is based on available information at the time of assessment. Changes to legislation, policy or databases used to inform the report may alter the results and conclusions of this report. This report also reflects conditions assessed during the dates of the field assessment. Changes to ecological conditions occur over time through natural and human influences and may alter the conclusions of this report.

This report assessed the ecological conditions of the sites and access tracks identified in this report. Any additional sites or access alignments will require further ecological investigations to confirm the values present.

4. Results

4.1 Landscape context

The DA is located within the Great Victoria Desert (GVD) region of Western Australia, which experiences an arid climate with variable rainfall ranging from 60 mm to 522 mm. The DA has an undulating topography with height above sea level ranging from 298 m Australian Height Datum (AHD) to 564 m AHD. Low points in the landscape are associated with drainage lines and Lake Yeo in the southwest extent of the DA, and Lake Throssell adjacent to the northwestern boundary of the DA area. Both Lake Yeo and Lake Throssell are Wetlands of National Importance. Additional smaller waterbodies are present throughout the DA, such as Millar Lake located towards the southeastern boundary. The interior of WA is generally internally draining, meaning that surface water runoff from storm events flows towards the region's salt lakes, rather than towards to coast and ocean. The western portion of the DA drains towards either Lake Yeo in the southwest or Lake Throssell in the northwest, with the remainder of the DA in the Warburton Basin draining towards the east, when runoff occurs. Given the arid nature of the environment and low annual rainfall, the salt lakes and drainages are ephemeral and likely to be dry the majority of the time.

The DA is located within the Central subregion of the GVD Bioregion as described by the Interim Biogeographic Regionalisation for Australia (IBRA). The Central subregion is described by Barton and Cowan (2001) as an "active sand-ridge desert with extensive dune fields of deep Quaternary aeolian sands overlying Permian strata of the Gunbarrel Basin. Vegetation is primarily a Tree steppe of *Eucalyptus gongylocarpa,* Mulga and *E. youngiana* over hummock grassland dominated by *Triodia basedowii* on the aeolian sands."

4.2 Vegetation communities

4.2.1 Modelled vegetation communities

Statewide vegetation mapping shows that the DA encompasses 13 vegetation associations defined by Beard (1974). More than 99% of the pre-European extent of these vegetation associations remains and none are considered in danger due to clearing or land development (Table 4-1). No threatened ecological communities (listed under the EPBC Act or BC Act) are modelled to occur within the DA by the Protected Matters Search Tool or the DBCA Threatened and Priority ecological communities database.

Table 4-1. Beard vegetation associations and extents within the DA

Vegetation association	Description	Extent within the DA (ha)	Pre-European extent (ha)	Current Extent (ha)	Extent remaining (%)
18	Low woodland; mulga	176,500.97	1,954,628.44	1,954,625.28	100.00
19	Low woodland; mulga between sand ridges	672,762.21	2,866,602.03	2,866,298.72	99.99
24	Low woodland; *Allocasuarina* sp.	10,778.25	226,362.03	226,362.03	100.00
39	Shrublands; mulga scrub	344,106.27	1,183,999.19	1,183,999.19	100.00
45	Shrublands; mallee scrub	2,215.61	170,379.67	170,379.67	100.00
84	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee over hard spinifex between sandhills	46,400.17	1,781,533.03	1,781,533.03	100.00
85	Hummock grasslands, open low tree and mallee steppe; marble gum &	1,040,840.98	6,351,699.56	6,349,770.63	99.97

Vegetation association	Description	Extent within the DA (ha)	Pre-European extent (ha)	Current Extent (ha)	Extent remaining (%)
	mallee over hard spinifex on sandplain				
125	Bare areas; salt lakes	47,536.38	225,180.04	225,108.81	99.97
139	Hummock grasslands, patchy shrub steppe; mulga over hard spinifex on laterite	34,872.54	6,314.80	6,314.80	100.00
239	Hummock grasslands, open medium tree and mallee steppe; marble gum and mallee over hard spinifex between sandhills	61,541.56	1,036,406.09	1,036,406.09	100.00
676	Succulent steppe; samphire	15,106.83	206,634.58	206,522.57	99.95
1239	Hummock grasslands, open medium tree and mallee steppe; marble gum and mallee over hard spinifex on sandplain	16,185.47	2,233,684.98	2,233,684.98	100.00
4621	Shrublands; mallee scrub	31,887.13	42,714.35	42,714.35	100.00

4.2.2 Vegetation Communities – Field Assessment

The vegetation communities found within the BPAC portion of the DA reflect the low sand dune and sandy inter-dune swale landforms that dominate the landscape. The sandy interdune swales typically support *Triodia basedowii* (Hard Spinifex)/*T. schinzii* (Feather-top Spinifex) hummock grassland ground storey with a range of tree and shrub species also present either as woodland and shrubland formations or sparsely present as emergent species. All swales surveyed had been burnt with some sites less than five years post fire ranging to approximately 15 years The post fire interval influences the height and structure of the vegetation and therefore the community to which it is assigned at the time of survey. Four broad vegetation groups were recorded at the working accommodation sites, impact sites and access track namely:

- Sand plains with Spinifex hummock grassland with mixed shrubs and emergent Marble Gum and Mallee (Hummock Grassland)
- Sand plains with Marble Gum / Mallee low open woodland over Spinifex hummock grassland (Open Woodland)
- Low sand dunes with Marble Gum / Mallee low open woodland over Spinifex hummock grassland (Dunes)
- Sandy shallow depressions with Mulga tall shrubland (Mulga Tall Shrubland)

Nine vegetation associations were recorded from the vegetation assessment quadrats at the working accommodation sites, impact sites and sites representative of the access track and these are described below.

Grevillea juncifolia (Honeysuckle Spider-flower) tall open shrubland with emergent *Eucalyptus youngiana* (Ooldea Mallee) +/- *E. gongylocarpa* (Marble Gum) over *Triodia basedowii* (Hard Spinifex)/*T. schinzii* (Feather-top Spinifex) hummock grassland

Sandplains and interdune swales with *Grevillea juncifolia* (Honeysuckle Spider-flower) tall open shrubland and emergent *Eucalyptus youngiana* (Ooldea Mallee) and, in some areas, *E. gongylocarpa* (Marble Gum). The sparse mid-storey includes *Micromyrtus flaviflora* (Yellow Heath-myrtle), *Bonamia erecta* (Bonamia) and *Androcalva loxophylla* (Rulinga) with *Triodia basedowii* (Hard Spinifex)/*T. schinzii* (Feather-top Spinifex) hummock grassland dominating the ground storey.

This community ranged from approximately five years post fire to approximately 15 years. Disturbance levels were low with occasional camel tracks and very low total grazing pressure noted. This community is represented at Impact Site T1 and Impact Site T3.

The characteristics of this vegetation community are summarised in Table 4-2 below.

Table 4-2. Vegetation characteristics - *Grevillea juncifolia* (Honeysuckle Spider-flower) tall open shrubland

Lifeform/Height class	Canopy cover (%)	Dominant taxa present
Mallee tree/tall shrub to 4.0 m	2	*Eucalyptus youngiana, E. gongylocarpa*
Medium shrubs 1.5 m	8	*Grevillea juncifolia, Micromyrtus flaviflora, Bonamia erecta*
Hummock grassland 0.4 m	25	*Triodia basedowii, Triodia schinzii*



Figure 4-1. Representative photo of *Grevillea juncifolia* (Honeysuckle Spider-flower) tall open shrubland with emergent *Eucalyptus youngiana* (Ooldea Mallee) +/- *E. gongylocarpa* (Marble Gum) over *Triodia basedowii* (Hard Spinifex)/*T. schinzii* (Feather-top Spinifex) hummock grassland vegetation community within the BPAC portion of the DA.

Triodia basedowii (Hard Spinifex) / *T. schinzii* (Feather-top Spinifex) hummock grassland with scattered shrubs and emergent *Grevillea juncifolia* (Honeysuckle Spider-flower) and *Eremophila forrestii* (Forrest's Emubush)

Sandplains of interdune swales with *Triodia basedowii* (Hard Spinifex) / *T. schinzii* (Feather-top Spinifex) hummock grassland with emergent *Grevillea juncifolia* (Honeysuckle Spider-flower) scattered throughout as tall shrubs. Mid-sized shrubs are patchily present including *Eremophila forrestii* (Forrest's Emubush), *Acacia aptaneura* (Narrow-leaf Mulga) and *Micromyrtus flaviflora* (Yellow Heath-myrtle). This community ranged from approximately 10 to 15 years post fire. Disturbance levels were low with occasional camel tracks and very low total grazing pressure noted. This community is represented at Impact Site T2.

The characteristics of this vegetation community are summarised in Table 4-3 below.

Table 4-3. Vegetation characteristics - *Triodia basedowii* (Hard Spinifex) / *T. schinzii* (Feather-top Spinifex) hummock grassland

Lifeform/Height class	Canopy cover (%)	Dominant taxa present
Tall shrubs 3.5 m	1	*Grevillea juncifolia*
Medium shrubs 1.5 m	3	*Eremophila forrestii, Acacia aptaneura, Micromyrtus flaviflora loxophylla*
Hummock grassland 0.25 m to 0.4 m	25	*Triodia basedowii, T. schinzii*



Figure 4-2. Representative photo of *Triodia basedowii* (Hard Spinifex) / *T. schinzii* (Feather-top Spinifex) hummock grassland with scattered shrubs and emergent *Grevillea juncifolia* (Honeysuckle Spider-flower) and *Eremophila forrestii* (Forrest's Emubush) vegetation community within Impact Site T2.

Eremophila forrestii (Forrest's Emubush) low open shrubland over *Triodia basedowii* (Hard Spinifex) hummock grassland

Sandplains of interdune swales with *Eremophila forrestii* (Forrest's Emubush) low open shrubland over *Triodia basedowii* (Hard Spinifex) hummock grassland. Low shrubs including *Scaevola basedowii* (Leafless Fanflower) and *Androcalva loxophylla* (Rulinga) are present throughout with *Triodia basedowii* (Hard Spinifex) hummock grassland dominating the ground storey. This community ranged from approximately five to 10 years post fire. Disturbance levels were low with occasional camel tracks and very low total grazing pressure noted. This community is represented at Impact Site T4.

The characteristics of this vegetation community are summarised in Table 4-4 below.

Table 4-4. Vegetation characteristics - *Eremophila forrestii* (Forrest's Emubush) low open shrubland

Lifeform/Height class	Canopy cover (%)	Dominant taxa present
Shrubs 1.0 m	8	*Eremophila forrestii*
Low shrubs 0.5 m	8	*Eremophila forrestii, Acacia aptaneura, Micromyrtus flaviflora, Androcalva loxophylla*
Hummock grassland 0.3 m	25	*Triodia basedowii, T. schinzii*



Figure 4-3. Representative photo of *Eremophila forrestii* (Forrest's Emubush) low open shrubland over *Triodia basedowii* (Hard Spinifex) hummock grassland vegetation community within Impact Site T4.

Acacia pachyacra (Shiny-pod Wattle) open shrubland over *Triodia schinzii* (Feather-top Spinifex) hummock grassland with and scattered low shrubs

Sandplains with *Acacia pachyacra* (Shiny-pod Wattle) open shrubland over *Triodia schinzii* (Feather-top Spinifex) hummock grassland with juvenile *Acacia abrupta* (Blunt-leaf Wattle) present as medium-sized shrubs. Low shrubs including *Bonamia erecta* (Bonamia) and *Androcalva loxophylla* (Rulinga) are common throughout.

This community ranged from approximately five to 10 years post fire. Disturbance levels were low with occasional camel tracks and very low total grazing pressure noted. This community is represented at Impact Site T5.

The characteristics of this vegetation community are summarised in Table 4-5 below.

Table 4-5. Vegetation characteristics - *Acacia pachyacra* (Shiny-pod Wattle) open shrubland

Lifeform/Height class	Canopy cover (%)	Dominant taxa present
Shrubs 1.5 m	8	*Acacia pachyacra, Acacia abrupta*
Low shrubs 0.8 m	20	*Androcalva loxophylla, Bonamia erecta*
Hummock grassland 0.4 m	20	*Triodia schinzii*



Figure 4-4. Representative photo of *Acacia pachyacra* (Shiny-pod Wattle) open shrubland over *Triodia schinzii* (Feather-top Spinifex) hummock grassland with and scattered low shrubs vegetation community within Impact Site T5.

Triodia basedowii (Hard Spinifex) hummock grassland with emergent *Acacia pruinocarpa* (Black Gidgee) and scattered low shrubs

Sandplains of interdune swales with *Triodia basedowii* (Hard Spinifex) hummock grassland with emergent *Acacia pruinocarpa* (Black Gidgee) and scattered low shrubs including *Dicrastylis exsuccosa* (Rusty Sand Sage) and *Androcalva loxophylla* (Rulinga). Tussock grass species including *Amphipogon sericeus* (Grey Beard Grass) and *Eragrostis eriopoda* (Woollybutt) are also common in the ground storey.

This community ranged from approximately three to five years post fire. Disturbance levels were low with occasional camel tracks and very low total grazing pressure noted. This community is represented at Working Accommodation Site W1 and Working Accommodation Site W2.

The characteristics of this vegetation community are summarised in Table 4-6 below.

Table 4-6. Vegetation characteristics - *Triodia basedowii* (Hard Spinifex) hummock grassland

Lifeform/Height class	Canopy cover (%)	Dominant taxa present
Shrubs 2.0 m	2	*Acacia pruinocarpa*
Low shrubs 0.7 m	4	*Androcalva loxophylla, Bonamia erecta*
Hummock grassland 0.3 m	30	*Triodia schinzii, Amphipogon sericeus, Eragrostis eriopoda*



Figure 4-5. Representative photo of *Triodia basedowii* (Hard Spinifex) hummock grassland with emergent *Acacia pruinocarpa* (Black Gidgee) and scattered low shrubs vegetation community within the BPAC portion of the DA.

Triodia schinzii (Feather-top Spinifex) hummock grassland with emergent *Eucalyptus youngiana* (Ooldea Mallee) and scattered shrubs

Sandplains of interdune swales with *Triodia schinzii* (Feather-top Spinifex) hummock grassland with emergent *Eucalyptus youngiana* (Ooldea Mallee) and scattered shrubs including *Eremophila forrestii* (Forrest's Emubush) and *Grevillea juncifolia* (Honeysuckle Spider-flower). Low shrubs include *Scaevola basedowii* (Leafless Fanflower) and *Androcalva loxophylla* (Rulinga).

This community was estimated to be regrowth approximately 10 to 15 years post fire. Disturbance levels were low with occasional camel tracks and very low total grazing pressure noted. This community is represented at Working Accommodation Site W3.

The characteristics of this vegetation community are summarised in Table 4-7 below.

Table 4-7. Vegetation characteristics - *Triodia schinzii* (Feather-top Spinifex) hummock grassland

Lifeform/Height class	Canopy cover (%)	Dominant taxa present
Mallee 3.0 m	2	*Eucalyptus youngiana*
Low shrubs 0.7 m	3	*Eremophila forrestii, Androcalva loxophylla, Scaevola basedowii*
Hummock grassland 0.4 m	25	*Triodia schinzii*



Figure 4-6. Representative photo of *Triodia schinzii* (Feather-top Spinifex) hummock grassland with emergent *Eucalyptus youngiana* (Ooldea Mallee) and scattered shrubs vegetation community within Working Accommodation Site W3.

Eucalyptus gongylocarpa (Marble Gum) low open woodland with scattered tall shrubs over *Triodia basedowii* hummock grassland

Sandplains of interdune swales with *Eucalyptus gongylocarpa* (Marble Gum) low open woodland with scattered tall shrubs including *Grevillea juncifolia* (Honeysuckle Spider-flower) and *Micromyrtus flaviflora* (Yellow Heath-myrtle). The ground storey is dominated by *Triodia basedowii* (Hard Spinifex) hummock grassland.

The site has been burnt approximately 15 years ago and includes old growth Marble Gum with some trees with hollows.

Small areas of this community are found at Impact Sites T1, T2 and T3 while the access track alignment also traverses several sections of this community.

The characteristics of this vegetation community are summarised in Table 4-9 below.

Table 4-8. Vegetation characteristics - *Eucalyptus gongylocarpa* (Marble Gum) low open woodland

Lifeform/Height class	Canopy cover (%)	Dominant taxa present
Tree 6.0 m	10	*Eucalyptus gongylocarpa*
Shrubs 2.5 m	5	*Grevillea juncifolia, Micromyrtus flaviflora*
Hummock/ tussock grassland 0.4 m	25	*Triodia basedowii*



Figure 4-7. Representative photo of *Eucalyptus gongylocarpa* (Marble Gum) low open woodland with mixed tall shrubs over *Triodia basedowii* hummock grassland within the BPAC portion of the DA.

Eucalyptus youngiana (Ooldea Mallee) low open mallee +/- emergent *Eucalyptus gongylocarpa* (Marble Gum) with mixed tall shrubs over *Triodia schinzii/T. basedowii* hummock grassland

Low sand dunes with *Eucalyptus youngiana* (Ooldea Mallee) low open mallee often with emergent *Eucalyptus gongylocarpa* (Marble Gum) with mixed tall shrubs including *Acacia ligulata* (Sandhill Wattle), *Dodonaea viscosa* ssp .*angustissima* (Narrow-leaf Hopbush) and *Senna artemisioides* (Desert Cassia). Low shrubs are common throughout including *Crotalaria eremaea* (Rattlepod) and *Aluta maisonneuvei* (Desert Heath-myrtle) and the ground storey is dominated by *Triodia schinzii* (Feather-top Spinifex), *Aristida holathera* (Tall Kerosene-grass) and *Eriachne helmsii* (Buck Wanderrie).

This community was estimated to be regrowth approximately 10 to 15 years post fire. Disturbance levels were low with occasional camel tracks and very low total grazing pressure noted. This community is represented at the sand dune site (access track).

The characteristics of this vegetation community are summarised in Table 4-9 below.

Table 4-9. Vegetation characteristics - *Eucalyptus youngiana* (Ooldea Mallee) low open mallee

Lifeform/Height class	Canopy cover (%)	Dominant taxa present
Mallee 3.0 m	3	*Eucalyptus youngiana*
Shrubs 1.5 m	10	*Acacia ligulate, Senna artemisioides,, Crotalaria eremaea*
Hummock/ tussock grassland 0.4 m	20	*Triodia schinzii, Eriachne helmsii, Arista holathera*



Figure 4-8. Representative photo of *Eucalyptus youngiana* (Ooldea Mallee) low open mallee and emergent *Eucalyptus gongylocarpa* (Marble Gum) with mixed tall shrubs over *Triodia schinzii/T. basedowii* hummock grassland vegetation community potentially traversed by access tracks within the BPAC portion of the DA

Acacia aptaneura (Narrow-leaf Mulga) / *A. aneura* (Mulga) tall shrubland to low woodland over scattered shrubs and tussock grasses

Sandy plains in shallow depressions supporting dense *Acacia aptaneura* (Narrow-leaf Mulga)/*A. aneura* (Mulga) tall shrubland to low woodland with a typically sparse mid-storey including *Eremophila latrobei* (Georgina Poison-bush), *Aluta maisonneuvei* (Desert Heath-myrtle) and *Solanum centrale* (Bush Tomato). The ground storey is sparse with scattered patches of *Triodia basedowii* (Hard Spinifex) and *Aristida contorta* (Kerosene Grass) recorded.

This community was estimated to be regrowth typically more than 15 years post fire. Disturbance levels were low with occasional camel tracks and very low total grazing pressure noted. This community is represented at the Mulga site (access track).

The characteristics of this vegetation community are summarised in Table 4-10 below.

Table 4-10. Vegetation characteristics - *Acacia aptaneura* (Narrow-leaf Mulga) / *A. aneura* (Mulga) tall shrubland

Lifeform/Height class	Canopy cover (%)	Dominant taxa present
Tall shrubs 2.5 m to 3.5 m	40	*Acacia aptaneura, A. aneura*
Shrubs 1.2 m	1	*Eremophila latrobei, Aluta maisonneuvei*
Tussock grassland 0.3 m	2	*Triodia basedowii, Aristida contorta*



Figure 4-9. Representative photo of *Acacia aptaneura* (Narrow-leaf Mulga) / *A. aneura* (Mulga) tall shrubland to low woodland over scattered shrubs and tussock grasses vegetation community potentially traversed by access tracks within the BPAC portion of the DA

4.2.3 Flora assessment quadrats

Eight flora assessment quadrats were installed to characterise the vegetation communities present at each of the working accommodation and impact sites. An additional two sites were installed in sand dune and Mulga environments not recorded at the working accommodation or impact sites, which are likely to be traversed by potential track alignments. Table 4-11 below summarises information collected at each of the flora assessment sites. Flora species recorded during the survey are detailed in Appendix B. Vegetation mapping is presented in Appendix C while site photos are provided in Appendix D. Site field sheets are attached as Appendix E.

Table 4-11. Flora assessment quadrats

Site number/name	Latitude	Longitude	Landform	Vegetation community	Species richness	Comments
T1 Impact Site (Tali Kuthu (Sand Hill 1))	-27.4411	124.6857	Sandplain, interdune swale	*Grevillea juncifolia* tall open shrubland with emergent *Eucalyptus youngiana / E. gongylocarpa* over *Triodia basedowii/T schinzii* hummock grassland	26	Excellent condition[1] ▪ Marble Gum woodland located to east and west ▪ Estimated 5 to 10 years post fire. ▪ No large trees within central 200 m x 200 m. ▪ Seven medium sized Marble Gum (20-40 cm DBH) in outer portion of 500 m x 500 m ▪ Larger (>40cm DBH) Marble Gums adjacent but outside 500 m x 500m ▪ Low total grazing pressure. ▪ Scattered camel tracks/dung.
T2 Impact Site (Tali Kutharra (Sand Hill 2))	-27.4415	124.7145	Sandplain, interdune swale	*Triodia basedowii/T schinzii* hummock grassland with emergent *Grevillea juncifolia* and scattered low shrubs	15	Excellent condition ▪ Marble Gum woodland to the north-east and Mulga to the north west, sand ridge to south ▪ Estimated > 10 years post fire. ▪ Light browsing (TGP low). ▪ Camel tracks/dung.

[1] Excellent condition is defined within Table 2. Vegetation Condition scale within the Government of Western Australia Department of Environment Regulation *A guide to the assessment of applications to clear native vegetation, Under Part v Division 2 of the Environment Protection Act 1986, December 2014* as 'Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species'.

Site number/name	Latitude	Longitude	Landform	Vegetation community	Species richness	Comments
						▪ Single Marble Gum (>20cm BDH) near south eastern boundary of 500 m x 500 m
T3 Impact Site (Tali Marnkurrpa (Sand Hill 3))	-27.4533	124.7677	Sandplain, interdune swale	*Grevillea juncifolia* tall open shrubland with emergent *Eucalyptus youngiana* over *Triodia basedowii/T schinzii* hummock grassland	26	Excellent condition ▪ Marble Gum woodland to the north-east and south-west ▪ Estimated 5 – 10 years post fire. ▪ Light browsing (TGP low). ▪ Camel tracks/dung. ▪ Brown Song-lark recorded. ▪ One tree >20cm DBH in south-east corner of 500 m x 500 m
T4 Impact Site (Tali Munu Kakarra (Sand Hill Long Way))	-27.3607	124.7573	Sandplain, interdune swale	*Eremophila forrestii* low open shrubland over *Triodia basedowii* hummock grassland	14	Excellent condition ▪ Large area of similar vegetation (no trees nearby) ▪ Estimated 5 to 10 years post fire. ▪ No large trees within central 500 m x 500 m. ▪ Low total grazing pressure. ▪ Scattered camel tracks/dung. ▪ Mulgara tracks diggings ▪ Cat tracks. ▪ Bustard tracks.
T5 Impact Site (Tali Wiya (No More Sand Hill))	-27.3140	124.7230	Sandplain, interdune swale	*Acacia pachyacra* open shrubland over *Triodia schinzii* hummock grassland with and scattered low shrubs	23	Excellent condition ▪ .Mulga patches surrounded but no large eucalypts nearby. Small sand dune to south-east. ▪ Estimated 5 to 10 years post fire. ▪ Low total grazing pressure. ▪ No large trees within central 500 m x 500 m. ▪ Scattered camel tracks/dung. ▪ Bustard tracks.

Site number/name	Latitude	Longitude	Landform	Vegetation community	Species richness	Comments
						▪ Budgerigars.
W1 Working Accommodation Site (Yilah (Close))	-27.1703	124.5573	Sandplain, interdune swale	*Triodia basedowii* hummock grassland with emergent *Acacia pruinocarpa* and scattered low shrubs	24	Excellent condition ▪ Mulga patches surrounded but no large eucalypts nearby. ▪ Regrowth community estimated 3 to 5 years post fire. ▪ No large trees within central 500 m x 500 m. ▪ Low total grazing pressure.
W2 Working Accommodation Site (Warta Thungurni (Little Tree))	-27.1815	124.5654	Sandplain, interdune swale	*Triodia basedowii* hummock grassland with emergent *Acacia pruinocarpa* and scattered low shrubs	23	Excellent condition ▪ Regrowth community estimated 5 to 10 years post fire. ▪ Low grazing pressure. ▪ Scattered camel dung/tracks.
W3 Working Accommodation Site (Warta Tjerwarl (Little Fire Wood for Starters))	-27.2082	124.5955	Sandplain, interdune swale	*Triodia schinzii* hummock grassland with emergent *Eucalyptus youngiana* and scattered low shrubs	19	Excellent condition ▪ Estimated 10 to 15 years post fire. ▪ No large trees within central 500 m x 500 m. ▪ Low total grazing pressure. ▪ Scattered camel tracks/dung. ▪ White-winged Fairy Wren *(Malurus leucopterus).*
Low open woodland (access track)	-27.44250	124.68219	Sandplain, interdune swale	*Eucalyptus gongylocarpa* low open woodland over *Triodia schinzii/T. basedowii* hummock grassland		
Dune (access track)	27.4472	124.7077	Low sand dune	*Eucalyptus youngiana* low open mallee +/- emergent *E. gongylocarpa* with mixed tall shrubs over *Triodia schinzii/T. basedowii* hummock grassland	17	Excellent condition ▪ Estimated 10 to 15 years post fire. ▪ Regrowth mallee and mid-size marble gum at base of dune. ▪ Low total grazing pressure. ▪ Scattered camel tracks/dung. ▪ Mulgara tracks diggings.

Site number/name	Latitude	Longitude	Landform	Vegetation community	Species richness	Comments
						▪ Cat tracks. ▪ Bustard tracks.
Mulga tall shrubland (access track)	27.4436	124.7117	Sandplain, interdune swale	*Acacia aneura/ aptaneura* tall shrubland to low woodland over scattered shrubs and tussock grasses	12	Excellent condition ▪ Estimated 10 to 15 years post fire. ▪ Regrowth mallee and mid-size marble gum at base of dune. ▪ Low total grazing pressure. ▪ Scattered camel tracks/dung. ▪ Mulgara tracks diggings. ▪ Cat tracks. ▪ Bustard tracks.

4.3 Threatened and migratory fauna

A total of 15 threatened fauna species have previously been recorded or are modelled to occur within the vicinity of the DA based on the Protected Matters Search Tool and DBCA Threatened and Priority fauna database searches (refer to Jacobs 2024a). Table 4-13 provides a summary of these species, as well as their likelihood of occurrence within the BPAC portion of the DA. The likelihood of occurrence assessment was based on the known preferred habitats in comparison to the habitat available in the DA, and the frequency, timing and location of previous records. The criteria used in the likelihood of occurrence assessment are detailed in Table 4-12 and the results of the assessment are listed in Table 4-13 below

Table 4-12. Likelihood of occurrence for conservation significant species: classification and criteria

Likelihood	Criteria
Unlikely	Species not recorded during site assessments and fit one or more of the following criteria: ▪ Have not been recorded previously in the site/locality and for which the site is beyond the current distribution range. ▪ Use specific habitats or resources that are not present in the site. ▪ Are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded.
Potential	Species not recorded during the site assessment that fit one or more of the following criteria: ▪ Have infrequently been recorded previously in the site/surrounds. ▪ Use specific habitats or resources present on the site but they are in a poor or modified condition. ▪ Are unlikely to maintain sedentary populations, however, may seasonally use resources within the site opportunistically or during migration. ▪ Are cryptic flowering flora species that were not seasonally targeted by survey and that have not been recorded.
Likely	Species recorded during the site assessments or species not recorded that fit one or more of the following criteria: ▪ Have frequently been recorded previously in the site/locality. ▪ Use habitat types or resources that are present on the site that are in abundance and/or are in good condition within the site. ▪ Are known to or are likely to maintain resident populations surrounding the site. ▪ Are known to or are likely to visit the site during regular seasonal movements or migration.
Present	Any threatened species recorded at the site during the site assessments.

Table 4-13. Threatened fauna species previously recorded or are modelled to occur within the vicinity of the DA.

Species name	Common name	Conservation status	Likelihood of occurrence	Comments
Mammals				
Dasycercus blythi	Brush-tailed Mulgara	Priority 4[2]	Likely	Preferred habitat of sand plains with Spinifex hummock grassland dominates at all sites Tracks and diggings observed at some sites
Dasycercus cristicauda	Crest-tailed Mulgara	Priority 4	Potential	Unlikely at sites Preferred habitat of deep sand (dunes) with Sandhill Canegrass not present on working accommodation or impact sites Sand dunes habitat may be cleared for track construction
Macrotis lagotis	Greater Bilby	Vulnerable (EPBC, BC Act)	Unlikely	Suitable habitat of sand plains with spinifex hummock grassland dominates at all sites and access tracks However no recent records within 100 km – most recent > 50 years ago Traditional owners advise that they have not observed this species in recent decades (Ngaanyatjarra Rangers *pers comm)* DA is outside current known distribution (DCCEEW, 2023)
Notoryctes typhlops	Southern Marsupial Mole	Priority 4	Potential	Unlikely at sites Preferred deeper sand of sand dunes not present at working accommodation or impact sites Sand dunes habitat may be cleared for track construction
Sminthopsis psammophila	Sandhill Dunnart	Endangered (EPBC Act; BC Act)	Potential	Unlikely at sites Preferred habitat of deep sand with mature Spinifex not present at working accommodation or impact sites Potential habitat in sand dunes potentially impacted during track construction
Birds				
Amytornis striatus striatus	Striated Grasswren (sandplain)	Priority 4	Likely	Preferred foraging and nesting habitat of Spinifex hummock grassland dominates at all sites and track alignment NOTE: A taxonomic revision for the species was completed in 2020. The WA subspecies found in the Great

[2] Refer to https://www.dbca.wa.gov.au/media/792/download for definitions of Department of Biodiversity, Conservation and Attractions Priority Rankings

Species name	Common name	Conservation status	Likelihood of occurrence	Comments
				Victoria Desert is now known as Amytornis striatus rowleyi. This species is not listed under the EPBC Act.
Amytornis textilis textilis	Western Grasswren	Priority 4	Unlikely	Preferred habitat of low shrubland with spiny shrubs not present within the survey area
Aphelocephala leucopsis	Southern Whiteface	Vulnerable (EPBC Act)	Potential	Small areas of preferred low woodland habitat on outer perimeter of some impact and working accommodation sites
Calidris acuminata	Sharp-tailed Sandpiper	Vulnerable (EPBC Act)	Unlikely	No suitable wetland habitat present within the potential disturbance footprint
Falco hypoleucos	Grey Falcon	Vulnerable (EPBC Act; BC Act)	Potential	Mature Marble Gum open woodland provides nesting habitat for this sparsely distributed species
Falco peregrinus	Peregrine Falcon	Other Specially Protected Fauna[3] (BC Act)	Potential	Mature Marble Gum open woodland provides nesting habitat for this sparsely distributed species
Leipoa ocellata	Malleefowl	Vulnerable (EPBC Act; BC Act)	Potential	Unlikely at sites Preferred nesting habitat of Mulga woodland not present at working accommodation or impact sites Habitat potentially traversed by track alignment
Pezoporus occidentalis	Night Parrot	Endangered (EPBC Act; BC Act)	Unlikely	Foraging and nesting habitat of Spinifex hummock grassland present throughout the survey area No records
Polytelis alexandrae	Princess Parrot	Vulnerable (EPBC Act); Priority 4	Potential	Mature Marble Gum open woodland with tree hollows found at site T1 provides nesting habitat
Reptiles				
Anilios margaretae	Buff Snouted Blind Snake (Lake Throssell)	Priority 2	Unlikely	Single record (1962) from possibly gypsiferous lunette/sand dune habitat at Lake Throssell approx. 35 km to south west
Liopholis kintorei	Tjakura, Great Desert Skink	Vulnerable (EPBC Act; BC Act)	Potential	Preferred foraging and burrowing habitat of Spinifex hummock grassland dominates at all sites and track alignments Species prefers long-unburnt spinifex hummock grassland that is not present at working accommodation or impact sites Species hibernates from April to August (approx.)

[3] Refer to https://www.dbca.wa.gov.au/media/792/download for definition of other specially protected fauna

The PMST identified seven migratory bird species that have the potential to occur within 10 km of the DA, these species are presented in Table 4-14 below. Migratory species are species that migrate to Australia and its external territories or pass though or over Australian waters during their annual migrations. Many of these species breed outside of Australia and spend a critical part of their lifecycle in Australia, often in areas of coastal or inland wetlands. These species are protected under the EPBC Act and listed under a number of international agreements and conventions.

Table 4-14. Migratory fauna species modelled to occur within 10 km of the DA by the PMST.

Species name	Common name	Likelihood of occurrence	Comment
Actitis hypoleucos	Common Sandpiper	Unlikely	No suitable habitat
Apus pacificus	Fork-tailed Swift	Potential (fly over)	Species may potentially fly over the DA
Calidris acuminata	Sharp-tailed Sandpiper	Unlikely	No suitable habitat
Calidris melanotos	Pectoral Sandpiper	Unlikely	No suitable habitat
Charadrius veredus	Oriental Plover, Oriental Dotterel	Unlikely	No suitable habitat
Motacilla cinerea	Grey Wagtail	Unlikely	Not known from southern WA
Motacilla flava	Yellow Wagtail	Unlikely	Suitable habitat not present

4.4 Habitat for threatened fauna

The interdune sand plains with spinifex tussock grassland that comprise the impact and working accommodation sites provide habitat for several fauna species of conservation significance including *Liopholis kintorei* (Tjakura, Great Desert Skink)(Vulnerable, EPBC Act), *Dasycercus blythi* (Brush-tail Mulgara) and *Amytornis striatus striatus* (Striated Grass Wren) (Priority 4 BC Act). Sand dunes provide potential habitat for additional threatened fauna species including *Sminthopsis psammophila* (Sandhill Dunnart) (Endangered, EPBC Act) and *Notoryctes typhlops* (Southern Marsupial Mole) (Priority 4 BC Act). However, as long-unburnt hummock grassland is preferred habitat for several threatened species including Tjakura and Sandhill Dunnart, the recently burnt vegetation at the proposed sites reduces the likelihood of these species being present.

The sand plains with spinifex hummock grassland provide habitat suitable for *Macrotis lagotis* (Greater Bilby), however there have been no records for over 50 years within 100 km of the DA which lies just south of the current known distribution (DCCEEW(b), 2023) and therefore the likelihood of occurrence has been assessed as unlikely.

4.5 Threatened and conservation significant flora

No threatened flora species listed under the EPBC Act or BC Act were identified during the field survey.

The PMST identified two EPBC Act listed flora species *Grevillea treueriana* (Mt Finke Grevillea) and *Hibbertia crispula* (Ooldea Guinea-flower) as potentially occurring within 10 km of the DA. However, the Western Australian Herbarium has no record of *Grevillea treueriana* occurring within the State, and the Western Australian Herbarium records for *Hibbertia crispula* are greater than 100 km south of the DA. Therefore, these two species are considered unlikely to occur within the DA and are not considered further in this assessment.

A search of the DBCA Threatened and Priority flora database and the WA Herbarium database identified 33 conservation significant flora species identified as having the potential to occur within the DA.

Following the field assessment, a likelihood of occurrence assessment was undertaken for threatened flora species. This assessment was based on the known preferred habitats in comparison to the habitat available in the BPAC portion of the DA, and more particularly, the potential disturbance footprint, and the frequency, timing and location of previous records. Of the conservation listed flora, 11 species were assessed to potentially occurring within the disturbance footprint. The remaining 22 species were considered unlikely to be present within the disturbance footprint. Table 4-15 provides a summary of these species, as well as their likelihood of occurrence within the BPAC portion of the DA.

Table 4-15. Conservation significant flora species potentially present within the potential disturbance footprint in BPAC portion of the DA.

Species Name	Conservation Status	Likelihood of occurrence	Comment
Eremophila aureivisca	Priority 1[4]	Unlikely	Preferred habitat of loamy soils and stony ground not present
Korthalsella leucothrix	Priority 1	Unlikely	Preferred laterite plain not present
Neurachne lanigera	Priority 1	Unlikely	Preferred rocky ground not present
Verticordia mirabilis	Priority 1	Unlikely	Preferred rocky ground not present
Abutilon sp. Warburton (A.S. George 8164)	Priority 1	Unlikely	Records are for Warburton area (200+km)
Aenictophyton anomalum	Priority 1	Unlikely	Outside known range
Eragrostis sp. Lake Carey (J. Paterson & J. Warden WB 40825)	Priority 1	Unlikely	No preferred habitat of ephemeral lakes present in survey area
Grevillea sp. Victoria Desert (R. Davis et al. RD 11611)	Priority 1	Unlikely	Outside known range
Labichea deserticola	Priority 1	Unlikely	No preferred rocky ground habitat present
Micromyrtus helmsii	Priority 1	Potential	Only known from two locations approx. 200km to east Preferred sand dune habitat present
Calytrix warburtonensis	Priority 2	Unlikely	No preferred rocky ground habitat present
Dampiera eriantha	Priority 2	Potential	Most records are for south of the DA
Eremophila undulata	Priority 2	Potential	Preferred sand plains with hummock grassland present
Caesia sp. Great Victoria Desert (C. Tauss 2835)	Priority 2	Unlikely	Outside known range
Calytrix gypsophila	Priority 2	Unlikely	Preferred sand dunes near salt lakes not present
Eremophila jamesiorum	Priority 2	Unlikely	Outside known range (Gibson Desert)
Grammosolen odgersii subsp. *odgersii*	Priority 2	Potential	Only known from two locations approx. 150 km to the south Preferred sand dune habitat present
Acacia eremophila var. Numerous-nerved variant (A.S. George 11924)	Priority 3	Potential	Few records, all to south east of the DA

[4] Refer to https://www.dbca.wa.gov.au/media/792/download for definitions of Department of Biodiversity, Conservation and Attractions Priority Rankings

Species Name	Conservation Status	Likelihood of occurrence	Comment
Bossiaea eremaea	Priority 3	Potential	Preferred interdune sand plain present Few records, all to west of the DA
Elatine macrocalyx	Priority 3	Unlikely	Preferred claypan or ephemeral lake habitat not
Eleocharis papillosa	Priority 3	Unlikely	Preferred claypan or ephemeral lake habitat not
Goodenia lyrata	Priority 3	Unlikely	Preferred claypan or ephemeral lake habitat not
Grevillea obliquistigma subsp. *cullenii*	Priority 3	Potential	Preferred interdune sand plain present but records are from > 150km to south west
Melaleuca apostiba	Priority 3	Unlikely	Preferred ephemeral lake habitat not present
Sauropus sp. Woolgorong (M. Officer s.n. 10/8/94)	Priority 3	Potential	Preferred sand plain present but very few records
Sporobolus blakei	Priority 3	Unlikely	No run on depressions or wetlands present
Thryptomene nealensis	Priority 3	Unlikely	Preferred habitat of loamy soils and stony or lateritic ground not present
Verticordia jamiesonii	Priority 3	Unlikely	Preferred habitat of clay soils on laterite break-aways not present
Conospermum toddii	Priority 4	Potential	Preferred sand dune habitat present Most records are for > 100km south of the DA
Comesperma viscidulum	Priority 4	Potential	Preferred sand plains with hummock grassland present
Frankenia glomerata	Priority 4	Unlikely	Preferred habitat of white sandy clay soils on break-away slopes not present
Grevillea secunda	Priority 4	Potential	Preferred sand dune habitat present Most records are for > 100km south of the DA
Olearia arida	Priority 4	Potential	Preferred sand dune habitat present Several records for approx. 150km to south east of the DA

4.6 Introduced flora and fauna

No declared weeds or other introduced (non-native) flora species were recorded during the field survey of the sites or the access track.

Feral camel tracks were recorded at most sites surveyed and a small camel herd was observed in the eastern portion of the DA. Grazing impact from camels was assessed as low throughout the DA with light browsing of palatable shrubs noted at most sites. Feral cat tracks were recorded at most sites surveyed.

4.7 Existing disturbance levels

Vegetation communities throughout the DA were characterised by very low disturbance levels and were assessed to be in excellent condition. No weeds or exotic flora species were recorded and total grazing pressure was uniformly low. Although camel tracks were recorded at most sites little evidence of browsing was recorded and perennial trees and shrubs were in mixed age stands indication long-term recruitment. No vehicle tracks were evident at sites and the proposed track alignments apart from a few two-wheel tracks near Tjukayirla roadhouse in the north of the DA.

4.8 Potential impacts

4.8.1 Direct impacts

4.8.1.1 Working accommodation sites

Direct impacts include vegetation clearing proposed to be carried out at working accommodation sites which will result in the clearance of hummock grassland vegetation community at each site installed. Sites with few tall shrubs and trees have been selected and the most severe impacts will be restricted to species that are restricted to sandplains dominated by hummock grassland rather than species restricted to woodland communities.

No large trees (DBH > 20cm) were recorded during the field assessment at or close to the working accommodation site footprints.

4.8.1.2 Impact sites

Direct impacts at impact sites will be limited to vegetation clearing for two sites of 100 m by 100 m (the target zone), in the worst-case scenario. The preferred method of vegetation clearing is via control burns, however mechanical clearing using a bulldozer or similar may be required. In addition, disturbance to soil surface within the target zone, likely to be less than 100m^2, will occur from the direct impact of projectiles on the land surface will occur. Additional disturbance will be required to retrieve projectiles, with the surface expression dependent on how deep the projectile is buried.

Several large trees were present at Impact Site T1 however these were located more towards the edge of the 500m x 500m site area and can be avoided during siting of the target zone. Single large trees were located in the south-eastern corners of Impact Site T2 and Impact Site T3 and can also be avoided during target zone siting. The remaining Impact Sites (T4 and T5) were free of large trees.

4.8.1.3 Access tracks

The construction of access tracks to working accommodation and impact sites will require clearing of native vegetation primarily from interdune sandplains dominated by hummock grassland communities. The proposed track alignment minimises impact to sand dune and Mulga communities however the proposed track alignment traverses considerable sections of open woodland. Trees in these areas are typically widely spaced and likely to be avoided by making micro adjustments to the alignment during track construction. Clearing of large trees is expected to be minimal during the construction of the access track.

Table 4-16 below provides a summary of the expected area of disturbance for each of the broad vegetation groups within the potential disturbance footprint for impact and working accommodation sites and the access track. It should be noted that 2.0 ha of vegetation clearing at each impact site has been assumed as the upper limit to vegetation clearing at these sites.

Table 4-16 Broad Vegetation Group - Approximate area of clearing

Site / Track	Broad Vegetation Group: estimated area of clearing (ha)				
	Hummock grassland	Open woodland	Sand dunes	Mulga tall shrubland	Total
Access Track	19.4	12	0.3	1.3	33
W1	2.0				2.0
W2	2.0				2.0
W3	2.0				2.0
T1	2.0				2.0
T2	2.0				2.0
T3	2.0				2.0
T4	2.0				2.0
T5	2.0				2.0
Total	34.9	11.6	0.3	1.3	49

4.8.2 Indirect impacts

Indirect impacts primarily relate to the construction of the tracks and are associated with potential "opening up" of the country and these include potential introduction of weeds and possible increase in native and feral predators such as dingoes, foxes and to a lesser extent, cats. Given the open nature of the landscape, the construction of the access track is unlikely to increase the ability of feral fauna to move through the DA.

4.8.3 Potential impacts to threatened species

Post-survey recommended sites and access track alignment was informed by both desktop assessments and field assessments consisting of aerial helicopter surveys and on ground field surveys. The recommended locations for the impact sites, working accommodation sites and access track were primarily situated in hummock grassland to avoid areas of woody vegetation communities such as marble gum woodland, mallee woodland and mulga woodland. Hummock grassland is preferred as it allows for the necessary clearing of vegetation and the top layer of soil. The clearing of land is required to provide safe working areas for Defence personnel, enabling monitoring of projectile impacts and to minimise the risk of bushfires resulting from projectile impacts. The recommended areas also aim to avoid impacts to other ecological or heritage values, such as, large trees, dunes and areas containing heritage values.

Potentially impacted species at working accommodation and impact sites include *Liopholis kintorei* (Tjakura or Great Desert Skink) and *Dasycercus blythi* (Brush-tail Mulgara). Vegetation clearing at working accommodation sites may result in destruction of burrows for these species, however the small areas of land disturbance means that while a small number of individuals may be impacted, risks to local and regional populations will be minimised. It should be noted that no burrows were observed during the field survey. Clearing of large trees, particularly trees with hollows will be avoided at all sites and access tracks minimising the risks of impact to hollow nesting species including Princess Parrot.

4.9 Mitigation measures

The locations of impact and working accommodation sites and the potential track alignments have been selected to minimise potential impacts to important habitat such as mature trees, particularly trees with hollows, and woodland areas more broadly. Potential track alignments have also been proposed that avoid

sand dunes wherever possible. Additional mitigation measures aimed at minimising impacts to threatened species have been proposed and these are included elsewhere in the Environmental Report prepared for the proposed action. Table 4-17 below lists impact and working accommodation sites and measures taken to minimise impacts during site selection.

Table 4-17. Site determination

Site name	Recommended site location reasoning/mitigation
T1 Impact Site (Tali Kuthu/Sand Hill 1)	Location adjusted following the field assessment to avoid impact to large trees.
T2 Impact Site (Tali Kutharra /Sand Hill 2	Location moved slightly following field assessment, to be located within centre of hummock grassland area.
T3 Impact Site (Tali Marnkurrpa/Sand Hill 3)	Location moved slightly following field assessment, to be located within centre of hummock grassland area.
T4 Impact Site (Tali Munu Kakarra/Sand Hill Long Way)	Location was informed by the helicopter and pedestrian survey.
T5 Impact Site (Tali Wiya/No More Sand Hill)	Location was chosen following the helicopter survey of the indicative access track and the on-ground field survey. The initial proposed location has since been moved approximately 20 m northwest to avoid the dunes to the southeast.
W1 Working accommodation site (Yilah/Close)	Location was informed by the helicopter and pedestrian survey.
W2 Working accommodation site (Warta Thungurni/Little Tree)	Location was chosen following the helicopter survey of the indicative access track and the on-ground field survey which identified heritage values within the northeast corner of the initial proposed location. The recommended location has consequently been moved 30 m west to avoid impact to the known heritage values.
W3 Working accommodation site (Warta Tjerwarl/Little Fire Wood for Starters)	Location chosen following the on-ground field survey.

5. Conclusions

Following the assessment of habitat values during the field survey and deeper examination of threatened species habitat requirements and occurrence records, it is considered that eleven fauna species listed under the EPBC Act or BC Act are potentially present or likely to be present within the disturbance footprint for the proposed action.

Potential impacts to all threatened species are mitigated by the comparatively small disturbance footprints at impact and working accommodation sites (anticipated no more than 2.0 ha disturbance at each site). In addition, disturbance at the sites will be short-term in nature. It is considered that this, together with other mitigation measures recommended in the Environmental Report will result in low residual risks to individuals and populations of threatened species.

6. References

DCCEEW (2023(a)) Department of Climate Change, Energy, Environment and Water. National Recovery Plan for the Great Desert Skink (*Liopholis kintorei*) 2023-2033

DCCEEW (2023)(b) Department of Climate Change, Energy, Environment and Water. National Recovery Plan for the Greater Bilby (*Macrotis lagotis*) 2022-2032

EPA (2016). *Technical Guidance - Flora and Vegetation Surveys* for Environmental Impact Assessment Environmental Protection Authority, Government of Western Australia.

Jacobs (2024a) Laverton Non-Defence Training Area: Rapid Constraints Assessment

Jacobs (2024b) Laverton Non-Defence Training Area: Detailed Site Assessment

Appendix A. Legislative and policy context

A.1 Commonwealth legislation

Legislation and description	Project
Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)	
The EPBC Act is the overriding legislation governing Defence activities, and Defence is required to comply with the EPBC Act to ensure protection of the environment and heritage. As the project is being conducted by a Commonwealth agency (Defence) the applicable sections of the EPBC Act include: ▪ Part 3, Division 1: Requirements relating to Matters of National Environmental Significance (MNES): - World Heritage properties - National Heritage places - Wetlands of International Importance - Listed threatened species and ecological communities - Migratory species (listed under international agreements) - Commonwealth Marine Areas - Great Barrier Reef Marine Park - Nuclear actions - A water resource, in relation to coal seam gas development and large coal mining ▪ Section 28: Requirement for approval of activities undertaken by Commonwealth agencies. Section 28 of the EPBC Act has a broader coverage of environmental and heritage matters relating to Defence activities, which may cover issues such as noise; pollution; visual amenity; economic impacts; and any heritage value (natural, Indigenous, and historic) that a place may have. If the action is likely to have a significant impact on MNES or is deemed to require approval under Section 28 by nature of a potential significant impact by a Commonwealth agency, a referral should be made to the Minister. The Minister would decide if the impacts are significant and whether an approval is required. The Minister's response to the referral would determine the level and nature of environmental assessment required for final approval by the Minister. Where an action is identified not to be a significant impact under the EPBC Act, but may kill, injure, take, trade, keep or move a member of a listed threatened species or ecological community, a member of a listed migratory species, or a member of a listed marine species in or on a Commonwealth area, a permit is required under the EPBC Act. Defence follows a self-assessment process, whereby the Defence Directorate of Environmental Planning, Assessment and Compliance (DEPAC) reviews the environmental risk and significant impact assessment against the EPBC Act (1999) and determines whether there is a significant impact on MNES and a whether a referral under the EPBC Act is required.	As the project would be undertaken by a Commonwealth Agency, it would be subject to assessment to determine if there are significant impacts to MNES and other environmental matters which are protected under the EPBC Act. If the project is assessed to be unlikely to have a significant impact, and a referral is not required, but would still result in a direct impact to threatened species, ecological communities, migratory species or whales and dolphins, then a General Permit Application under Part 13 would be required. Determination as to whether the project requires referral under the EPBC Act is made by DEPAC.

A.2 State legislation

Legislation	Description
Biodiversity Conservation Act 2016	Conservation and protection of State biodiversity components including native species, habitats, ecological communities, genes, ecosystems and ecological processes
Biosecurity and Agricultural Management Act 2007	Biosecurity management through the control of organisms which may have an adverse impact on the environment, human health or agriculture, including the spread or weeds or feral pests
Bush Fires Act 1954	Make better provision for diminishing the dangers resulting from bushfires and for the prevention, control and extinguishment of bushfires.
Environmental Protection Act 1986	Prevention and control of pollution and environmental harm, to conserve, preserve, protect, enhance, and manage the environment.
Environmental Protection (Clearing of Native Vegetation) Regulations 2004	Regulates the circumstances in which clearing of native vegetation may occur.
Environmental Protection (Clearing of Native Vegetation) Regulations 2004	Regulates the circumstances in which clearing of native vegetation may occur.
Environmental Protection (Noise) Regulations 1997	Noise standards at sensitive locations and regulation of the emission of noise.
Environmental Protection (Unauthorised Discharges) Regulations 2004	Prohibits the discharge of certain wastes such as heavy metals, highly acidic or alkaline solutions, dust, hydrocarbons, sediment, sewage, and visible smoke.
Rights in Water and Irrigation Act 1914	Regulates and manages access to, and the sustainable use of water resources; protection and management of river flows and drainage.
Land Administration Act 1997	Provides for the administration of land in WA including powers to acquire land in public interest, place positive and restricted covenants on land, constitute land districts and townsites, subdivide and develop Crown land, apply to the Registrar for the creation and registration of a certificate of Crown land title or lease.
Planning and Development Act 2005	Provides for a system of land use planning and development in the State.

Appendix B. Flora species recorded during field survey of the BPAC portion of the DA

Scientific Name	Common Name	Family	Site Number									
			T1	T2	T3	W1	W2	W3	T5	T4	Dune	Mulga	Opp.
Abutilon leucopetalum	Desert Lantern Bush	Malvaceae											
Acacia abrupta	Blunt-leaf Wattle	Fabaceae		x					x				
Acacia aneura	Broad-leaf Mulga	Fabaceae		*	*							x	
Acacia aptaneura	Slender Mulga	Fabaceae	*	x								x	
Acacia burkittii	Sandhill Wattle	Fabaceae											
Acacia colletioides	Wait-a-while	Fabaceae											
Acacia helmsiana	Helm's Wattle	Fabaceae											
Acacia kempeana	Witchetty Bush	Fabaceae			x								
Acacia ligulata	Sandhill Wattle	Fabaceae	x	x	*		x		x		x		
Acacia mulganeura	Milky Mulga	Fabaceae	x		x		x		x		x		
Acacia murrayana	Colony Wattle	Fabaceae	x										
Acacia melleodora	Waxy Wattle	Fabaceae											
Acacia pachyacra	Shiny-pod Wattle	Fabaceae				x			x				
Acacia pruinocarpa	Black Gidgee	Fabaceae	x		*	x	x		x				
Acacia tetragonophylla	Dead Finish	Fabaceae											
Aluta maisonneuvei	Desert Heath-myrtle	Myrtaceae	x	x	x						x	x	
Alyogyne pinoniana	Sand Hibiscus	Malvaceae	x	*	x						x		
Amphipogon sericeus	Grey-beard Grass	Poaceae	x		x	x		x	x	x			
Amyema gibberula	Mistletoe	Loranthaceae											
Amyema miquelii	Box Mistletoe	Loranthaceae											
Androcalva loxophylla	Rulingia	Malvaceae	x	x	x	x	x	x	x	x	x		
Anthobolus leptomerioides	Desert Broombush	Santalaceae											

Scientific Name	Common Name	Family	Site Number									
			T1	T2	T3	W1	W2	W3	T5	T4	Dune	Mulga	Opp.
Aristida contorta	Kerosene Grass	Poaceae										x	
Aristida holathera	Tall Kerosene Grass	Poaceae				*	x				x		
Baeckea sp	Waxflower	Myrtaceae							x				
Bonamia erecta	Convolvulaceae	Bonamia	x	*	x				x				
Brunonia australis	Blue Pincushion	Goodeniaceae					x						
Calotis hispidula	Bogan Flea	Asteraceae											
Calandrinia eremaea	Small Purslane	Portulacaceae					x						
Calytrix carinata	Keeled Fringe-myrtle	Myrtaceae											
Chrysocephalum apiculatum	Common Everlasting	Asteraceae											
Chrysocephalum eremaeum	Sandhill Everlasting	Asteraceae									x		
Codonocarpus cotinifolius	Desert Poplar	Gyrostemonaceae				x	x	x					
Crotalaria eremaea	Rattle-pod	Fabaceae									x		
Dampiera dentata	Dampiera	Goodeniaceae								x			
Dicrastylis exsuccosa	Rusty Sand Sage	Lamiaceae	x	x	x	x	x	x	x	x			
Digitaria brownii	Cotton Panic Grass	Poaceae					x						
Diplopeltis stuartii	Diplopeltis	Sapindaceae											
Dysphania kalpari	Rat's=tail Goosefoot	Chenopodiaceae		*		x	x	x				x	
Dodonaea viscosa ssp. *angustissima*	Narrow-leaf Hopbush	Sapindaceae									x		
Eragrostis eriopoda	Woollybutt	Poaceae				x	x	x	*	x		x	
Eremophila forrestii	Forrest's Emubush	Scrophulariaceae	x	x	x	x		x	x	x			
Eremophila gilesii	Giles Emubush	Scrophulariaceae											
Eremophila latrobei	Georgina Poison Bush	Scrophulariaceae			x			x	x			x	

Scientific Name	Common Name	Family	Site Number									
			T1	T2	T3	W1	W2	W3	T5	T4	Dune	Mulga	Opp.
Eremophila longifolia	Long-leaf Emubush	Scrophulariaceae		*	*				*				
Eremophila maculata	Fuschia Bush	Scrophulariaceae											
Eriachne helmsii	Buck Wanderrie	Poaceae	x		x	x		x	x		x		
Eriachne mucronata	Mountain Wanderrie	Poaceae											
Eucalyptus concinna	Victoria Desert Mallee	Myrtaceae											
Eucalyptus gongylocarpa	Marble Gum	Myrtaceae	x	*							x		
Eucalyptus youngiana	Ooldea Mallee	Myrtaceae	x	*	x	*		x			x		
Euphorbia australis	Caustic Weed	Euphorbiaceae									x		
Exocarpos sparteus	Weeping Cherry	Santalaceae	x	*	x				x				
Goodenia schwerinensis	Goodenia	Goodeniaceae		*		x		x	x		x		
Goodenia xanthosperma	Yellow-seed Goodenia	Goodeniaceae	x							x			
Goodenia sp	Goodenia	Goodeniaceae					x						
Grevillea eriostachya	Orange Grevillea	Proteaceae			*				x		x		
Grevillea juncifolia	Honeysuckle Spider Flower	Proteaceae	x	x	x			x	x	x			
Hakea lorea	Corkbark	Proteaceae				x			*				
Haloragis odontocarpa	-	Haloragaceae					x						
Indigofera georgii	George's Indigo	Fabaceae				*		x					
Kennedia prorepens	Purple-flowered Pea	Fabaceae	x							x			
Lasiopetalum sp.	-	Malvaceae				x							
Leptosema chambersii	Upside-down Plant	Fabaceae	x	x	x				x	x			
Lysiana murrayi	Mulga Mistletoe	Loranthaceae											
Maireana tomentosa	Hairy Bluebush	Chenopodiaceae											

Scientific Name	Common Name	Family	Site Number									
			T1	T2	T3	W1	W2	W3	T5	T4	Dune	Mulga	Opp.
Marsdenia australis	Bush Banana	Apocynaceae			*								
Micromyrtus flaviflora	Yellow Heath-myrtle	Myrtaceae	x	x	x				*				
Monachather paradoxus	Bandicoot Grass	Poaceae				*	x						
Prostanthera sericea	Silky Mintbush	Lamiaceae			x					x			
Ptilotus exaltatus	Lambs Tail	Amaranthaceae											
Ptilotus gaudichaudii	Paper Foxtail	Amaranthaceae											
Ptilotus obovatus	Silver Tails	Amaranthaceae			*								
Ptilotus polystachyus	Long Tails	Amaranthaceae	x				x	x				x	
Ptilotus sessilifolius	Crimson-tails	Amaranthaceae											
Rhodanthe charsleyae	Charles Daisy	Asteraceae											
Rhyncharrhena linearis	Bush Bean	Apocynaceae										x	
Santalum lanceolatum	Northern Sandalwood	Santalaceae											
Santalum spicatum	Sandalwood	Santalaceae											
Scaevola basedowii	Leafless Fanflower	Goodeniaceae		*	x	x		x	x	x	x		
Scaevola spinescens	Spiny Fanflower	Goodeniaceae			*								
Sclerolaena parviflora	Small-flower Bindyi	Chenopodiaceae											
Senna artemisioides	Desert Cassia	Fabaceae			*	x					x		
Senecio sp.	Groundsel	Asteraceae					x					x	
Senna pleurocarpa	Chocolate Bush	Fabaceae				x	x	x					
Sida sp	Sida ball fruit	Malvaceae				x	x						
Solanum centrale	Bush Tomato	Solanaceae	x	x	x	x	x	x	x	x		x	
Solanum lasiophyllum	Flannel Bush	Solanaceae											
Solanum orbiculatum	Wild Tomato	Solanaceae					x						

Scientific Name	Common Name	Family	Site Number									
			T1	T2	T3	W1	W2	W3	T5	T4	Dune	Mulga	Opp.
Stackhousia megaloptera	Dune Candles	Celastraceae							x				
Stylidium humphreysii	Sand Stylidium	Stylidiaceae	x	x	x	*							
Swainsona unifoliolata	Swainsona	Fabaceae						x					
Teucrium teucriiflorum	Bead Bush	Lamiaceae											
Themeda triandra	Kangaroo Grass	Poaceae											
Thyridolepis mitchelliana	Window Mulga-grass	Poaceae											
Trichodesma zeylanicum	Cattle Bush	Boraginaceae									x		
Triodia basedowii	Hard Spinifex	Poaceae	x	x	x	x	x		x	x	x	x	
Triodia schinzii	Feather-top Spinifex	Poaceae	x	x	x		x	x	x	x	x		

Appendix C. Vegetation Mapping

Appendix D. Site photos

D.1 T1 - Tali Kuthu

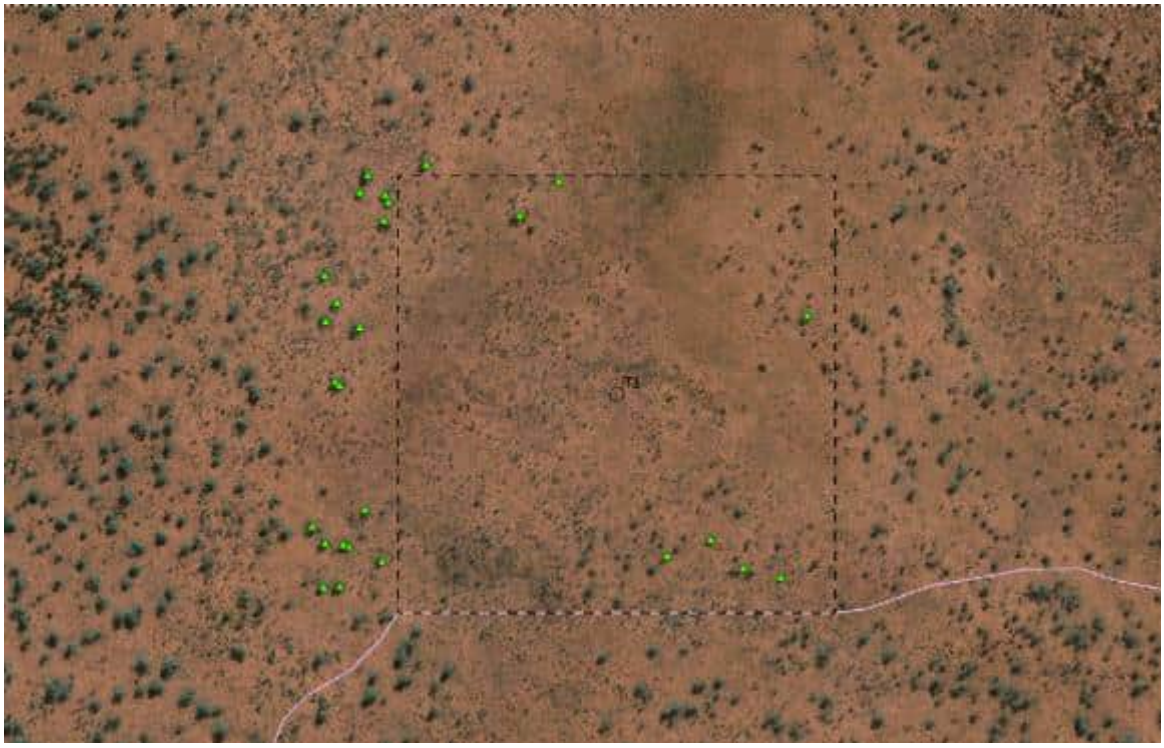


Plate D-1. Aerial imagery of T1 – Tali Kuthu. Green triangles show trees (>20cm DBH) mapped. Site located to avoid impact to Marble Gum woodland areas



Plate D-2. Left: typical Marble Gum within site. Right: typical larger tree located adjacent (but outside) site



Plate D-3. Photo from north-west corner of T1 – Tali Kuthu flora quadrat

D.2 T2 - Tali Kutharra



Plate D-4. Aerial image of T2 -Tali Kutharra. Green triangles show trees (>20cm DBH) mapped. Dark green patch indicates Mulga patch located to north-west. Sand ridge to the south also evident in imagery and Marble Gum woodland occurs to the north-east.



Plate D-5. Photo from north-west corner of T2 – Tali Kutharra flora quadrat

D.3 T3 - Tali Marnkurrpa

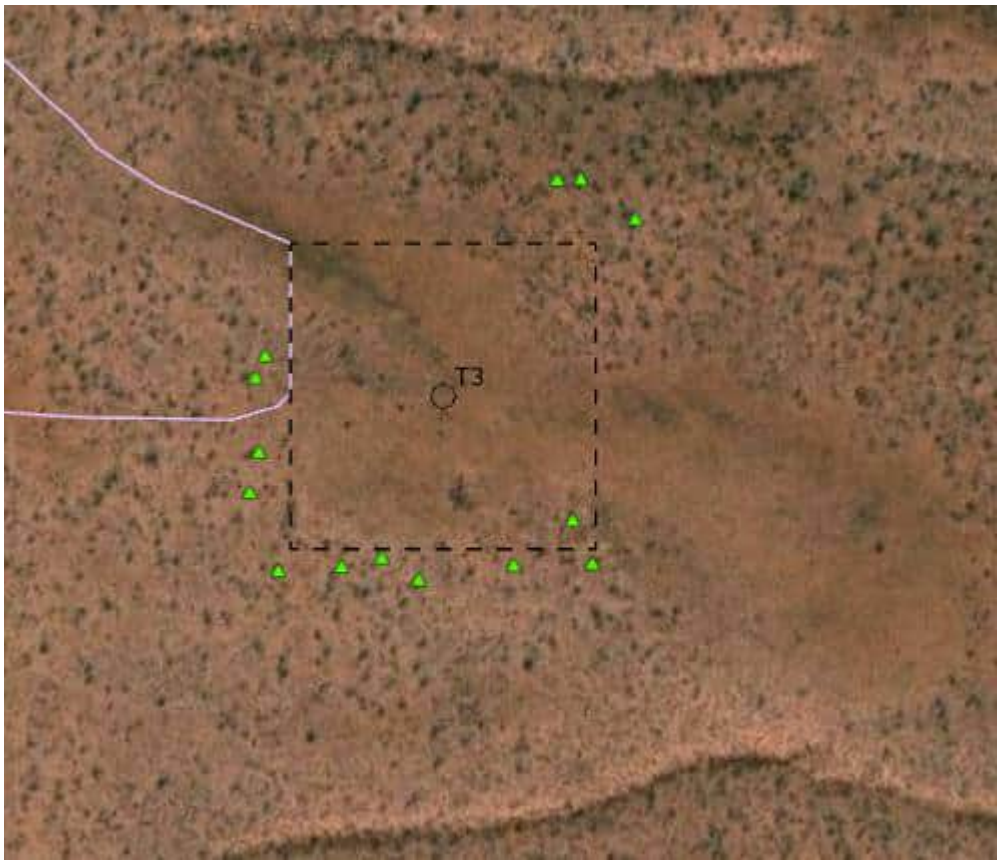


Plate D-6. Aerial imagery T3 – Tali Marnkurrpa. Green triangles show trees (>20cm DBH) mapped. Marble Gum woodland to the north-east and south-west and sand ridges to north and south evident.



Plate D-7. Tree located within south-east corner of 500 m x 500 m area



Plate D-8. Photo from north-west corner of T3 – Tali Marnkurrpa flora quadrat

D.4 T4 - Tali Munu Kakarra



Plate D-9. Aerial imagery T4 – Tali Munu Kakarra. Large area of similar vegetation (no trees nearby)



Plate D-10. Photo from north-west corner of T4 – Tali Munu Kakarra flora quadrat

D.5 T5 - Tali Wiya

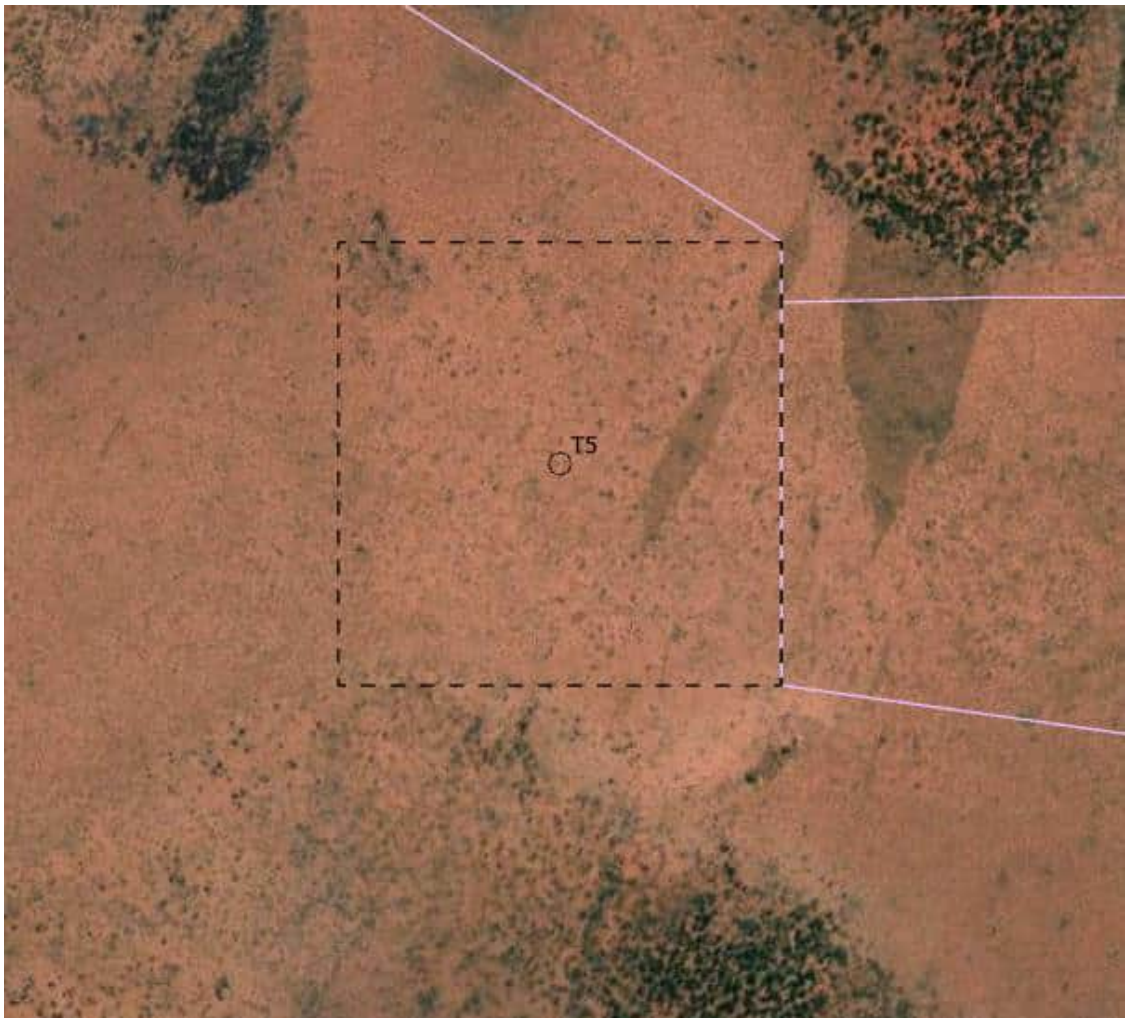


Plate D-11. Aerial imagery T5 – Tali Wiya. Mulga patches evident as dark green vegetation. Small dune to south.



Plate D-12. Photo from north-west corner of T5 – Tali Wiya flora quadrat

D.6 W1 - Yilah



Plate D-13. Aerial imagery W1 – Yilah. Mulga patches evident as dark green vegetation.



Plate D-14. Photo from north-west corner of W1 – Yilah flora quadrat

D.7 W2 – Warta Thungurni



Plate D-15. Aerial imagery W2 – Warta Thungurni. Mulga patches evident as dark green vegetation.



Plate D-16. Photo from north-west corner of W2 – Warta Thungurni flora quadrat

D.8 W3 – Warta Tjerwarl



Plate D-17. Aerial imagery W3 – Warta Tjerwarl. Mulga patches evident as dark green vegetation.



Plate D-18. Photo from north-west corner of W3 – Warta Tjerwarl flora quadrat

Appendix E. Field sheets

Project		Site	BPAC T1	Date	14/07/2024
Assessor	Rick Barratt Andy Stephens	Latitude	-27.441129	Longitude	124.684661
Type	Quad 100 x 100m	Quad shp	square		
Photo start		Photo end		NW photo	

Veg group: *Grevillea juncifolia* tall open shrubland with emergent *Eucalyptus youngiana / E. gonglyocarpa* over *Triodia basedowii/T schinzii* hummock grassland
Landform: Sandplain (swale)
Soils: Red sands
Disturbance/fire: Regrowth community estimated 5 to 10 years post fire
Vegetation Condition: Pristine

Slope	zero	Aspect	-	Litter	Discontinuous litter layer under trees and shrubs
Bare ground		Rocks	nil	Cryptograms:	nil

	Upper-storey	Mid-storey	Ground-storey
Growth form:	Low trees/mallee	Low shrubs	Hummock grass
Height (m):	4.0	1.5	0.4
Projective Foliage Cover (%):	2	8	25
Weed cover	zero	zero	zero
zero			

Taxa	Layer dominant (U, M,G)	Crown Separation Ratio (CSR)
Eucalyptus youngiana	U	1
Eucalyptus gonglyocarpa	U	1
Triodia schinzii	G	4
Leptosema chambersii		3
Eremophila forrestii		3
Androcalva loxophylla		4/5
Amphipogon sericeus		1
Grevillea juncifolia	M	4
Bonamia erecta	M	4
Waxflower		1
Alyogyne pinoniana		1
*Acacia aptaneura**		1
Acacia pruinocarpa		3
Acacia murrayana		1
Acacia mulganeura		3
Acacia ligulata		1
Stylidium humphreysii		3
Eriachne helmsii		1
Triodia basedowii	G	5
Aluta maisonneuvei		3
Exocarpus sparteus		3
Solanum centrale		1
Dicrastylis exsuccosa		1/3
Micromyrtus flaviflora		3/4
Goodenia xantosperma		1

Ptilotus polystachyus		1
Kennedia prorepens		1

Taxa	Layer dominant (U, M,G)	Projective foliage cover%
* = extra species in 500 x 500m		

Comments: Estimated 5 to 10 years post fire, no large trees within central 200 x 200m, larger marble gums including several with medium-sized hollows in outer portion of 500 x 500, Low total grazing pressure; scattered camel tracks/dung.

Centre: North	Centre: South
	
Centre: East	Centre: West

Taxa	Layer dominant (U, M,G)	Projective foliage cover%
* = extra species in 500 x 500m		

Comments: Estimated 10 years post fire, no large trees within central 250 x 250 m, larger marble gums, some with medium tree hollows in outer portion of 500 x 500, light browsing (TGP low) camel tracks/dung. Bustard tracks



Project		Site	35	Date	15/07/2024
Assessor	Andy Stephens	Latitude	-27.441521	Longitude	124.714464
Type	Quad 100 x 100m	Quad shp	square		
Photo start		Photo end		NW photo	

Veg group: *Triodia basedowii/T schinzii* hummock grassland with emergent *Grevillea juncifolia* and scattered low shrubs
Landform: Sandplain (swale)
Soils: Red sands
Disturbance/fire: Regrowth community estimated > 10 years post fire
Vegetation Condition: Pristine

Slope	zero	Aspect	-	Litter	Discontinuous litter layer under trees and shrubs
Bare ground	30%	Rocks	nil	Cryptograms:	nil

	Upper-storey	Mid-storey	Ground-storey
Growth form:	Low trees/mallee	Low shrubs	Hummock grass
Height (m):	3.5	1.5	0.5
Projective Foliage Cover (%):	1	3	40
Weed cover	zero	zero	zero
zero			

Taxa	Layer dominant (U, M,G)	Crown Separation Ratio (CSR)
*Eucalyptus gonglyocarpa**		1
*Eucalyptus youngiana**		1
Triodia schinzii	G	4/5
Leptosema chambersii		3
Eremophila forrestii	M	3
*Eremophila longifolia**		2
Androcalva loxophylla	G	3
Grevillea juncifolia	U	1
Acacia aptaneura	M	3
*Acacia aneura**		2
Acacia abrupta		1
Acacia ligulata		1
Stylidium humphreysii		1
Triodia basedowii	G	4/5
Aluta maisonneuvei		3
Solanum centrale		2
Dicrastylis exsuccosa		1
Micromyrtus flaviflora		3
*Aylogyne pinoniana**		1
Bonamia erecta		3
*Exocarpus sparteus**		3
*Scaevola basedowii**		1
*Goodenia concolorous**		3
*Disphania kalpari**		5

Taxa	Layer dominant (U, M,G)	Projective foliage cover%
* = extra species in 500 x 500m		

Comments: Estimated > 10 years post fire. light browsing (TGP low) camel tracks/dung.

Centre: North



Centre: East



Centre: South



Centre: West



Project		Site	37A	Date	14/07/2024
Assessor	Rick Barratt Andy Stephens	Latitude	-27.453323	Longitude	124.767733
Type	Quad 100 x 100m	Quad shp	square		
Photo start		Photo end		NW photo	

Veg group: *Grevillea juncifolia* tall open shrubland with emergent *Eucalyptus youngiana* over *Triodia basedowii/T schinzii* hummock grassland
Landform: Sandplain (swale)
Soils: Red sands
Disturbance/fire: Regrowth community estimated 5 to 10 years post fire
Vegetation Condition: Pristine

Slope	zero	Aspect	-	Litter	Discontinuous litter layer under trees and shrubs
Bare ground	30%	Rocks	nil	Cryptograms:	nil

	Upper-storey	Mid-storey	Ground-storey
Growth form:	Tall shrubs/mallee	shrubs	Hummock grass
Height (m):	3.0	2.0	0.4
Projective Foliage Cover (%):	2	5	25
Weed cover	zero	zero	zero
zero			

Taxa	Layer dominant (U, M,G)	Crown Separation Ratio (CSR)
Eucalyptus youngiana	U	1
Triodia schinzii	G	4
Leptosema chambersii		3
Eremophila forrestii	M	4
Eremophila latrobei		1
Androcalva loxophylla		4/5
Grevillea juncifolia	U	3/4
*Grevillea eriostachya**		1
*Acacia aneura**		1
Acacia pruinocarpa		1
Acacia mulganeura		2/3
*Acacia ligulata**		1
Acacia kempeana		1
Stylidium humphreysii		1
Triodia basedowii		5
Aluta maisonneuvei		3
Solanum centrale		2
Dicrastylis exsuccosa		3
Micromyrtus flaviflora		3
Aylogyne pinoniana		3
Bonamia erecta		1
Exocarpus sparteus		2
Scaevola basedowii		1
*Eremophila longifolia**		1

Eriachne helmsii		1
Prostanthera sericea		2
Amphipogon sericeus		1
*Ptilotus obavatus**		1
*Scaevola spinescens**		1
*Senna artemisioides ssp filafolia**		2
*Marsdenia australis**		1

Taxa	Layer dominant (U, M,G)	Projective foliage cover%
* = extra species in 500 x 500m		

Comments: Estimated 5 to 10 years post fire. light browsing (TGP low) camel tracks/dung, Brown Song-lark

Centre: North



Centre: East



Centre: South



Centre: West



Project		Site	BPAC T5	Date	16/07/2024
Assessor	Rick Barratt Andy Stephens	Latitude	-27.36074094	Longitude	124.7573214
Type	Quad 100 x 100m	Quad shp	square		
Photo start		Photo end		NW photo	

Veg group: *Eremophila forrestii* low open shrubland over *Triodia basedowii* hummock grassland
Landform: Sandplain (swale)
Soils: Red sands
Disturbance/fire: Regrowth community estimated 5 to 10 years post fire
Vegetation Condition: Pristine

Slope	zero	Aspect	-	Litter	Discontinuous litter layer under trees and shrubs
Bare ground	30%	Rocks	nil	Cryptograms:	nil

	Upper-storey	Mid-storey	Ground-storey
Growth form:	shrubs	Low shrubs	Hummock grass
Height (m):	1.0	0.5	0.3
Projective Foliage Cover (%):	8	8	25
Weed cover	zero	zero	zero
zero			

Taxa	Layer dominant (U, M,G)	Crown Separation Ratio (CSR)
Triodia schinzii	G	3
Eremophila forrestii	U	4
Leptosema chambersii		3/4
Dampiera dentata		1
Kennedia prorepens		3
Prostanthera sericea		1
Scaevola basedowii	M	4
Goodenia xanthosperma		1
Amphipogon sericeus	G	4
Androcalva loxophylla		3
Grevillea juncifolia		1
Triodia basedowii	G	5
Solanum centrale		2
Dicrastylis exsuccosa		3
Eragrostis eriopoda		1

Taxa	Layer dominant (U, M,G)	Projective foliage cover%
* = extra species in 500 x 500m		
Comments: Estimated 5 to 10 years post fire, no large trees within central 500 x 500, Low total grazing pressure; scattered camel tracks/dung. Mulgara tracks diggings, Cat tracks, Bustard tracks		
Centre: North	Centre: South	





Centre: East

Centre: West





Project		Site	BPAC T4	Date	16/07/2024
Assessor	Rick Barratt Andy Stephens	Latitude	-27.36066 E124.75740	Longitude	124.75740
Type	Quad 100 x 100m	Quad shp	square		
Photo start		Photo end		NW photo	

Veg group: *Acacia pachyachra* open shrubland over *Triodia schinzii* hummock grassland with and scattered low shrubs
Landform: Sandplain (swale)
Soils: Red sands
Disturbance/fire: Regrowth community estimated 5 to 10 years post fire
Vegetation Condition: Pristine

Slope	zero	Aspect	-	Litter	Discontinuous litter layer under trees and shrubs
Bare ground	30%	Rocks	nil	Cryptograms:	nil

	Upper-storey	Mid-storey	Ground-storey
Growth form:	shrubs	Low shrubs	Hummock grass
Height (m):	1.5	0.8	0.4
Projective Foliage Cover (%):	8	20	20
Weed cover	zero	zero	zero
zero			

Taxa	Layer dominant (U, M,G)	Crown Separation Ratio (CSR)
Triodia schinzii	G	4
Eremophila forrestii		4
Leptosema chambersii		4
Acacia ligulata		1/2
Bonamia erecta		3/4
Scaevola basedowii		3
Exocarpus sparteus		1/2
Acacia abrupta		3/4
Acacia mulganeura		1
Stackhousia megaloptera		3
Acacia pachyachra	U	4
Goodenia concolorous		1
Amphipogon sericeus		1/3
Androcalva loxophylla	M	4
Eremophila latrobei		1
Eriachne helmsii		1
Grevillea juncifolia		1
Acacia pruinocarpa		1
Baeckea sp		1
Grevillea eriostachya		2
Triodia basedowii		3
*Micromyrtus flaviflora**		1
*Hakea lorea**		1

*Eremophila longifolia**		1
Solanum centrale		1
Dicrastylis exsuccosa		4/5
*Eragrostis eriopoda**		

Taxa	Layer dominant (U, M,G)	Projective foliage cover%
* = extra species in 500 x 500m		

Comments: Estimated 5 to 10 years post fire, no large trees within central 500 x 500, Low total grazing pressure; scattered camel tracks/dung. Bustard tracks, Budgerigars

Centre: North



Centre: South



Centre: East



Centre: West



Project		Site	BPAC Working Site W1	Date	16/07/2024
Assessor	Rick Barratt Andy Stephens	Latitude	-27.17033736	Longitude	124.5572528
Type	Quad 100 x 100m	Quad shp	square		
Photo start		Photo end		NW photo	

Veg group: *Triodia basedowii* hummock grassland with emergent *Acacia pruinocarpa* and scattered low shrubs
Landform: Sandplain (swale)
Soils: Red sands
Disturbance/fire: Regrowth community estimated 3 to 5 years post fire
Vegetation Condition: Pristine

Slope	zero	Aspect	-	Litter	Discontinuous litter layer under trees and shrubs
Bare ground	30%	Rocks	nil	Cryptograms:	nil

	Upper-storey	Mid-storey	Ground-storey
Growth form:	shrubs	Low shrubs	Hummock grass
Height (m):	2.0	0.7	0.3
Projective Foliage Cover (%):	2	4	30
Weed cover	zero	zero	zero
zero			

Taxa	Layer dominant (U, M,G)	Crown Separation Ratio (CSR)
*Eucalyptus youngiana**		
Eremophila forrestii		2
Androcalva loxophylla		3
Acacia pachyachra		2
Acacia pruinocarpa	U	1/3
Stylidium humphreysii		3
Triodia basedowii	G	5
Solanum centrale		2
Dicrastylis exsuccosa	M	4
Scaevola basedowii		3
Goodenia concolorous		3
Eragrostis eriopoda		3/4
Amphipogon sericeus		4
Senna pleurocarpa		3
Senna artemisioides		1
Hakea lorea		1
Codonocarpus cotinifolius		1
Disphania kalpari		3
Lasiopetalum sp		2
Eriachne helmsii		1
Sida ball fruit		3
*Indigofera georgii**		1
*Aristida holathera**		1
Monachather paradoxus		1

Taxa	Layer dominant (U, M,G)	Projective foliage cover%
* = extra species in 500 x 500m		

Comments: Estimated 3 to 5 years, no large trees within central 500 x 500, Low total grazing pressure; scattered camel tracks/dung. Purple-back Fairy Wren, White-winged Fairy Wren, Black-faced Woodswallow, Masked Woodswallow, White-fronted Honeyeater, Pied Honeyeater, Crested Bellbird

Centre: North



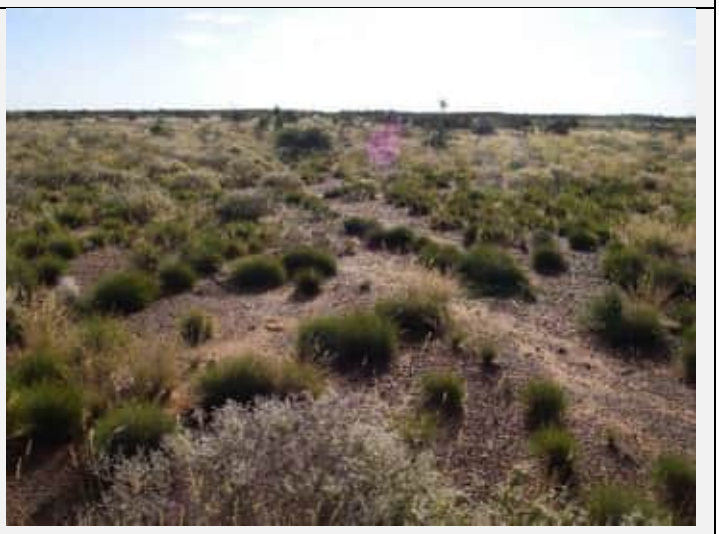
Centre: South



Centre: East



Centre: West



Project		Site	BPAC W2	Date	16/07/2024
Assessor	Rick Barratt Andy Stephens	Latitude	-27.1815403	Longitude	124.5654101
Type	Quad 100 x 100m	Quad shp	square		
Photo start		Photo end		NW photo	

Veg group: *Triodia basedowii* hummock grassland with emergent *Acacia pruinocarpa* and scattered low shrubs
Landform: Sandplain (swale)
Soils: Red sands
Disturbance/fire: Regrowth community estimated 5 to 10 post fire
Vegetation Condition: Pristine

Slope	zero	Aspect	-	Litter	Discontinuous litter layer under trees and shrubs
Bare ground	30%	Rocks	nil	Cryptograms:	nil

	Upper-storey	Mid-storey	Ground-storey
Growth form:	shrubs	Low shrubs	Hummock grass
Height (m):	2.5	0.8	0.3
Projective Foliage Cover (%):	2	3	20
Weed cover	zero	zero	zero
zero			

Taxa	Layer dominant (U, M,G)	Crown Separation Ratio (CSR)
Triodia schinzii	G	3
Androcalva loxophylla		3
Acacia ligulata		1
Acacia pruinocarpa	U	3
Triodia basedowii	G	5
Solanum centrale		2
Dicrastylis exsuccosa	M	3/4
Senna pleurocarpa		2
Disphania kalpari		3
Sida ball fruit		1
Aristida holathera		2
Eragrostis eriopoda		3
Monachather paradoxus		3
Senecio sp ?		3
Goodenia dissected		3
Calandrinia eremaea		2
Brunonia australis		1
Ptilotus polystachyus		3
Digitaria brownii		1
Solanum orbiculatum		1
Haloragus odontocarpa		3
Acacia mulganeura		2
Codonocarpus cotinifolius		1/3

Taxa	Layer dominant (U, M,G)	Projective foliage cover%
* = extra species in 500 x 500m		

Comments: Estimated 5 to 10 years, no large trees within central 500 x 500, Low total grazing pressure; scattered camel tracks/dung. White-winged Fairy Wren, White-fronted Honeyeater, Grey-fronted Honeyeater, Crested Bellbird

Centre: North



Centre: South



Centre: East



Centre: West



Project		Site	BPAC T3	Date	16/07/2024
Assessor	Rick Barratt Andy Stephens	Latitude	-27.208218	Longitude	124.595473
Type	Quad 100 x 100m	Quad shp	square		
Photo start		Photo end		NW photo	

Veg group: *Triodia schinzii* hummock grassland with emergent *Eucalyptus youngiana* and scattered low shrubs
Landform: Sandplain (swale)
Soils: Red sands
Disturbance/fire: Regrowth community estimated 10 to 15 years post fire
Vegetation Condition: Pristine

Slope	zero	Aspect	-	Litter	Discontinuous litter layer under trees and shrubs
Bare ground	30%	Rocks	nil	Cryptograms:	nil

	Upper-storey	Mid-storey	Ground-storey
Growth form:	mallee	Low shrubs	Hummock grass
Height (m):	3.0	0.7	0.4
Projective Foliage Cover (%):	2	3	25
Weed cover	zero	zero	zero
zero			

Taxa	Layer dominant (U, M,G)	Crown Separation Ratio (CSR)
Eucalyptus youngiana	U	1
Triodia schinzii	G	4/5
Eremophila forrestii	M	3
Scaevola basedowii		3/4
Goodenia concolorous		3
Amphipogon sericeus		3
Androcalva loxophylla	M	3/4
Eremophila latrobei		1
Eriachne helmsii		3
Grevillea juncifolia		3
Swainsona unifoliolata		1
Indogofera georgii		1
Solanum centrale		1
Dicrastylis exsuccosa		3/4
Senna pleurocarpa		1
Disphania kalpari		1
Eragrostis eriopoda		3
Ptilotus polystachyus		1
Codonocarpus cotinifolius		1

Taxa	Layer dominant (U, M,G)	Projective foliage cover%
* = extra species in 500 x 500m		

Comments: Estimated 10 to 15 years post fire, no large trees within central 500 x 500, Low total grazing pressure; scattered camel tracks/dung. White-winged Fairy Wren

Centre: North



Centre: South



Centre: East



Centre: West



Project		Site	Open Woodland	Date	14/07/2024
Assessor	Rick Barratt Andy Stephens	Latitude	-27.44250	Longitude	124.68219
Type	Quad 100 x 100m	Quad shp	square		
Photo start		Photo end		NW photo	

Veg group: *Eucalyptus gonglocarpa* open woodland over *Triodia basedowii* hummock grassland
Landform: Sandplain (swale)
Soils: Red sands
Disturbance/fire: Regrowth community estimated 5 to 10 years post fire
Vegetation Condition: Pristine

Slope	zero	Aspect	-	Litter	Discontinuous litter layer under trees and shrubs
Bare ground		Rocks	nil	Cryptograms:	nil

	Upper-storey	Mid-storey	Ground-storey
Growth form:	Low trees/mallee	Tall shrubs	Hummock grass
Height (m):	7.0	2.5	0.4
Projective Foliage Cover (%):	10	5	25
Weed cover	zero	zero	zero
zero			

Taxa	Layer dominant (U, M,G)	Crown Separation Ratio (CSR)
Eucalyptus youngiana		1
Eucalyptus gonglyocarpa	U	4
Triodia schinzii		2
Leptosema chambersii		3
Eremophila forrestii		3
Androcalva loxophylla		3
Amphipogon sericeus		1
Grevillea juncifolia	M	3
Bonamia erecta	M	4
Alyogyne pinoniana		1
*Acacia aptaneura**		1
Eriachne helmsii		1
Triodia basedowii	G	5
Aluta maisonneuvei		3

Comments: Estimated 15 years post fire Low total grazing pressure; scattered camel tracks/dung; Some large trees including trees with medium-sized (15cm) hollows.	
Centre: South	
	

Project		Site	Dune	Date	16/07/2024
Assessor	Rick Barratt Andy Stephens	Latitude	-27.447201°	Longitude	124.707690°
Type	Quad 150 x 50m	Quad shp	Rectangle along dune		
Photo start		Photo end		NW photo	

Veg group: *Eucalyptus youngiana* low open mallee with mixed tall shrubs over *Triodia schinzii/T. basedowii* hummock grassland
Landform: Sand Dune
Soils: Deep Red sands
Disturbance/fire: Regrowth community estimated 10 to15 years post fire
Vegetation Condition: Pristine

Slope	zero	Aspect	-	Litter	Discontinuous litter layer under trees and shrubs
Bare ground	30%	Rocks	nil	Cryptograms:	nil

	Upper-storey	Mid-storey	Ground-storey
Growth form:	mallee	shrubs	Hummock grass
Height (m):	3.0	1.5	0.4
Projective Foliage Cover (%):	3	10	20
Weed cover	zero	zero	zero
zero			

Taxa	Layer dominant (U, M,G)	Crown Separation Ratio (CSR)
Triodia schinzii	G	4/5
Eriachne helmsii		4
Aluta maisonneuvei	M	4
Eucalyptus youngiana	U	3/4
Aristida halathera		3/4
Trichodesma zeylanicum		3
Chrysocephalum eremaeum		3
Dodonaea viscosa ssp angustissima		1
Grevillea eriostachya		1
Crotalaria eremaea	M	1/3
Acacia mulganeura		1
Exocarpus sparteus		1
Eucalyptus gongylocarpa		1
Acacia ligulata		1
Senna artemisioides		1
Alogyne pinoniana		1
Scaevola basedowii		1

Taxa	Layer dominant (U, M,G)	Projective foliage cover%
* = extra species in 500 x 500m		

Comments: Estimated 10 to 15 years post fire, regrowth mallee and mid-size marble gum at base of dune, Low total grazing pressure; scattered camel tracks/dung. Mulgara tracks diggings, Cat tracks, Bustard tracks	
Centre: North	Centre: South
	
Centre: East	Centre: West
	

Project		Site	Mulga	Date	16/07/2024
Assessor	Rick Barratt Andy Stephens	Latitude	-27.443569	Longitude	124.711695
Type	Quad 100 x 100m	Quad shp	square		
Photo start		Photo end		NW photo	

Veg group: *Acacia aneura/ aptaneura* tall shrubland to low woodland over scattered shrubs and tussock grasses
Landform: Sandy plain
Soils: Red sands
Disturbance/fire: Regrowth community estimated 10 to15 years post fire
Vegetation Condition: Pristine

Slope	zero	Aspect	-	Litter	continuous litter layer under trees and shrubs
Bare ground	30%	Rocks	nil	Cryptograms:	nil

	Upper-storey	Mid-storey	Ground-storey
Growth form:	Tall shrubs	shrubs	Tussock / hummock grasses
Height (m):	2.5	1.2	0.3
Projective Foliage Cover (%):	40	1	2
Weed cover	zero	zero	zero
zero			

Taxa	Layer dominant (U, M,G)	Crown Separation Ratio (CSR)
Acacia aneura	U	5
Acacia apataneura	U	5/6
Eremophila latrobei	M	1/3
Triodia basedowii	G	3
Aluta maisonneuvei		1
Aristida contorta	G	3
Disphania kalpari		1
Solanum centrale		2
Senecio spp		1
Eragrostis eriopoda		1
Ptilotus polystachyus		1
Rhyncharrhena linearis		1

Taxa	Layer dominant (U, M,G)	Projective foliage cover%
* = extra species in 500 x 500m		
Comments: Estimated 10 to 15 years post fire, regrowth mallee and mid-size marble gum at base of dune, Low total grazing pressure; scattered camel tracks/dung. Mulgara tracks diggings, Cat tracks, Bustard tracks		
Centre: North	Centre: South	





Centre: East

Centre: West



