Environmental Report

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Laverton Non-Defence Training Area
25 March 2025

Environmental Report

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Acknowledgement of Country

Jacobs proudly acknowledges Aboriginal and Torres Strait Islander peoples as the Traditional Owners of the lands upon which each Jacobs office is located and those upon which we operate. We recognise that Traditional Owners have cared for and protected these lands for thousands of generations. Traditional Owners always have and always will have strong cultural, social and spiritual connections to the lands, skies, and waters. Jacobs respectfully recognises the Ancestors and Elders, past, present, and future. We acknowledge that sovereignty was never ceded and we are committed to working towards reconciliation.

Executive summary

The Department of Defence (Defence) requires land to support high priority activities in accordance with the recent Commonwealth 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 - Figure 1-1). This area must be temporarily declared a "Defence Area" (DA or the proposed action area) by the Minister for Defence during specified activity periods in order to provide Defence with exclusive use for safety purposes. During declared period(s) public access will be prohibited.

The disturbance to the DA (the proposed action area) will be contained within impact sites, working accommodation sites and access track as follows:

- 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. Sewage will be trucked off site.
- Impact sites represent the [redacted]. These sites will not contain any permanent infrastructure and must be located more than 10 km and potentially up to 30 km from the boundary of the proposed action area to allow for a safety perimeter to be established. It is currently expected that one impact site will be used, however additional sites may be established if a future requirement is identified. Primary and secondary sites have been identified as part of the preferred site option, with the remaining surveyed sites considered back-up (alternate) options.
- 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 [redacted]. This portion of the access may be able to be downgraded to be four-wheel drive (4WD) accessible only, however this remains uncertain and this ER assumes a worst-case scenario.

Due to the early planning stage of the proposed action, exact site requirements have not been confirmed. This Environmental Report (ER) assesses a number of sites in order to provide flexibility in both siting and number of sites used. Two disturbance scenarios for each Traditional Owner area are presented along with alternate options, should the preferred and secondary options become unsuitable. The maximum possible disturbance, should all site options be used, is also presented (Table ES-1).

Table ES-1. Disturbance scenarios

Development scenario	Maximum Disturbance (ha)	
	Nangaanya-Ku Lands	Ngaanyatjarra Lands
Preferred option	19.3	16.7
Preferred and secondary options	32.7	26.0
Alternate options	16.3	NA
Preferred, secondary and alternate options	49	26.0

In accordance with the impact assessment process detailed within the Defence Environment and Heritage Manual (Defence 2019), this ER has been prepared to assess the potential environmental impacts of the action against the requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The potential significance of these impacts and management measures to avoid or minimise environmental harm are also described. The ER has been prepared in accordance with the Department of Defence Directorate of Environmental Planning, Assessment and Compliance's (DEPAC) *Guidance on the Preparation of an Environmental Report* (Version 3, August 2020) and the *Draft Environmental Report Guidelines* (Version 4, August 2024), as directed by DEPAC.

The following studies were undertaken to support preparation of this ER:

- **Rapid Constraints Assessment**

  A high-level desktop assessment was undertaken to identify environmental and heritage values and potential constraints. The desktop assessment consisted of a database search and literature review which included a review of relevant databases (including the EPBC Act Protected Matters Search Tool) and previous studies within the locality to identify the environmental and heritage values present and determine those that present a constraint for siting of the required infrastructure.

- **Detailed Site Assessment**

  To identify site location options for working accommodation sites, impact sites and access tracks, a detailed site assessment was undertaken using Multi-Criteria Analysis (MCA). The MCA was conducted using a spatially enabled platform to automate the process and involved two main steps; criteria definition and ranking followed by multi-criteria analysis. Further inspection of aerial photography and available topography data was undertaken for the areas identified by the MCA to define flat areas of at least 500 m by 500 m where working accommodation and impact sites could be located. Preliminary access track alignments from the perimeter of the proposed action area to the working accommodation and impact sites were also identified.

- **Field Surveys**

  Heritage and ecological surveys of the sites were undertaken from 11 – 16 July 2024. For the heritage survey this involved systematic pedestrian survey of the proposed sites. The ecology survey was undertaken through a combination of helicopter survey and systematic assessment of 100 m by 100 m quadrats at the sites.

- **EPBC Act Protected Matters Search Tool (PMST)**

  An initial search of the PMST was undertaken as part of the Rapid Constraints Assessment. A new search using the PMST was conducted on 28/08/2024 to confirm the Matters of National Environmental Significance (MNES) and other matters protected under the EPBC Act potentially present within and adjacent to the disturbance footprint for the proposed action. The PMST search area is shown in Figure C-1 and a 10 km buffer. The results of the field investigations were used to refine the PMST results and identify those matters that may be impacted by the proposed action.

The information from these studies has been incorporated into the Environmental Risk Assessment (ERA) completed to identify aspects of the proposed action that have the potential to affect the environment. The ERA identified potential impacts to matter protected under the EPBC Act, inherent/initial risk ratings for these impacts, mitigation measures to avoid or minimise the impacts and the residual risk rating once mitigations are implements.

Significant impacts tests were then undertaken for those matters relevant to the proposed action. The assessment was completed using the criteria in the Department of Climate Change, Energy, the Environment and Water (DCCEEW) Significant Impact Guidelines 1.1 Matters of National Environmental Significance (MNES) (Significant Impact Guidelines 1.1) and Significant Impact Guidelines 1.2 Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies (Significant Impact Guidelines 1.2). The results of the significant impact tests are summarised in Table ES-2.

Table ES-2. Summary of significant impact tests

Protected Matter	Possibility of significant impact
MNES	
World Heritage Properties	No
National Heritage Places	No
Wetlands of International Importance (Ramsar wetlands)	No
Listed Threatened Ecological Communities (TEC)	No
Listed Threatened species	No
Listed Migratory species	No
Commonwealth Marine Area	Not relevant
Great Barrier Reef Marine Park	Not relevant
Nuclear actions	Not relevant
A water resource, in relation to coal seam gas development and large coal mining development.	Not relevant
Whole of Environment	
Landscape and soils	No
Coastal landscapes and processes	Not relevant
Ocean forms, ocean processes and ocean life	Not relevant
Water resources	No
Pollutants, chemicals, and toxic substances	No
Plant	No
Animals	No
People and communities	No
Heritage	No

No significant impacts as a result of the proposed action have been identified. Additionally, the need for an EPBC Act permit is unlikely to be triggered by the proposed action. While accidental impacts on individual members of species that may be protected under the EPBC Act are possible, such impacts are not predictable. Existing reporting protocols treat such impacts as incidents, and these would be reported to DCCEEW (via DEPAC) for investigation whenever appropriate.

An Environmental Clearance Certificate (ECC) will be required for the proposed action. It is recommended that a Construction Environmental Management Plan (CEMP) is developed for the proposed action. Mitigation of potential impacts during active operations will be managed through Defence procedures and [redacted] The CEMP, procedures and [redacted] will include the relevant mitigation measures proposed in the ER to manage the potential impacts.

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Acronyms and abbreviations

Acronym	Definition
4WD	Four-wheel drive
AHD	Australian Height Datum
ALA	Atlas of Living Australia
ASS	Acid Sulfate Soil
BC Act	Western Australian *Biodiversity Conservation Act 2016*
BGL	Below Ground Level
BPAC	Barra Parrapi Aboriginal Corporation
CALM Act	Western Australian *Conservation and Land Management Act 1984*
CDNTS	Central Desert Native Title Services Limited
CEMP	Construction Environmental Management Plan
CHL	Commonwealth Heritage List
CSR	Contaminated Site Record/Register
DA	Defence Area (as declared by the Minister for Defence)
DBCA	Department of Biodiversity Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety
DEPAC	Department of Defence Directorate of Environmental Planning, Assessment and Compliance
Disturbance footprint	The area to be cleared or otherwise disturbed by the proposed action
DPLH	Department of Planning, Lands and Heritage
DWER	Western Australian Department of Water and Environmental Regulation
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ER	Environmental Report
ERIK	Defence Estate Resources and Information Kiosk
[redacted]	[redacted]
GHG	Greenhouse gas
GHG	Greenhouse Gas
ha	hectares
IBRA	Interim Biogeographic Regionalisation for Australia
km	kilometres
km2	square kilometres
Laverton NDTA	Laverton Non-Defence Training Area (The proposed action)
m	metres
MCA	Multi-Criteria Analysis
MNES	Matters of National Environmental Significance
NC	Ngaanyatjarra Council

Acronym	Definition
NHL	National Heritage List
P1 - 5	Priority 1 - 5
PEC	Priority Ecological Community
PMST	Protected Matters Search Tool
PPMM	Pollution Prevention Management Plan
Proposed action area	Area within the boundary of the DA
RCA	Rapid Constraints Assessment
RIWI Act	Western Australian *Rights in Water Irrigation Act 1914*
SOP	Standard Operating Procedure
SRE	Short Range Endemic
SSO	State Solicitor's Office
TEC	Threatened Ecological Community
UAV	Unmanned Aerial Vehicles
UXO	Unexploded Ordnance
WA	Western Australia

1. The Proposed Action

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 - Figure 1-1). 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 [redacted] '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 [redacted] for each exercise with first use expected [redacted]. It is anticipated that the area will be used [redacted] between [redacted] and the end of 2028.

1.1 Description of the proposed action

The primary purpose of the DA is to allow Defence to undertake the required exercises [redacted]. The disturbance to the proposed action area will be contained within impact sites, working accommodation sites and access track as follows:

- 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 and water for potable and non-potable uses will be trucked to site. Sewage will be trucked off site.
- Impact sites [redacted] will not contain any permanent infrastructure and must be located more than 10 km and potentially up to 30 km from the boundary of the proposed action area to allow for a safety perimeter to be established. It is currently expected that one impact site will be used, however additional sites may be established if a future requirement is identified. Primary and secondary sites have been identified as part of the preferred site option, with the remaining surveyed sites considered back-up (alternate) options.
- 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 [redacted]. This portion of the access may be able to be downgraded to be four-wheel drive (4WD) accessible only, however this remains uncertain and this ER assumes a worst-case scenario.

Due to the early planning stage of the proposed action, a number of sites have been included in this ER. The sites are detailed in Table 1-1 and shown on Figure 1-2. 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.

This ER assesses all options, including all alternate options. Should all potential options be developed, the maximum disturbance footprint will be 49 ha in Nangaanya-Ku Lands or 26 ha in Ngaanyatjarra Lands within the 24,000 km^2 proposed action area. A final decision on the location of sites has not yet been made, though it is assumed that all working accommodation and impact sites for the current use case will be within the lands of a single Traditional Owner group and not across both.

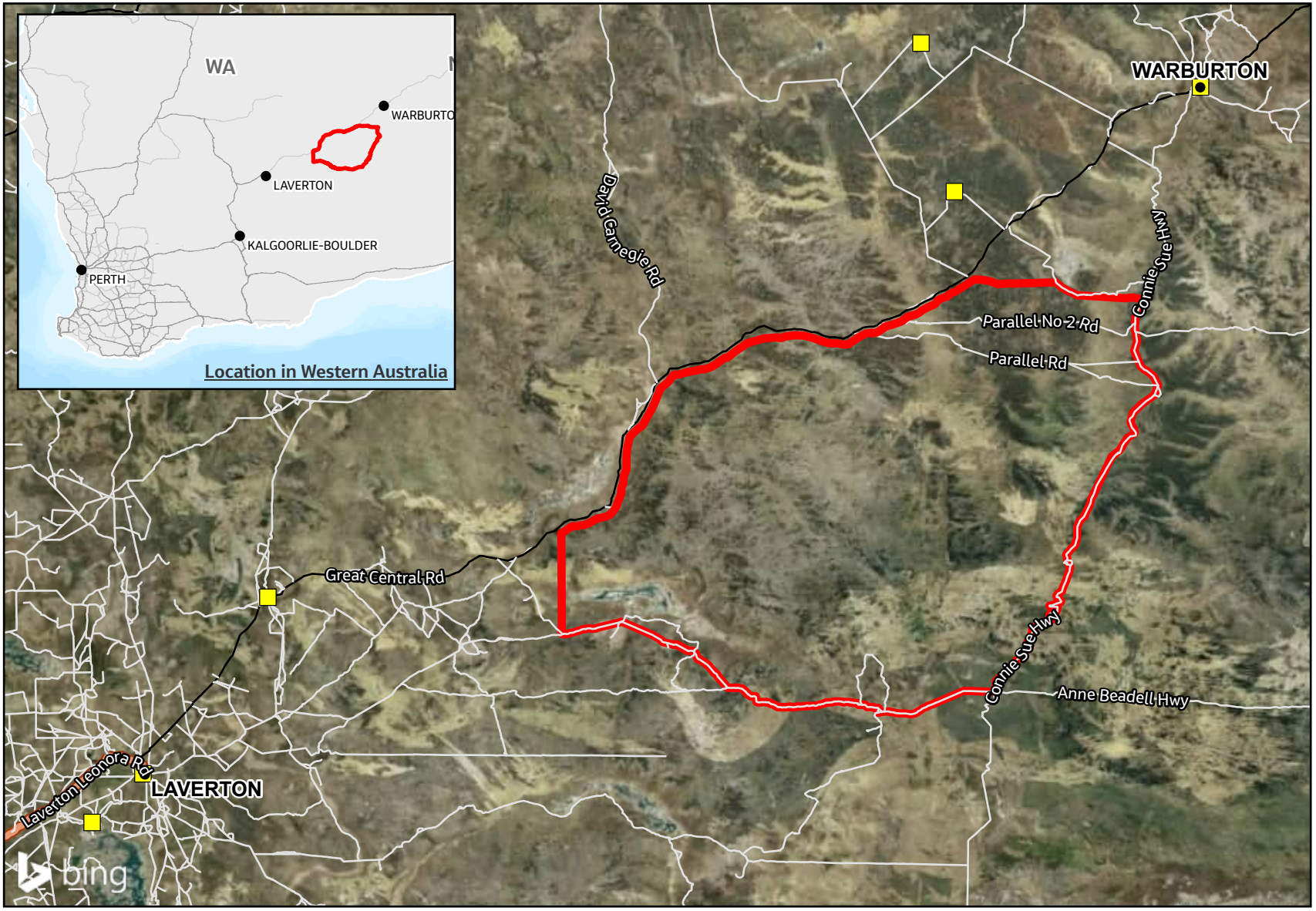
The works to be undertaken for the proposed action are detailed in Table 1-3. Figure 1-3 shows a general schematic of the site layout, noting that this is not to scale and the secondary impact site may not be required. While it is assumed that the sites and access track will be decommissioned and remediated once the DA is no longer required, there may be opportunity for some infrastructure to be handed over to the Traditional Owners for their ongoing use. Transfer of these assets and the responsibility for their upkeep will be subject to consultation and agreement with the relevant Traditional Owners.

Table 1-1. Description of site and access options - Nangaanya-Ku Lands

Site Type	Site ID	Option Type	Location
Working Accommodation	W1 – Working Accommodation Site 101 (Yilah (Close))	Secondary	-27.170,124.557
	W2 - Working Accommodation Site 102 (Warta Thungurni (Little Tree))	Secondary	-27.182,124.565
	W3 - Working Accommodation Site 103 (Warta Tjerwarl (Little Fire Wood for Starters))	**Preferred**	**-27.208,124.595**
Impact	T5 - Impact Site 104 (Tali Wiya (No More Sand Hill))	Alternate	-27.314,124.723
	T4 - Impact Site 105 (Tali Munu Kakarra (Sand Hill Long Way))	**Preferred**	**-27.361,124.757**
	T1 - Impact Site 33A (Tali Kuthu (Sand Hill 1))	Alternate	-27.441,124.686
	T2 - Impact Site 35A (Tali Kutharra (Sand Hill 2))	Alternate	-27.442,124.713
	T3 - Impact Site 37A (Tali Marnkurrpa (Sand Hill 3))	Secondary	-27.453,124.768
Access	N/A	**Preferred to T4** Alternate between T4 and T1/2/3	From intersection with Great Central Road at -27.164, 124.555 in a generally south-easterly direction. Great Central Road to T4: 33.8 km T4 to T3: 15 km T4 to T1: 15.5 km T4 to T2: 12.7 km T3 to T1: 9.7 km T3 to T2: 12.5 km

Table 1-2. Description of site and access options - Ngaanyatjarra Lands

Site Type	Site ID	Option Type	Location
Working Accommodation	**Working Accommodation Site 1**	**Preferred**	**-27.001, 125.581**
	Working Accommodation Site 3	Secondary	-27.047, 125.576
Impact	**Impact Site 9**	**Preferred**	**-27.220, 125.624**
	Impact Site 10	Secondary	-27.233, 125.654
Access	N/A	**Preferred to Impact Site 9** Secondary between Impact Sites 9 and 10	From intersection with Parallel No. 2 Road at -26.995, 125.580 in a generally southerly direction Parallel Rd No 2 to Impact Site 9: 29.6 km Impact site 9 to Impact site 10: 4.5 km



LEGEND

- Proposed Action Area
- Aboriginal Communities and Town Reserves
- Towns

Roads

- Principal Road
- Secondary Road
- Minor Road

0 40 80

Kilometres

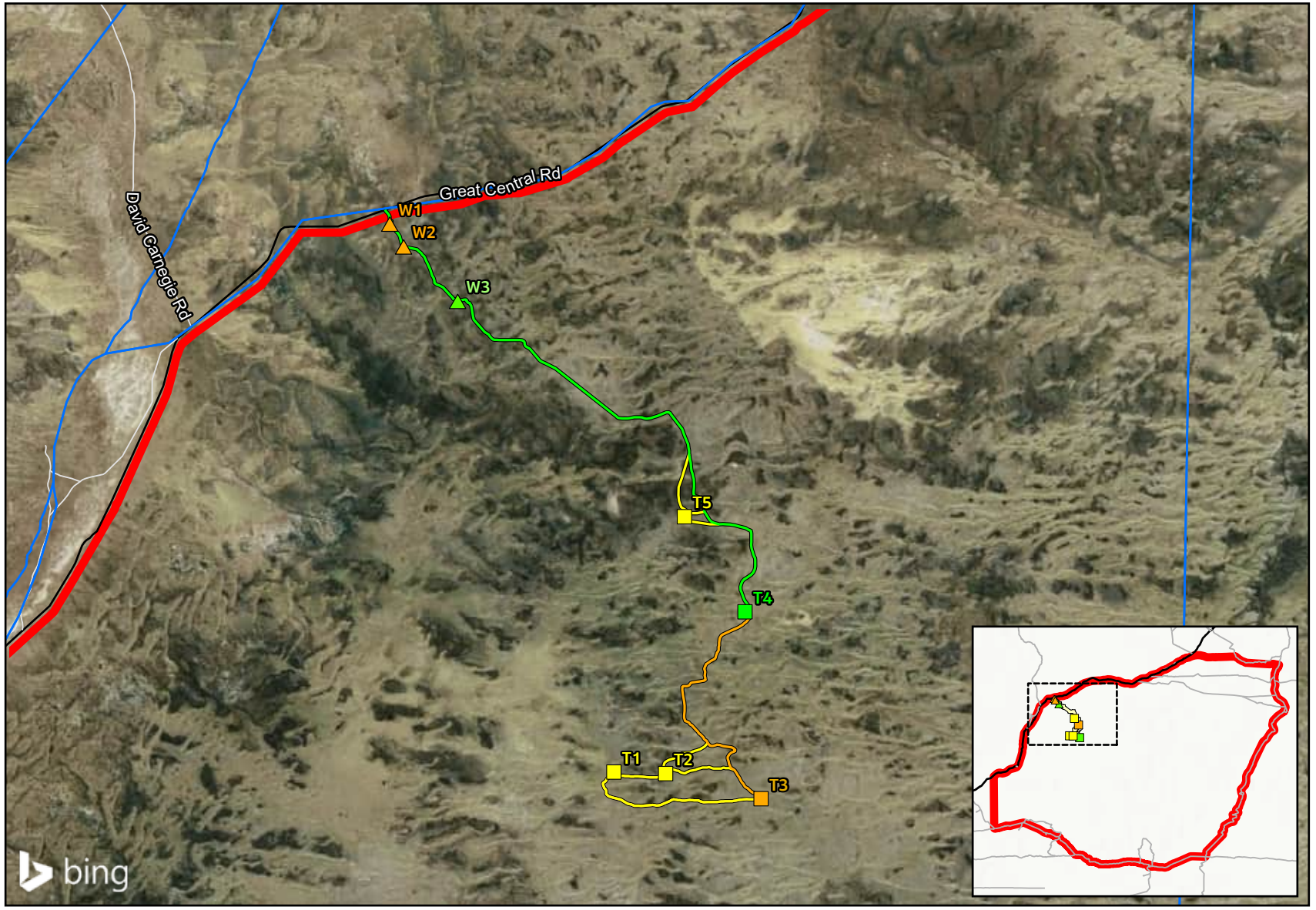
N

A4 1:2,300,000

GDA2020 MGA Zone 51

Figure 1-1: Location Map

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



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 1-2A. Site and access options - Nangaanya-Ku lands

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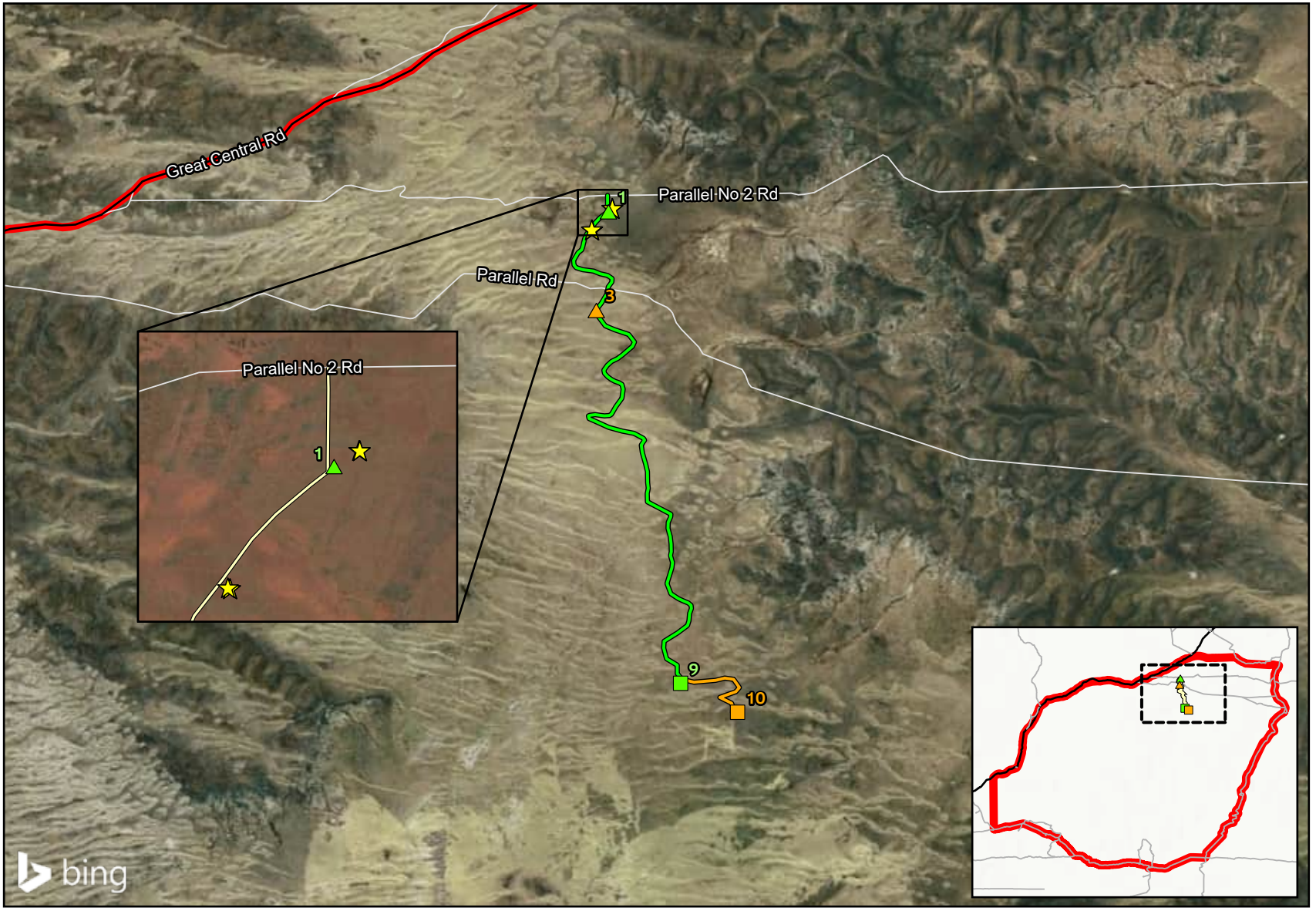

Figure 1 2B. Site and access options: Ngaanyatjarra lands

Data Sources: Geosciences Australia (2006). Imagery Sources: ESRI Online Imagery Services
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Table 1-3. Proposed action scope of works

Proposed action attribute	Works required
Working accommodation sites	▪ Clearing of vegetation and removal of topsoil at working accommodation sites (200 m by 100 m). ▪ Stockpiling of cleared vegetation and topsoil for use in decommissioning/revegetation. It is expected that cleared vegetation and topsoil will be windrowed along the edge of the site, rather than stored in a dedicated stockpile area. ▪ Leveling of the site, compaction of areas required for deployable buildings/infrastructure and may include gravel sheeting or other surfacing of the site. ▪ Once sites are no longer required, all equipment and infrastructure will be removed from site, gravel sheeting removed, compacted areas treated to remove compaction (such as through deep ripping), topsoil respread and stockpiled vegetation spread across the site to provide fauna habitat and seed source while vegetation establishes. *Note: subject to consultation and agreement with the Traditional Owners, some sites may be handed over for their ongoing use.*
Impact site	▪ Clearing of vegetation at impact sites to permit the placement of instrumentation, visual monitoring systems and minimise the risk of bushfires. ▪ 'Backburning' of vegetation using traditional indigenous methods is preferred. ▪ Minimum burn/cleared area of 100 m by 100 m with a maximum of two burn/cleared areas ▪ Recovery [redacted] and remediation [redacted]
Access track to working accommodation site/s	▪ Clearing of vegetation and removal of topsoil (8.0 m width). ▪ Stockpiling of cleared vegetation and topsoil for use in decommissioning and revegetation. It is expected that cleared vegetation and topsoil will be windrowed along the edge of the track, rather than stored in a dedicated stockpile area. This will facilitate easier respread during rehabilitation and return of topsoil and soil seed store to the same location from which it was removed. ▪ Compaction and forming of the road surface. ▪ Application of gravel 'pavement' layer. ▪ Maintenance as required to maintain accessibility to working accommodation sites. ▪ Once access is no longer required, all infrastructure (such as road blocks) will be removed, gravel sheeting removed, compacted areas treated to remove compaction (such as through deep ripping), topsoil respread and stockpiled vegetation spread across the site to provide fauna habitat and seed source while vegetation establishes. *Note: subject to consultation and agreement with the Traditional Owners, the access track may be handed over for their ongoing use.*
Access track from working accommodation site to impact site/s	▪ Clearing of vegetation and removal of topsoil (4 m width). ▪ Stockpiling of cleared vegetation and topsoil for use in decommissioning and revegetation. It is expected that cleared vegetation and topsoil will be windrowed along the edge of the track, rather than stored in a dedicated stockpile area. This will facilitate easier respread during rehabilitation and

Proposed action attribute	Works required
	return of topsoil and soil seed store to the same location from which it was removed. ▪ It is anticipated that this portion of the access track will be constructed to a level suitable for 4WD access, however if two-wheel drive access is required the following activities may be undertaken: - Compaction and forming of the road surface. - Application of gravel 'pavement' layer. - Maintenance as required to maintain accessibility. ▪ Once access is no longer required any compaction will be treated and stockpiled vegetation spread across the site to provide fauna habitat and seed source while vegetation establishes. *Note: subject to consultation and agreement with the Traditional Owners, the access track may be handed over for their ongoing use.*
Other	▪ An access control point (road block) will be established on the new access track, close to the perimeter of the proposed action area, to prevent non-activity participants from accessing the area via road during activities. ▪ [redacted] ▪ [redacted] involve the use of earthmoving machinery to excavate [redacted] the excavated hole will be filled to the extent feasible, and the surface shaped to blend in with the surrounds. It is not intended for additional fill material to be imported to site. ▪ Establishment of a high-risk exclusion zone using surveillance and monitoring equipment to keep non-Defence personnel out of area during activities. The perimeter of this zone will be at least 10 km from the boundary of the impact sites(s) determined through safety analysis of the planned activity. No clearing of vegetation or other intrusive works will be required.

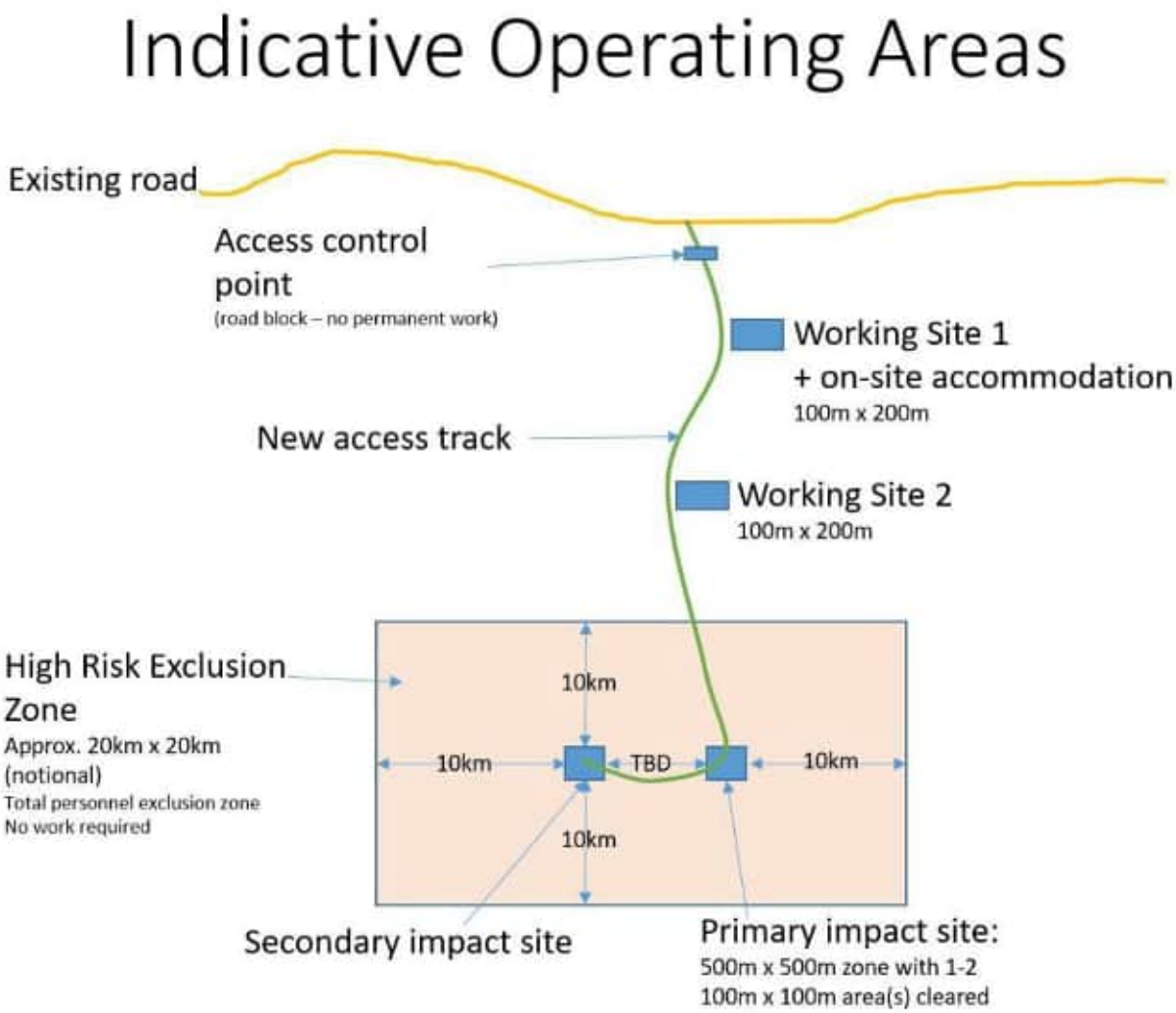


Figure 1-3. Indicative proposed action layout

1.2 Location of the proposed action

The proposed action area is located within the Great Victoria Desert region of Western Australia (WA), approximately 173 km northeast of Laverton. The proposed action area 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 (Figure 1-1). It encompasses an area of approximately 24,000 km^2. It should be noted that the boundary of the proposed action area does not extend onto or across the Great Central Road, meaning that this critical transport corridor will remain open when the DA declaration is in effect.

1.3 Size and extent of the proposed action

The total disturbance footprint will depend upon final Defence requirements for each specific exercise. Table 1-4 presents the expected disturbance footprint under the current use scenario while Table 1-5 presents the anticipated worst-case disturbance footprint should the preferred and secondary site options be required. Table 1-6 presents the disturbance footprint for the alternate sites, using the anticipated worst-case scenario for disturbance at the alternate impact sites. Design of the access track has not yet commenced and as such, disturbance requirements have been assumed based on the requirements of similar access tracks.

Should all potential sites and access routes be developed, a maximum disturbance footprint of 49 ha in Nangaanya-Ku Lands or 26 ha in Ngaanyatjarra Lands is anticipated. Should the use case change or should future Defence projects require additional sites to be developed, the findings in this ER will be reviewed and the Defence Directorate of Environmental Planning, Assessment and Compliance (DEPAC) consulted to determine if further assessment or approval is required.

Table 1-4. Disturbance footprint – preferred site option

Disturbance type	Description	Maximum Disturbance (ha)	
		Nangaanya-Ku	Ngaanyatjarra
Working accommodation	One site. Clearing footprint: 200 m by 100 m	2.0	2.0
Impact	One site. Site boundary: 500 m by 500 m Clearing footprint: 100 m by 100 m	1.0	1.0
Access track	To working accommodation. Clearing footprint: Nangaanya-Ku: 8 m by 6.8 km Ngaanyatjarra: 8 m by 600 m	5.5	0.5
	Working accommodation to impact site. Clearing footprint: Nangaanya-Ku: 4 m by 27 km Ngaanyatjarra: 4 m by 33 km	10.8	13.2
	Total	**19.3**	**16.7**

Table 1-5. Disturbance footprint – preferred and secondary sites options

Disturbance type	Description	Maximum Disturbance (ha)	
		Nangaanya-Ku	Ngaanyatjarra
Working accommodation	Clearing footprint per site: 200 m by 100 m Nangaanya-Ku: 3 sites. Ngaanyatjarra: 2 sites	6.0	4.0
Impact	Site boundary: 500 m by 500 m Clearing footprint per site: two areas of 100 m by 100 m (2 ha per site) Nangaanya-Ku: 2 sites. Ngaanyatjarra: 2 sites	4.0	4.0
Access track	To working accommodation. Clearing footprint: Nangaanya-Ku : 8 m by 6.8 km Ngaanyatjarra: 8 m by 8 km	5.5	6.4
	Working accommodation to impact site. Clearing footprint: Nangaanya-Ku : 4 m by 43 km Ngaanyatjarra: 4 m by 29 km	17.2	11.6
	Total	**32.7**	**26.0**

Table 1-6. Disturbance footprint – alternate options: Nangaanya-Ku Lands only

Disturbance type	Description	Maximum Disturbance (ha)
Impact	3 sites Site boundary: 500 m by 500 m Clearing footprint per site: two areas of 100 m by 100 m (2 ha per site)	6.0
Access track	To impact sites: T1 – Clearing footprint: 4 m by 12.6 km (5 ha) T2 – Clearing footprint: 4 m by 6.7 km (2.7 ha) T5 – Clearing footprint: 4 m by 6.6 km (2.6 ha)	10.3
	Total	**16.3**

1.4 Timeframe

Construction works, including clearing, grading and any civil works required for the access track, working accommodation sites and impact sites are expected to commence once all approvals and agreements are in place. The timing of this is yet to be confirmed but may commence during 2025. These works will prepare the sites for the infrastructure to be deployed at each location and create the access track.

Key dates for the operational phase of the proposed action are detailed below:

- First operational use of the site: [redacted]
- Typical timeframe for each exercise:
  - Site establishment: up to [redacted].
  - Active operations: up to [redacted]
  - Impact site cleanup/remediation: nominally up to [redacted]
  - Demobilisation: up to [redacted] (concurrent with site cleanup)
- End of DA requirement: end 2028
  Handover of access/sites to Traditional Owners (as negotiated) and remediation of areas no longer required

Construction works (clearing , grading and civils), site establishment (placement of deployable infrastructure) and demobilisation will occur during daylight hours. During each [redacted] exercise period, operations may be undertaken at any time of the day, depending on the requirements of the exercise.

Should other programs or capabilities in Defence require use of the proposed action area, the DA may be extended beyond the end of 2028. It should be noted that this ER does not apply to any future uses of the DA by other Defence capabilities or programs. Where other programs or capabilities in Defence require use of the DA, a further assessment should be undertaken to consider the environmental and heritage risks specific to that use case.

1.5 Alternatives to taking the proposed action

No alternatives to taking the action (other than the 'do nothing' option) have been identified. The location of the proposed action area was identified following an extensive review of the wider region. The proposed site is free of population centres, settlements and pastoral leases, and was assessed as being the most likely to satisfy public safety requirements for the intended activities.

Not proceeding with the proposed action (the 'do nothing' option) will result in the objectives of the proposed action not being achieved. This will result in the high priority activities identified in the recent Government Defence Strategic Review not receiving an appropriate level of support and may result in delays to the capability that will be supported by the proposed action.

1.6 A staged development or component of a larger action

The proposed action is not a staged development or a component of a larger action.

1.7 Relationship of the action to other developments or actions

The proposed action is not directly related to any other developments or actions.

2. Planning framework, legislation and policy requirements

2.1 Defence planning framework and policies

Defence follows a self-assessment process, whereby DEPAC reviews the environmental risk and potential for impact against the EPBC Act and determines whether there is a significant impact on MNES or other protected matters and a whether a referral under the EPBC Act is required.

The Defence Estate Resources and Information Kiosk (ERIK) provides an integrated approach to environmental management and a guide to the legislative requirements to Defence personnel. The key Defence environmental and heritage policies and guidelines and how they apply to Defence projects are detailed in Table 2-1.

Table 2-1. Defence policies and guidelines relevant to the proposed action

Planning document and description	Relevance to the proposed action
Defence Environmental Policy 2016	
The *Defence Environmental Policy* has a 20-year horizon and outlines Defence's vision and strategic aims as they relate to the environmental management of the estate and operations across Australia. This policy is supported by the *Defence Environmental Strategy 2016–2036* and the *Defence Environmental Plan*. The vision of the policy is: *Defence will be a leader in sustainable environmental management to support the ADF capability to defend Australia and its national interests.*	Defence projects are to consider the objectives of the policy through the design and delivery.
Defence Environmental Strategy 2016 – 2036	
Environmental protection and management of future development and maintenance of a base to support current and future capability is guided by the overarching Defence Environment Strategy 2016 -2036 which recognises the First Principles Review and *2016 Defence White Paper*. The strategy aims are to: ▪ Strategic aim 1: Defence will deliver a sustainable estate across Defence maritime, land and aerospace areas, activities and operations ▪ Strategic aim 2: Defence will understand and manage its environmental impacts ▪ Strategic aim 3: Defence will minimise future pollution risks and manage existing contamination risks ▪ Strategic aim 4: Defence will improve the efficiency of its resource consumption and strengthen resource security ▪ Strategic aim 5: Defence will recognise and manage the Defence estate heritage values	The strategic aims of the strategy should be incorporated into the proposed action's delivery, including the avoidance and minimisation of environmental harm.
Defence Environmental Plan	
Provides a framework for implementation, communication, monitoring and reporting centred around actions and guided by principles. The plan stems from the Defence Environmental Strategy and has a five-year horizon.	The principals outlined in the plan are required to be applied to Defence projects.

Planning document and description	Relevance to the proposed action
Defence Smart Infrastructure Handbook	
The aim of the Smart Infrastructure Handbook (the Handbook) outlines Defence's approach to achieving ecological sustainable development (ESD) during the planning and development of infrastructure. It aims to continuously improve the efficiency, effectiveness and sustainability of the Defence estate through the application of ESD and whole of life (WOL) principals across the estate Lifecyle. The Handbook sets Defence's minimum standards for ESD, outlines roles and responsibilities and provides guidance on how to consider WOL outcomes.	The principals outlined in the handbook are required to be applied to Defence projects. For this proposed action, this will include consideration of energy and water use for working accommodation and disposal or recycling of wastes
Defence Environment and Heritage Manual	
The Environment and Heritage manual describes the agreed approach to enabling Defence capability through long-term sustainable management of the environment. The purpose of the manual is to provide instruction and policy guidance on Defence's legislative obligations and stewardship goals in line with the Defence Environmental Policy. Although the manual is designed to apply to all Defence personnel, the relevant information extends to contractors and consultants. The manual steps out Defence legislative and policy requirements for the following areas: ▪ Environment and heritage management in Defence ▪ Environmental assessment and approval ▪ Heritage management ▪ Domestic biosecurity ▪ Native species and communities ▪ Soil management ▪ Bushfire management ▪ Pollution prevention ▪ Site contamination management ▪ Estate water management ▪ Estate energy management ▪ Waste minimisation and management ▪ Estate climate adaptation	The requirements outlined under each environmental discipline have been considered in the development of this ER.
Guidance on the Preparation of an Environmental Report (V3) (August 2020)	
The guideline outlines the requirements for preparing an Environmental Report (ER) for the Department of Defence. It is intended as guidance for consultants and contractors in ER preparation and for proponents to understand the key requirements of an ER. The guidelines outlines what information is required to be provided to DEPAC so that they can undertake the self-assessment process and determine the requirement for a referral. This guidance is being updated and the V4 guideline is expected to be released in 2024.	This ER has been prepared in accordance with the Guidance as well as the Draft Environmental Report Guideline (V4).

Planning document and description	Relevance to the proposed action
Bushfire	
The follow Defence guidelines are specific to the management of bushfire risk: ▪ Manual of Fire Protection and Engineering (MPFE) ▪ National Guidelines for Bushfire Management and Mitigation on the Defence Estate, 2013	The proposed action area is considered Bushfire Prone. A bushfire risk assessment for the proposed action should be undertaken and any requirements of the MPFE and Defence Guidelines relevant to deployable buildings should be incorporated into proposed action planning and deployment.
Heritage	
The follow Defence guidelines are specific to the management of heritage: ▪ Defence Heritage Strategy (August 2017) ▪ Defence Heritage Management Manual (2022)	Heritage surveys have been undertaken. The heritage values will be identified and documented as part of the ER and potential impacts to Aboriginal cultural heritage assessed. Construction and operation of the proposed action will include environmental management measures that incorporate the requirements of the Chance Finds Protocols of the Heritage Management Manual
Contamination, pollution prevention [redacted]	
The follow Defence guidelines are specific to the identification and management of contamination for the proposed action: ▪ Defence Contamination Management Manual (DCMM - 2021) and annexes: - Annex B – Technical Guidance on Investigation and Assessment Types - Annex C – Stockpiles & Reuse of Excavated Material - Annex M - Manual for the Management and Remediation of Petroleum Hydrocarbon Contaminated Soils and Sediments - Annex N - Guidelines for Consideration of Sustainability in Remediation of Contaminated Sites	There are no known contaminated sites or contamination issues within the proposed action area. The proposed action includes activities that may result in minor contamination, such as refuelling operations.
▪ Defence Pollution Prevention Management Manual (PPMM)	The proposed action includes potentially polluting activities such as hydrocarbon storage and management, chemical storage and waste disposal. The proposed action will be managed in accordance with the requirements of the PPMM
▪ [redacted]	[redacted]

2.2 Commonwealth legislation and EPBC Act policies

The Commonwealth Government has a number of legislative responsibilities with respect to the environment. The proposed action will be required to comply with relevant Commonwealth legislation as well as Defence standards and policies. Defence recognises that effective environmental management is an important part of successfully undertaking Defence activities and ensuring the long-term sustainability of capability and the Defence estate (Defence 2016).

2.2.1 EPBC Act

The EPBC Act is the overriding environment and heritage legislation governing Defence activities, and Defence is required to comply with the EPBC Act to ensure protection of the environment and heritage. As the proposed action 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.

The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) maintains a range of policy and guidance documents relevant to the EPBC Act. Those documents that are applicable to the proposed action are detailed in Table 2-2.

Table 2-2. Relevant EPBC Act policy and guidance documents

Commonwealth obligation	Relevance to the proposed action
Significant Impact Guidelines	▪ Significant Impact Guidelines 1.1 - Matters of national environmental significance ▪ Significant Impact Guidelines 1.2 - Actions on, or impacting upon, Commonwealth land and actions by Commonwealth agencies
Conservation Advice	▪ Conservation Advice for the Grey Falcon (*Falco hypoleucos*) (TSSC, 2020) ▪ Conservation for the Princess Parrot (*Polytelis alexandrae*) (TSSC, 2018) ▪ Conservation Advice for the Southern Whiteface (*Aphelocephala leucopsis*) (DCCEEW, 2023c) ▪ Conservation Advice for the Sandhill Dunnart (*Sminthopsis psammophila*) (TSSC, 2015) ▪ Conservation Advice for the Great Desert Skink (*Liopholis kintorei*) (TSSC, 2016c)
Threat Abatement Plans	▪ Threat abatement plan for predation by feral cats (DoE, 2015a) ▪ Threat abatement plan for competition and land degradation by rabbits (DoEE, 2016) ▪ Threat abatement plan for predation by the European red fox (DEWHA, 2008a) ▪ Threat abatement plan for competition and land degradation by unmanaged goats (DEWHA, 2008b)
Recovery Plans	▪ National Recovery Plan for Malleefowl (Benshemesh, 2007) ▪ National Recovery Plan for the Great Desert Skink (*Liopholis kintorei*) (DCCEEW, 2023b)
Survey Guidelines	▪ Survey guidelines for Australia's threatened birds ▪ Survey guidelines for Australia's threatened mammals ▪ Survey guidelines for Australia's threatened reptiles
Wildlife Conservation Plans	There are two wildlife conservation plans prepared under the EPBC Act: ▪ Wildlife Conservation Plan for Migratory Shorebirds (DoE, 2015b) ▪ Wildlife Conservation Plan for Seabirds (CoA, 2020) Neither of these are relevant to the species potentially occurring within the disturbance footprint for the proposed action.

2.2.2 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

Under the Aboriginal and Torres Strait Islander Heritage Protection Act Aboriginal cultural property that is significant to Aboriginal people is protected. Cultural property includes any places, objects and folklore that 'are of particular significance to Aboriginals in accordance with Aboriginal tradition'. This includes intangible cultural heritage values; these sites may not necessarily have an archaeological component.

Declarations to protect an area, object or class of objects from a threat of injury or desecration can be made by the Environment Minister, on the application of an Aboriginal person or group of persons.

As defined under Section 3(2), an area or object shall be taken to be injured or desecrated if:

a. in the case of an area:
    i. it is used or treated in a manner inconsistent with Aboriginal tradition;
    ii. by reason of anything done in, on or near the area, the use or significance of the area in accordance with Aboriginal tradition is adversely affected; or
    iii. passage through or over, or entry upon, the area by any person occurs in a manner inconsistent with Aboriginal tradition; or
b. in the case of an object – it is used or treated in a manner inconsistent with Aboriginal tradition; and references in the Act to injury or desecration shall be construed accordingly.

2.2.3 Native Title Act 1993

The *Native Title Act 1993* provides for the recognition and protection of native title and establishes a mechanism for determining claims to native title. The objectives of the *Native Title Act 1993* are to:

- Provide for the recognition and protection of native title;
- Establish ways in which future dealings affecting native title may proceed and to set standards for those dealings;
- Establish a mechanism for determining claims to native title; and
- Provide for, or permit, the validation of past acts, and intermediate period acts, invalidated because of the existence of native title.

Under Part 2 Division 3, voluntary Indigenous Land Use Agreements (ILUAs) can be made between a native title group/s and others about the use of land and waters. These agreements allow people to negotiate flexible, pragmatic agreements to suit their circumstances. Defence will negotiate ILUAs with both Native Title holders within the proposed action area prior to commencing any works.

2.2.4 National Environment Protection Council Act 1994 and National Environmental Protection Measures

This Act defines the National Environmental Protection Measures (NEPMs) through the establishment of a National Environmental Protection Council (NEPC). As defined in Part 1 (3) the object of the Act is to ensure that:

- People enjoy the benefit of equivalent protection from air, water or soil pollution and from noise, wherever they live in Australia; and
- Decisions of the business community are not distorted, and markets are not fragmented, by variations between participating jurisdictions in relation to the adoption or implementation of major environmental protection measures.

The NEPMs that may be relevant to the proposed action are:

- Assessment of Site Contamination; and
- Movement of Controlled Waste.

2.3 State legislation

As there are no plans to acquire the land for the DA (the proposed action area), the area will remain State Crown land. In this instance, State legislation and regulations will apply to the proposed action. The key State requirements include:

- *Land Administration Act 1997*: A licence under Section 91 of the Act will be required to permit Defence to access the proposed action area and declare the DA.
- *Aboriginal Heritage Act 1972*: Disturbance of, damage to, or otherwise interfering with a Registered Aboriginal cultural heritage site is prohibited under the Act unless approval is granted under Section 18.
- *Environmental Protection Act 1986*: Clearing of native vegetation for the proposed action requires approval under Part V of the 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. It is unlikely that the proposed action would be considered a significant Proposal under the EP Act.
- *Biodiversity Conservation Act 2016*: Appropriate licences under the Act were obtained to allow for the collection of flora during the field surveys. The Act also provides for the listing of Threatened flora, fauna and communities in WA.

3. Methodology

3.1 Overview

The purpose of this ER is to provide a description of the environmental, heritage and social values within and adjacent the proposed action area that may be affected by the proposed action. The proposed action has been assessed in accordance with the following policies and guidelines:

- Matters of National Environmental Significance: significant impact guidelines 1.1 (Guideline 1.1) (DEWHA, 2013)
- Actions on, or impacting upon, Commonwealth land and actions by Commonwealth agencies: significant impact guidelines 1.2 (Guideline 1.2) (DSEWPAC, 2013)
- Guidance on the Preparation of an Environmental Report (Version No.3) (DEPAC, 2020).
- Draft Environmental Report Guidelines (Version 4, August 2024) (DEPAC, 2024)

A combination of desktop review and site investigations have been used to assess the potential environmental and heritage impacts associated with the proposed action. A summary of the sources of information used and investigations carried out at each site are provided in the body of this ER. An overview of the general approach is provided below.

3.2 Project team

The team involved in the development of this ER is detailed in Table 3-1.

Table 3-1. Project team

Name	Role	Experience
Lisa Boulden	Environment Lead	Lisa is a Principal Environmental Consultant and Impact Assessment Technical Leader with Jacobs. She has over 19 years' experience in environmental impact assessment and management with much of this experience in Western Australia. She has worked across a range on industry sectors including transport, energy generation and transmission, resources, and water. Lisa has undertaken environmental assessments for several Defence projects including projects located at HMAS Stirling, Bindoon Training Area, Edinburgh Defence Precinct, RAAF Base Darwin, Defence Establishment Berrimah, RAAF Base Williamtown and Gallipoli Barracks. ***BSc (Conservation Biology) PostGrad Dip (Env Mgmt)***
Hannah Nichol	EIA support	Hannah is an Environmental Consultant at Jacobs. She has over 4 years' experience in environmental impact assessment and management in Western Australia. Hannah's experience includes technical authorship of primary and secondary environmental approvals documents across a range of industry sectors including transport, energy generation and transmission, resources, and water. ***BSc (Environmental Science and Marine Science) MSc (Environmental Science)***

Name	Role	Experience
Alexandra Seifertova	Heritage specialist	Alexandra is a Senior Archaeologist with over six years' experience in heritage management, including involvement in Aboriginal and historical heritage projects in NSW, VIC, ACT, NT, and WA. This experience has provided Alex with extensive and varied experience in Aboriginal community consultation, technical report writing, survey, and test excavation, and a thorough understanding of legislative requirements across Australia. ***BA Hons (Archaeology) MA (Archaeological and Evolutionary Science)***
Ben Watson	Heritage specialist	Ben is a Senior Associate Archaeologist and Technical Leader for cultural heritage at Jacobs and has worked as an archaeologist and heritage consultant for 18 years. He brings extensive experience in planning and implementation of desktop research and fieldwork, Traditional Owner consultation, recording and assessment of archaeological sites, development of effective strategies for heritage site management, and preparation and review of high-quality technical reports. ***BA Hons (Archaeology), PhD (Archaeology)***
Rick Barratt	Ecologist	Rick has extensive experience and expertise in environmental assessment gained through over 20 years as a scientific officer with the South Australian Government and more than 17 years as an environmental consultant. As an Associate Ecologist he brings a broad range of skills in biodiversity assessment and has extensive knowledge of both flora and fauna with a focus on Australia's arid lands. Rick has coordinated environmental approvals for a range of mining and infrastructure projects and as field lead, has led multi-disciplinary teams undertaking activities including flora and fauna surveys (baseline and threatened species/communities), condition assessments and weed and pest surveys. Rick has worked on several Defence projects including Yampi Sound, WA, RAAF Base Tindal (NT) and Woomera Base (SA). ***Diploma of Applied Science in Natural Resource Management***
Andrew Stephens	Ecologist	Andrew is Technical Director for Ecology ANZ at Jacobs. He has twenty years' experience in ecological survey (flora and fauna survey, vegetation quality assessments), impact assessment and ecological management. He has worked across a range of sectors and geographies across Australia. While he has primarily focussed on vegetation and botany he is also experienced in zoology. ***BSc (Conservation Biology and Ecology), MSc (Fire Ecology)***

Name	Role	Experience
Sophia Pellicioli	Geospatial specialist	Sophia is a Geospatial Consultant at Jacobs with more than five years of experience in multi-disciplinary environments from the public and private sector. She provided applications to market sectors including mining, environment, higher education, and project management. Sophia has been involved in creating spatial solutions to support Defence project teams including projects located at RAAF Base Darwin, Edinburgh Defence Precinct, Defence Establishment Berrimah, HMAS Harman, Kapooka Military Area, and Geraldton Satellite Comms Station. ***Bachelor of Science (Geographic Infor. Science)***
Fran Scully	Technical Review - Heritage	Fran is a Principal Heritage Consultant at Jacobs. She has extensive experience in archaeology, heritage management, strategic heritage planning and heritage policy, having worked in these areas for the last 28 years. She has widespread experience in local and state government, consultancy and in the field, as well as in project management and delivery. She has worked on numerous community, development and infrastructure projects in Australia, Ireland and the UKL. ***BA Hons (Archaeology) MSc (Archaeological Prospection)***
Tatia Zubrinich	Technical Review - Environment	Tatia is a Principal environmental Scientist at Jacobs. She has over 20 years consulting experience providing strategic and technical advice with a focus on environmental assessment, monitoring and management, acquisition and divestment due diligence, and providing targeted consultation and engagement with stakeholders, community and government. She has extensive experience on Defence projects and particularly with preparing ERs and REAs in accordance with DEPAC's Guidelines for the Preparation of an Environmental Report. ***BSc (Hons), PhD (Ecology/Env Mgt)***

3.3 Rapid constraints assessment

A high-level desktop assessment was undertaken to identify environmental and heritage values and potential constraints (Jacobs, 2024a). The desktop assessment consisted of database searches and literature review, including previous studies within the locality to identify the environmental and heritage values present, sites of previous contamination and identify those environmental attributes that present a constraint for siting of the required infrastructure. Due to the remote nature of the proposed action area, the level of information available is limited.

The following information was reviewed:

- Existing reports and studies associated with previous assessments undertaken for the study area and/or nearby developments.

- Relevant spatial data layers relating to environmental, physical and heritage attributes, including soil and geology mapping, acid sulfate soils mapping, hydrology and topography.
- Species-specific management plans and recovery plans pertaining to the broader area around the proposed action area.
- Historical and recent aerial imagery and photographs.
- Search results from the EPBC Act Protected Matters Search Tool (PMST) to identify potential MNES for the proposed action area using a ten-kilometre (km) buffer radius.
- Search results from DBCA Threatened and Priority flora, fauna and communities databases. A buffer of 100 km was applied to the search by DBCA due to the remoteness of the search area and expected scarcity of survey effort and records in the area.
- Search results from the WA Museum invertebrate records. A buffer of 10 km was applied to the search.
- Search results from the WA Contaminated Sites Database.
- All available relevant historic heritage registers including the National Heritage List (NHL), the Commonwealth Heritage List (CHL), World Heritage List, Register of the National Estate, the WA State Heritage Register (via the online tool inHerit) and the WA Aboriginal Cultural Heritage Inquiry System.

Following the desktop review, recommendations for additional work to address identified gaps were made.

3.4 Defining site and access options

To identify location options for working accommodation sites, impact sites and access tracks, a detailed desktop site assessment was undertaken using Multi-Criteria Analysis (MCA; Jacobs, 2024b). The MCA was conducted using a spatially enabled platform to automate the process and involved two main steps; criteria definition and ranking followed by multi-criteria analysis.

Initially, a list of assessment criteria and relative weightings were developed at an internal workshop involving key Jacobs team members. A second workshop was held with proposed action stakeholders from Defence which allowed for refinement of the proposed criteria and their respective weightings.

GIS software was used to apply buffers to constraint criteria layers where specified, followed by combining the layers using a weighted ranking system and summing the products. This generated a composite map providing a visual representation of the cumulative ranking of all criteria. A visual review of the composite map was undertaken following the completion of the MCA to identify if there were sufficient areas of low or no constraints where the impact sites could be located.

Further inspection of aerial photography and available topography data was undertaken within these areas to identify flat areas of at least 500 m by 500 m where working accommodation and impact sites could be located. Preliminary access track routes from the perimeter of the proposed action area to the working accommodation and impact sites were also identified.

The preliminary sites and access routes identified were provided to the traditional owners through the Barra Parrapi Aboriginal Corporation (BPAC) and Ngaanyatjarra Council and advice sought as to whether any of the identified sites or routes were within areas of cultural significance. Locations of the sites and accesses were adjusted to take this feedback into account.

3.5 Field surveys

The site and access options identified in Section 3.4 formed the basis for field survey planning. Prior to mobilisation, sites were prioritised through discussion with Defence according to their distance from the proposed action area boundary, ease of accessibility/length of access track, slope and apparent vegetation cover determined through review of aerial imagery. This prioritisation was reviewed once on site with input from the Traditional Owners.

3.5.1 Heritage survey

The ground survey was undertaken from 13 – 16 July 2024 and involved systematic pedestrian survey of the proposed working accommodation and impact sites. Transects were walked across the entirety of the survey areas, with participants spaced at even distances of between 15 and 30 m depending on ground conditions and potential for cultural heritage. Opportunistic survey was used where ground visibility was low or access was not possible (e.g. due to vegetation), targeting those areas where ground visibility was variable or generally higher.

The ground surface was closely inspected for the presence of Aboriginal stone artefacts and other archaeological features. In addition, all pertinent information relating to the environmental and archaeological context of the survey areas were recorded, including landscape features, topography, surface geology, vegetation and soil types, ground surface visibility (GSV), ground disturbance and the likely presence of Aboriginal cultural heritage. Photographs were taken with digital cameras and photo-logs were made.

Information recorded for archaeological sites included:

- Site name/ID, based on a standard naming convention.
- Site type.
- Components and attributes (material, form, dimensions, etc.).
- Coordinates, including coordinates to identify a site boundary.
- Ground surface characteristics.
- Topography.
- Distance and direction to water and type of water source.
- Vegetation.
- Ground disturbance.
- GSV.
- Site description.
- Date and recorders.

The proposed access track alignment was determined to have low potential for Aboriginal cultural heritage and due to its considerable length and time and budgetary constraints, was surveyed via low-altitude helicopter fly over. This allowed for an assessment of the alignment's topography, vegetation, soil and geology, and the likelihood of Aboriginal cultural heritage being present.

A Differential Global Positioning System (DGPS) unit (Trimble® DA2 GNSS receiver) together with an Apple iPad with Fieldmaps application was used for mobile mapping. The DPGS units was pre-loaded with high-resolution aerial imagery, results of the desktop Multi-Criteria Analysis, polygons of the survey locations, and previously recorded Aboriginal sites.

Relevant features located during the survey were be mapped using the DGPS. At the completion of the fieldwork, surveyed areas and recorded features were documented and mapped in the proposed action Geographic Information System (GIS), and the collected data used to produce maps produced for the purposes of this report.

The heritage survey reports are provided in Appendix A

3.5.2 Ecology survey

The desktop assessment from the RCA was reviewed to confirm the information remained up to date. In addition, a likelihood of occurrence assessment for threatened flora, fauna and communities was undertaken.

3.5.2.1 Field assessment

A field assessment was conducted by two Jacobs ecologists on 13 to 16 July 2024 to inform site selection of the impact sites, working accommodation sites and access track. Due to the expansive of the proposed action area , helicopter surveys were initially used to inform site selection, particularly the siting of the 40 km access track, followed by on ground field surveys. Eight sites were surveyed (five impact sites and three working accommodation sites) within the Nangaanya-Ku Native Title area and four sites (two impact sites and two working accommodation sites) were surveyed in the Ngaanyatjarra Native Title area.

Tasks completed as part of the on-ground field surveys included:

- Ground truthing of vegetation within the greater site plot (500 m x 500 m)
- Installation of flora assessment sites (100 m x 100 m) centred on plot 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
- Disturbance levels – fire, grazing, weeds (500 m x 500 m)
- Wildlife observations and habitat assessment (500 m x 500 m)

Habitat and wildlife observations included searches for burrows/warrens, tracks, nesting or denning habitat (e.g. tree hollows, ground structures, habitat complexity). 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 sites; a sand dune site and a Mulga Woodland site, were included to assist with mapping and describing vegetation communities traversed by proposed access tracks.

The ecology survey reports are provided in Appendix B.

3.6 Environmental risk assessment

An environmental risk assessment was undertaken to identify aspects of the proposed action that have the potential to affect the environment. Planned activities were assessed with consideration to the existing context, known environmental values, existing land uses and measures to control or manage environmental impacts. The risk assessment methodology adopted is a risk-based approach designed to assess risk based on the likelihood of an environmental impact or event happening, and the consequences of the occurrence on the surrounding environment. The likelihood and consequences are scored for each potential impact or event and a risk level is determined.

The risk assessment included:

- An initial risk assessment (Section 8) to assess the 'inherent risk' to the relevant environmental matters that have negative consequences, inclusive of the 'business-as-usual' mitigation measures detailed in Section 8.
- A residual risk assessment (Section 11), which is a revised assessment of the initial risk assessment, incorporating both the 'business-as-usual' committed mitigation measures and the recommendations proposed for consideration.

As outlined in Annex 3 of the DEPAC ER Guidelines, the purpose of the risk assessment is two-fold in that it serves to identify aspects of the action for consideration:

- against the provisions of the EPBC Act in order to subsequently determine whether a potentially significant impact is likely; and
- of mitigation measures that reduce the environmental footprint, regardless of the action's significance under the EPBC Act.

The risk matrix in Table 3-2 was used to determine the risk associated with potential impacts based on the likelihood and consequence definitions provided in *Defence Guidance on the preparation of an environmental Report V.3 (DEPAC 2020)*. Likelihood definitions are included in Table 3-3 and consequence definitions in Table 3-4.

Table 3-2 Risk matrix (DEPAC 2024)

	Minor	Moderate	High	Major	Critical
Highly Likely	Medium	High	High	Severe	Severe
Likely	Low	Medium	High	High	Severe
Possible	Low	Medium	Medium	High	Severe
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Low	Medium	High

Table 3-3 Likelihood definitions (DEPAC 2024)

Rating	Descriptors
Highly Likely (HL)	Expected to occur in most circumstances. *Guide: Is expected to occur multiple times within a year or incident is clearly imminent.*
Likely (L)	Probably occur in most circumstances. *Guide: Is expected to occur approximately once per year.*
Possible (P)	Could occur at some time. *Guide: Likely to occur approximately once every 5 years.*
Unlikely (U)	Not expected to occur. *Guide: Likely to occur approximately once every 5-10 years.*
Rare (R)	Exceptional circumstances only. *Guide: Likely to occur with less frequency than once every 10 years.*

Table 3-4 Consequence definitions (DEPAC 2024)

Rating	Descriptors
Minor (Mi)	Minor incident of environmental damage that can be easily reversed
Moderate (Mo)	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts
High (H)	Substantial instances of environmental damage that could be reversed with intensive efforts
Major (Ma)	Major loss of environmental amenity and real danger of continuing environmental damage
Critical (C)	Severe widespread loss of environmental amenity and irrecoverable environmental damage

3.7 EPBC Act significant impact tests

Significant impact guideline 1.1 (DEWHA, 2013) and significant impact guideline 1.2 (DSEWPAC, 2013) were used to guide the significant impact assessments (SIAs) presented in this ER to determine the potential for significant impacts, as a result of the proposed action, to matters protected by the EPBC Act.

An initial review of the results of the PMST search completed for the RCA was undertaken to identify those matters that are relevant to the proposed action. Those relevant matters were then assessed against the criteria detailed in the guidelines and a determination made as to the likelihood for significant impact to occur. The assessment considered information and outcomes from the previous desktop assessments (rapid constraints assessment and detailed site assessment) and the field surveys.

3.8 EPBC Act PMST

The original PMST search was undertaken for the RCA (30/01/2024) using the proposed action area as the search area, with a 10 km buffer applied. A new search using the PMST was conducted on 28/08/2024 to confirm the Matters of National Environmental Significance (MNES) and other matters protected under the EPBC Act potentially present within and adjacent to the disturbance footprint for the proposed action. The revised search area focused on the disturbance footprint for the proposed action and immediate surrounds. The revised PMST search area is shown in Figure C-1 and included a 10 km buffer. Figure C-1 also shows the original PMST search area used for the RCA to provide a comparison of the two areas used.

4. Assumptions, limitations and biases

This report is intended only for the purpose of identifying and determining potential approval requirements associated with environmental, heritage and social values within the proposed action area . The assessment presented in this ER is based upon the site options and understanding of the expected design and Defence requirements at as August 2024. Should site locations or Defence requirements change, further assessment may be required.

The assessment of the nature and extent of impacts is based on a broad overview of the vegetation and habitat available on each site as derived from the ecological survey, aerial photography, and State biodiversity databases.

While searches of publicly available databases have been conducted, and observations of fauna presence (including signs such as scats or tracks) were made during the ecological survey, additional species may occur within the proposed action area for which there are currently no local records on the Commonwealth or State databases or that were not recorded during the survey.

There is also the possibility that fauna will move into the area of the disturbance footprint prior to first use of the proposed action area by Defence[redacted]. Mitigation measures have been proposed to manage this risk.

Assessment[redacted]has been undertaken using the information provided by Defence. Given the classified nature of the capability some specific details[redacted] are not available for this ER. A precautionary approach has been taken[redacted]. Defence activities are subject to detailed assessment prior to undertaking the activity through the Environmental Clearance Certificate (ECC) process. No activities will occur without an approved ECC in place, thereby mitigating this limitation of the ER.

5. Consultation

Consultation has been ongoing between the project team and relevant stakeholders (Table 5-1). Consultation with the Traditional Owners, through the Ngaanyatjarra Council and Barra Parrapi Aboriginal Corporation, has been a key component in identifying appropriate locations for sites and alignment of the access track in order to avoid areas of cultural significance.

Table 5-1. Stakeholder consultation details

Stakeholder	Date	Consultation method	Outcomes
Defence Stakeholders			
[redacted]	Various	Email, phone, online meetings	General project updates, delivery of RCA and Detailed Site Assessment, confirmation of details for ER
DEPAC	25/06/24	Online meeting	Agreement on survey methods
DEPAC	3/07/24	Online meeting	Follow up discussion on survey methods
DEPAC	26/08/24	Phone	Conversation regarding Draft V4 ER Guideline and incorporating components into this ER
[redacted]	Quarterly	Meeting	Communication Project updates and any changes to Defence requirements
External Stakeholders			
Shire of Laverton	23/11/22	Meeting	Project briefing
Department of Planning, Lands and Heritage (DPLH) State Solicitor's Office (SSO)	18/09/23	Meeting	Project briefing
Shire of Laverton	18/02/24	Meeting	Project briefing
DPLH SSO	26/03/24	Meeting	Project briefing
Ngaanyatjarra Council (NC)	19/03/24 20/03/24	In person meeting and site visit	Presented the project to NC (19/03) and Warburton community Traditional Owners (20/03)
Barra Parrapi Aboriginal Corporation (BPAC) Central Desert Native Title Services Limited (CDNTS) Daniel Bruckner - anthropologist	29/06/24	In person workshop *(note some Project team members attended via MS Teams)*	Update on the Project and presentation of preliminary site and access options to BPAC. BPAC to review site options and inform Defence of any sites/access that are in culturally sensitive areas and should be relocated.

Stakeholder	Date	Consultation method	Outcomes
			Tentative agreement on field survey dates
Ngaanyatjarra Council Charmaine Jones – anthropologist	03/07/24	Online meeting	Update on the Project and presentation of preliminary site and access options. Discussion on field survey logistics
DEMIRS	various	Email	
K2O Minerals Pty Ltd	20/08/24	Meeting	Discussion on proposed DA and impact to Trigg Minerals access to tenements along Great Central Road.

6. Summary of the environment

6.1 Site Context

The proposed action area is located within the Central subregion of the Great Victorian Desert 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".

The proposed action area offers a range of ecological environments for native flora and fauna and remains relatively undisturbed with minimal anthropogenic influence. The closest towns to the proposed action area are Laverton and Warburton, located approximately 173 km southwest and 85 km northeast of the boundary of the proposed action area, respectively. Laverton is primarily a mining town and has a population of 11,459 with 4,497 private dwellings (ABS, 2021a). Warburton is a remote Aboriginal community with a population of 511 with 211 private dwellings (ABS, 2021b).

Other land use surrounding the proposed action area includes:

- Mining tenements immediately adjacent to the proposed action area. Exploration Licences E38/03458, E38/03483 and E38/03537, owned by K2O Minerals Pty Ltd overlap the proposed action area in the northwest, adjacent to the Great Central Road in the vicinity of Lake Throssell.
- Pastoral stations – the closest being Yamarna which is approximately 7.5 km west of the proposed action area.
- Remote Aboriginal communities:
  - Kanpa – 37 km north of the proposed action area
  - Tjirrkarli – 95 km north of the proposed action area
  - Cosmo Newbery – 115 km east of the proposed action area
  - Illirlka – 150 km east of the proposed action area
  - Bandya – 175 km west of the proposed action area

Lake Yeo Nature Reserve is located in the southwestern portion of the proposed action area and is protected under the Western Australian *Conservation and Land Management Act 1984* (CALM Act) for the purpose of "conservation of flora and fauna". Additionally, Neal Junction Nature Reserve is located in the southeastern portion of the proposed action area and is protected under the CALM Act for the purpose of "conservation of flora and wildlife".

The closest biosphere reserve is Fitzgerald Biosphere Reserve, located approximately 720 km southwest of the proposed action area. Given the distance and nature of the proposed action, it is not likely that the proposed action would significantly damage the Fitzgerald Biosphere Reserve.

The closest Commonwealth reserve is Uluru - Kata Tjuta National Park, located approximately 460 km northeast of the proposed action area. Given the distance and nature of the proposed action, it is not likely that the proposed action would significantly damage the Uluru - Kata Tjuta National Park.

Two Environmental Impact Assessments have been undertaken for projects within the vicinity of the proposed action area:

- Tropicana Gold Project (EPA Assessment Number: 1745, EPBC 2008/4270) is an open cut gold mine. The operational development envelope is located approximately 90 km to the south of the proposed action area. The Proponent is Tropicana Joint Venture.
- Gruyere Gold Project (EPA Assessment Number: 2083) is an open cut gold mine located approximately 11 km to the west of the proposed action area. The proponent is Gold Road Resources Limited.

The proposed action area does not overlap with offset locations under the EP Act or the EPBC Act.

6.2 Site Characteristics

6.2.1 Climate, air quality and acoustics

The proposed action area is located within the Desert – hot (persistently dry) climate class, as defined by the Köppen classification (BoM, 2024). The closest Bureau of Meteorology (BoM) weather stations to the proposed action area are:

- Laverton Aero (Station ID 012305); Opened in 1994 and records all climate data;
- Warburton Airfield (Station ID 013011): Opened in 1940 and records all climate data; and
- Tjukayirla (Station ID 13040): Opened in 1994 and records rainfall data.

The Tjukayirla station is located at the Roadhouse, adjacent to the proposed action area while the Laverton Aero and Warburton Airfield stations are approximately 180 km and 114 km from the proposed action area respectively.

Maximum temperatures range from 34 to 38°Celcius in December and January to18 to 21°Celcius in June and July. Minimum temperatures range from 20 to 23 °Celcius in January and December to 6 °Celcius in July (Figure 6-1). Rainfall is variable across the region with mean annual rainfall at Laverton Aero recorded as 276.1 mm, 243.5 mm at Warburton Airfield and 285.2 mm at Tjukayirla. Mean monthly rainfall is generally below 60 mm (Figure 6-2), however extreme rainfall events are known to occur, associated with the remnants of tropical cyclones and tropical lows passing through the region. Tjukayirla recorded a total of 241.1 mm in March, which was associated with widespread flooding in the region. A further 45.7 mm was recorded in June, significantly above the monthly mean of 14.4 mm (Table 6-1).

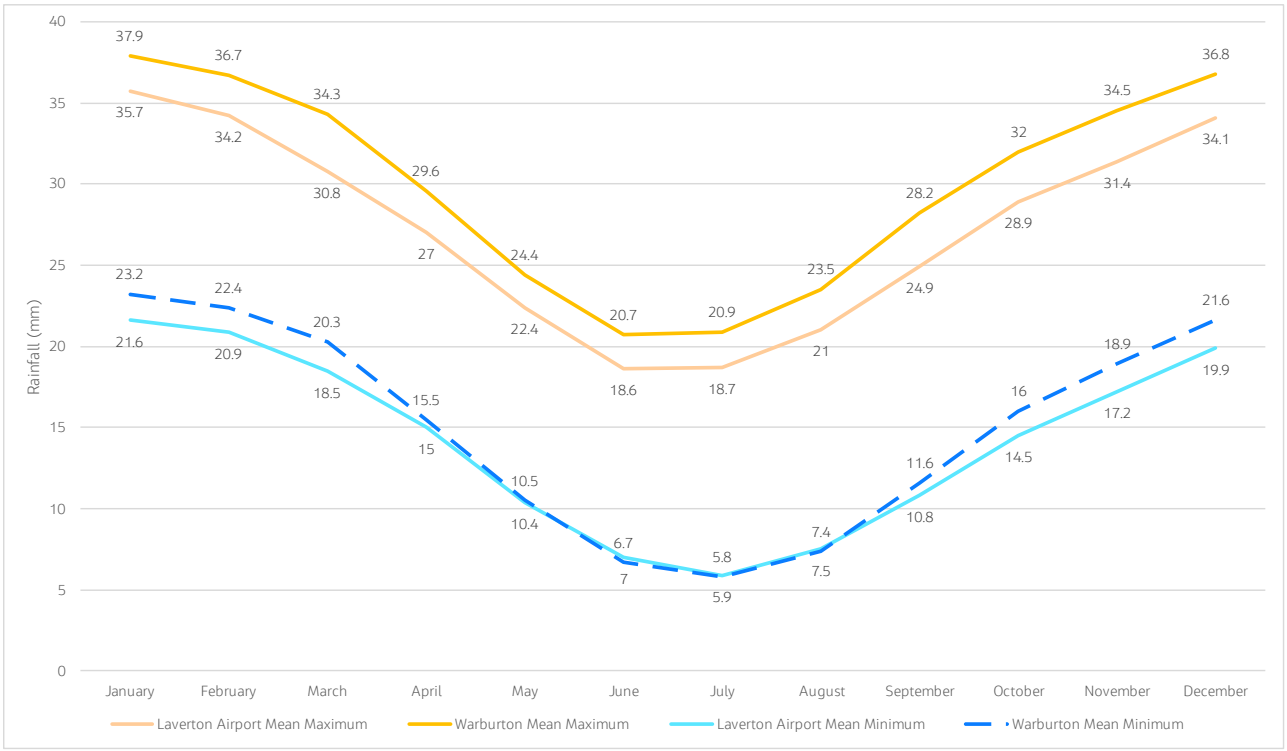


Figure 6-1. Temperature statistics for the proposed action area

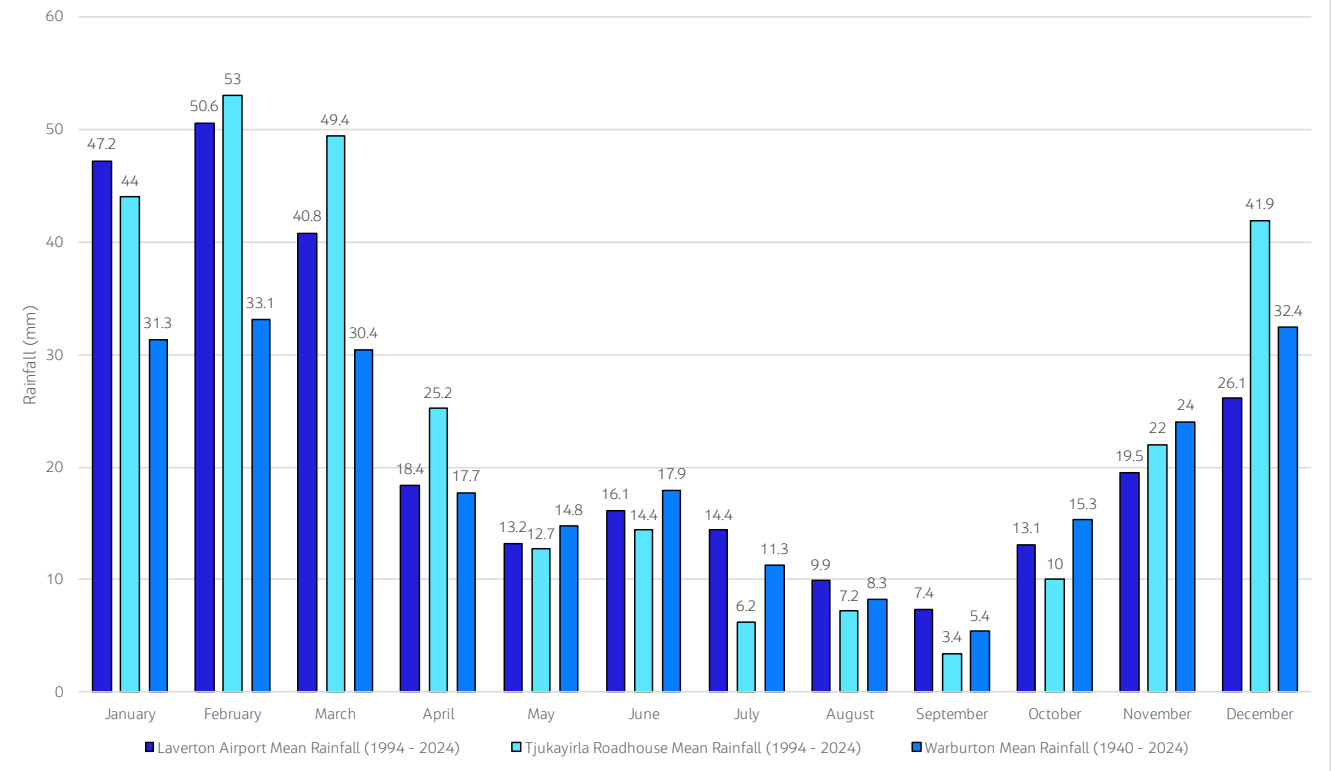


Figure 6-2. Rainfall statistics for the proposed action area

Table 6-1. Mean rainfall and 2024 rainfall records for Tjukayirla

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2024 rainfall (mm)	14.8	0	241.1	0	18	45.7	5.2						324.8
Mean rainfall (mm)	44	53	49.4	25.2	12.7	14.4	6.2	7.2	3.4	10	22	41.9	285.2

Red numbers indicated highest rainfall. **Blue** numbers indicate lowest rainfall

As the proposed action area is remote from large towns or urban centres, air quality and noise characteristics are expected to be relatively unaffected by anthropogenic sources. Typically noise sources include vehicle traffic along the Great Central Road and generators used at Tjukayirla Roadhouse for power.

6.2.2 Soil, topography, landscape features

6.2.2.1 Proposed action area

The proposed action area has an undulating topography with height above sea level ranging from 298 m Australian Height Datum (AHD) to 564 m AHD (Figure 6-3). Low points in the landscape are associated with salt lakes (Lake Yeo and Lake Throssell) and drainages.

Soil-Landscape mapping for the proposed action area (Tille, 2006) indicates that the majority of the area (85.6%) is characterised as plains with longitudinal and/or ring dunes. Salt lakes and drainages account for 3.5% of the proposed action area with the remaining 10.9% being scarps, breakaways, mesas and low stony hills with associated undulating uplands.

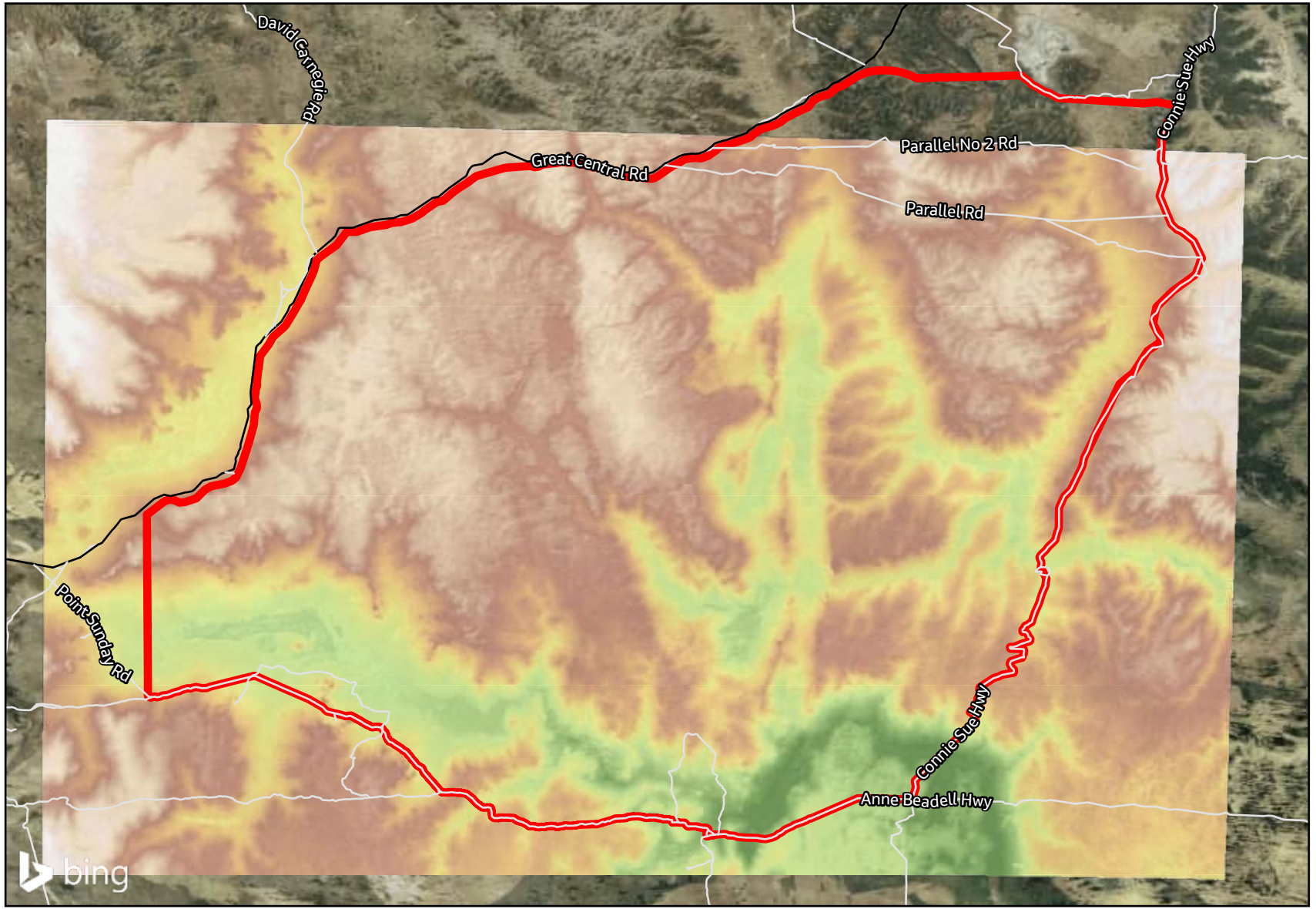


Figure 6-3: Topography

Data Sources: Geosciences Australia (2006); Elevation - ELVIS. Imagery Sources: ESRI Online Imagery Services
\\ausyd0vs01\GISDefence\IS489800_Laverton_NTDA\Apps\ArcPro\Figures\IS489800_FIGURES_ER.aprx/IS489800_HER_4_Topography_A4L_RevA | Date: 30/08/2024

Tille (2006) identifies the soils of the proposed action area as red deep sands and sandy earths (Figure 6-4). The soil landscape mapping units overlapping the proposed action area are shown in Table 6-2.

Table 6-2. Soil landscape mapping in the proposed action area (DPIRD-027)

Soil-landscape system	Unit description
122b2	Plains and dunes - longitudinal and ring dunes with interdune corridors and plains; occasional salt pans
122b3	Very gently undulating plain traversed by longitudinal dunes
122d6	Dissected lateritic upland (tableland) of flat to hilly topography with shallow detrital valleys and pediment slopes
122d7	Broad undulating upland (tableland) elevated above the adjacent plains and dunes; scarps, pediments, mesas, and buttes are common
122d8	Scarpland elevated above surrounding plains and dunes and characterized by breakaways (mesas, buttes) and low stony hills frequently capped by lateritic duricrust; some sedimentary rocks are exposed
122f6	Small valley plains with calcrete (kunkar) platforms; some small clay pans and salt pans
122h4	Scarpland-breakaways and residuals of various forms, cuestas, mesas, buttes, stony hillocks, and hills commonly with large bare slabs of silcrete; stone and gravel pavements are common
122k5	Plains often flanking areas of regional drainage (unit SV10); some longitudinal sand dunes
122m4	Plains with extensive gravel pavements and small tracts of longitudinal dunes
122n2	Shallow valleys with lakes, clay pans, salt pans, calcrete (kunkar) platforms, sand dunes, kopi dunes, and calcareous dunes
124b2	Plains and dunes - longitudinal and ring dunes with interdune corridors and plains; occasional salt pans
124b3	Very gently undulating plain traversed by longitudinal dunes
124d2	Plains with occasional low dunes
124d8	Scarpland elevated above surrounding plains and dunes and characterized by breakaways (mesas, buttes) and low stony hills frequently capped by lateritic duricrust; some sedimentary rocks are exposed
124h4	Scarpland-breakaways and residuals of various forms, cuestas, mesas, buttes, stony hillocks, and hills commonly with large bare slabs of silcrete; stone and gravel pavements are common;
124m4	Plains with extensive gravel pavements and small tracts of longitudinal dunes
192b2	Plains and dunes--longitudinal and ring dunes with interdune corridors and plains; occasional salt pans
129d6	Dissected lateritic upland (tableland) of flat to hilly topography with shallow detrital valleys and pediment slopes
192n2	Shallow valleys with lakes, clay pans, salt pans, calcrete (kunkar) platforms, sand dunes, kopi dunes, and calcareous dunes

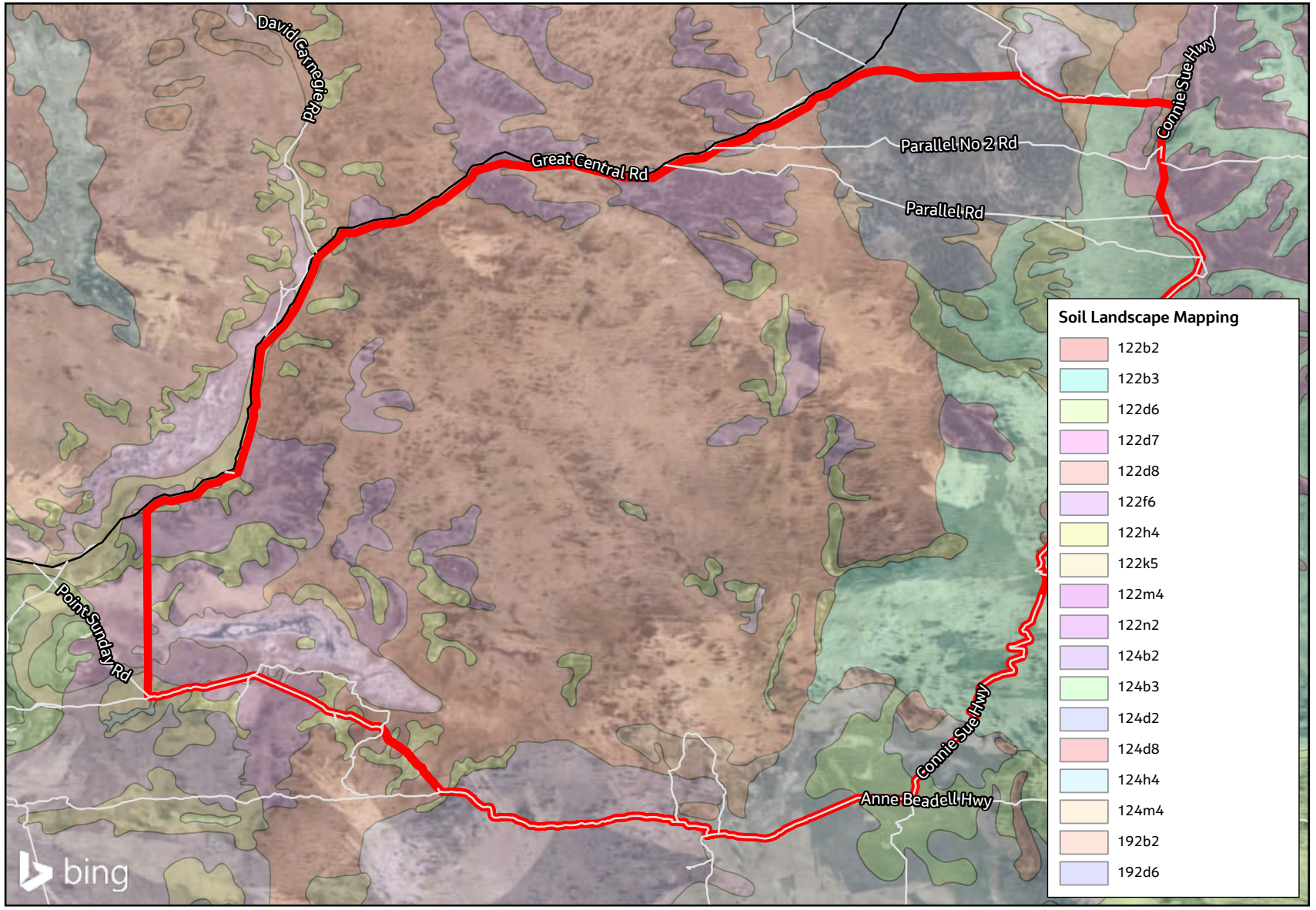


Figure 6-4: Soils

Data Sources: Geosciences Australia (2006); Soil Landscape Mapping - DPIRD. Imagery Sources: ESRI Online Imagery Services
\\ausyd0vs01\GISDefence\IS489800_Laverton_NTDA\Apps\ArcPro\Figures\IS489800_FIGURES_ER.aprx/IS489800_HER_6_Soils_A4L_RevA | Date: 30/08/2024

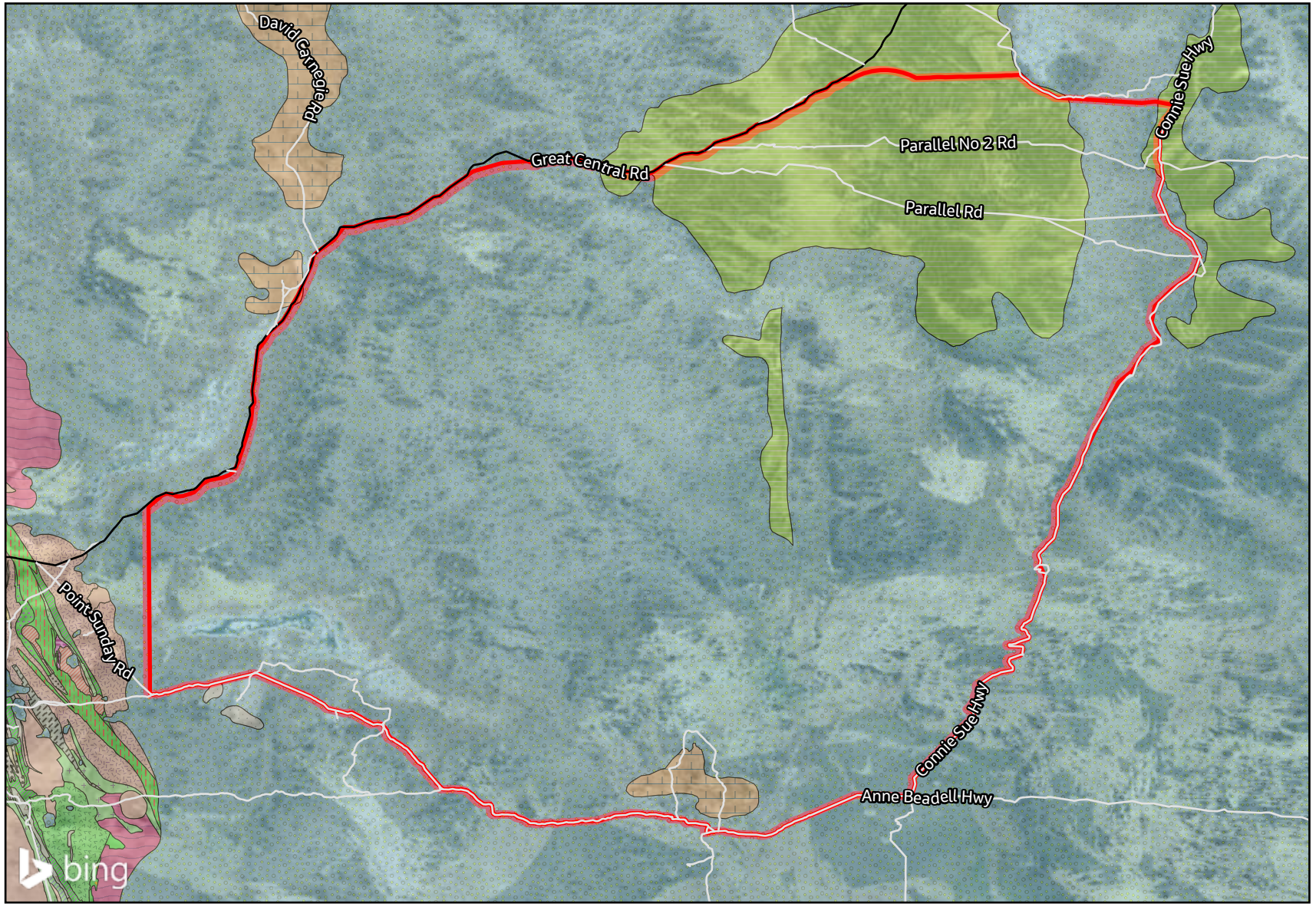
The Australian Soil Classification Map (Searle, 2021) further defines the soil types within the proposed action area as:

- Tenosols: soils with generally only weak pedologic organisation that do not fit the classification of the other soil types identified in Searle (2021). This is the most common soil of the proposed action area.
- Kandosols: soils which lack strong texture contrast and clearly defined soil horizons. Second most common soils within the proposed action area.
- Rudosols: young, recently formed soils with little, if any, pedologic organisation
- Vertosols: associated with Lake Yeo, these soils are clay soils with shrink-swell properties that exhibit strong cracking when dry.
- Chromosols: very minor representation within the proposed action area. These soils are described as soils with a clear B horizon and are not strongly acidic. These soils are more commonly found in the agricultural region of Australia.

The proposed action area is within the Canning Basin tectonic unit (DMIRS, 2017). State interpreted geological mapping (1:500,000) available for the proposed action area identifies the following bedrock geologies (Figure 6-5):

- Buldya Group (upper): Siltstone, sandstone, dolomite, limestone, evaporites (halite, gypsum, anhydrite) in subsurface and diapirs; stromatolitic; includes Hussar, Kanpa, and Steptoe Formations.
- Paterson Formation: Conglomerate (including diamictite), sandstone, and siltstone; largely glacigene.
- Samuel Formation and Bejah Claystone: Siltstone, sandstone and claystone; carbonaceous, locally glauconitic; radiolarian siltstone in Bejah Claystone.

According to the Western Australian Department of Water and Environmental Regulation (DWER) risk mapping dataset (DWER-048) there is no risk of acid sulfate soil (ASS) occurring within the proposed action area. The absence of significant waterways and tributaries in proximity to the proposed action area (the exception being Yeo Lake in the south-west), and depth to groundwater (greater than 20 m) observed in the registered bores and wells, confirms there is a low and unlikely potential for the presence of ASS to be encountered as part of the proposed action.



LEGEND

- Project Area
- Secondary Road
- Minor Road

1:500 000 State interpreted bedrock geology

- CP-_pa-sepg; Paterson Formation; Conglomerate (including diamictite), sandstone, and siltstone; largely glacigene
- K-_sb-sf; Samuel Formation and Bejah Claystone; Siltstone, sandstone and claystone; carbonaceous, locally glauconitic; radiolarian siltstone in Bejah Claystone
- P_-BUU-sf; Buldya Group, upper; Siltstone, sandstone, dolomite, limestone, evaporites (halite, gypsum, anhydrite) in subsurface and diapirs; stromatolitic; includes Hussar, Kanpa, and Steptoe Formations
- P_-_tk-ss; Turkey Hill Formation; Sandstone, siltstone and mudstone; possibly diamictite

0 20 40

Kilometres

N

A4 1:1,300,000

GDA2020 MGA Zone 51

Figure 6-5: Geology

Data Sources: Geosciences Australia (2006); Geology - DMIRS. Imagery Sources: ESRI Online Imagery Services
\\ausyd0vs01\GISDefence\IS489800_Laverton_NTDA\Apps\ArcPro\Figures\IS489800_FIGURES_ER.aprx/IS489800_HER_5_Geology_A4L_RevA | Date: 30/08/2024

6.2.2.2 Disturbance Footprint

The landscape of the working accommodation and impact sites consists primarily of sand plains and dunes. The access tracks largely cross the same landscape, however they also intersect areas of woodland, particularly on the western side of the proposed action area. The majority of the disturbance footprint has been mapped as soil-landscape system 122b2, which is described as longitudinal and ring dunes with interdune corridors and plains. Soils are typically red sandy earth. A small portion of the preferred access track is within an area mapped as 122m4, while Working Accommodation Site 1 is adjacent to and may intersect 192d6. The landforms and soils within the proposed action footprint are described in Table 6-3.

Table 6-3. Soil landscape mapping in the proposed action area (DPIRD-027)

Soil-landscape system	Unit description
122b2	Plains and dunes - longitudinal and ring dunes with interdune corridors and plains; occasional salt pans. Red sandy earth.
122m4	Plains with extensive gravel pavements and small tracts of longitudinal dunes. Red-brown hardpan shallow loam.
192d6	Dissected lateritic upland (tableland) of flat to hilly topography with shallow detrital valleys and pediment slopes. Shallow gravel.

There is low risk of presence of ASS, contaminated sites, UXO and asbestos at the working accommodation sites, impact sites, access tracks and surrounding areas. Based on the geological setting of the proposed action, and the shallow nature of the proposed activities (approximately 0 to 4 mBGL) there is a low and unlikely probability of radioactive materials being exposed or encountered.

6.2.3 Hydrology and hydrogeology

6.2.3.1 Hydrology

Proposed action area

The dominant surface water features within and adjacent to the proposed action area are the salt lakes Lake Yeo, in the southwest corner of the proposed action area, and Lake Throssell, adjacent to the northwestern boundary of the proposed action area (Figure 6-6). Both Lake Yeo and Lake Throssell are Wetlands of National Importance. Additional smaller, intermittent waterbodies are present throughout the proposed action area, such as Millar Lake.

The interior of WA is generally internally draining, meaning that surface water runoff from storm events flow towards the region's salt lakes, rather than towards to coast and ocean. The western portion of the proposed action area drains towards either Lake Yeo in the southwest or Lake Throssell in the northwest with the remainder of the proposed action area in the Warburton Basin draining towards the east, when runoff occurs. Surface water catchments are shown on Figure 6-6.

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.

Disturbance footprint

The working accommodation sites, impact sites and access track will be on areas of sandplains with spinifex grassland cover and do not overlap any drainage lines, floodplains or watercourses.

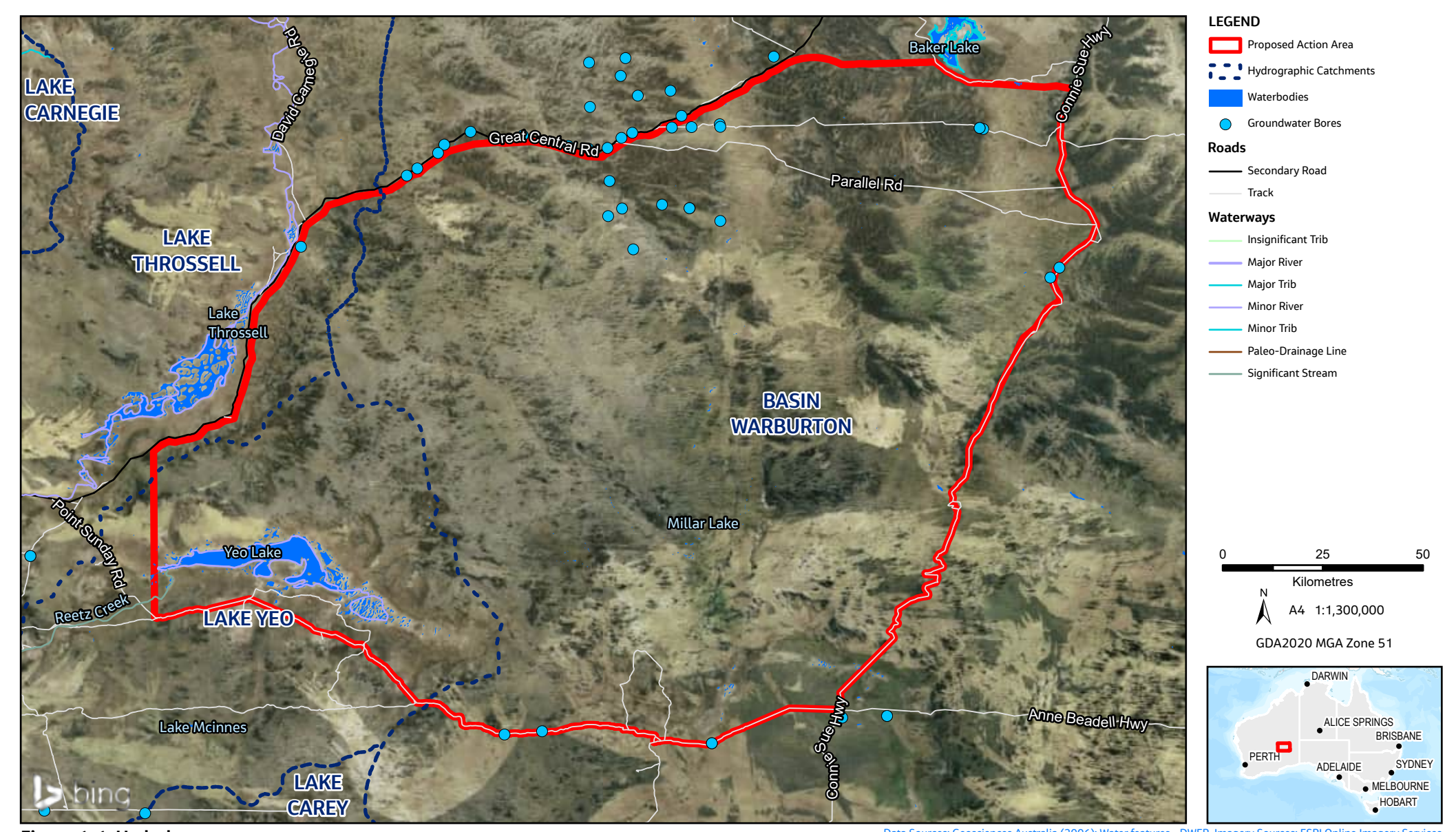


Figure 6-6: Hydrology

Data Sources: Geosciences Australia (2006); Water features - DWER. Imagery Sources: ESRI Online Imagery Services
\\ausyd0vs01\GISDefence\IS489800_Laverton_NTDA\Apps\ArcPro\Figures\IS489800_FIGURES.aprx/IS489800_RCA_Fig2.7_SurfaceWaters_A4L | Date: 29/10/2024

6.2.3.2 Hydrogeology

The proposed action area is within the Goldfields groundwater area proclaimed under the Western Australian *Rights in Water Irrigation Act 1914* (RIWI Act). The proposed action area is situated in the Great Victoria Desert with an overlying aeolian sand layer of 0 to 5 m in thickness. Groundwater would be stored here temporarily before infiltrating to deeper underlying rock aquifers of calcrete and sandstone (Wharton, 1984). To the south and east of the proposed action area, larger groundwater volumes occur in shallow sand aquifers (less than 15 m deep) that tend to flow along the axes of paleochannels, with local recharge (through tributaries) and local discharge occurring at salt lakes (Johnson, Commander and O'Boy, 1999).

Regional groundwater flow is influenced by past tectonics and the presence of deep subsurface fractured rock environments. The hydrogeology of the Warburton Basin is relatively unknown due to the significant depths to groundwater (more than 50 m).

On review of the Department of Water and Environmental Regulation's (DWER) Water Information Reporting database, there are 17 registered bores and/or groundwater wells situated within the proposed action area (Figure 6-6).

Data collection undertaken in 2000 reported the Static Water Level for groundwater between 22.2 to 83 m below ground level across 12 of 17 bore/wells. Total Dissolved Solids ranged between 770 and 15,000 mg/L in nine of 17 bores/wells. Based on available mapping, groundwater salinity ranges from between 1,000 mg/L to >35,000 mg/L with higher concentrations around the periphery of the proposed action area, likely associated with the extent of the salt lakes and preferred drainage channels. No past surface water monitoring results or data in the proposed action area was available.

Groundwater flow or direction is unknown, however, is likely to be influenced by paleochannels, local topography and drainage at salt lakes (e.g. Lake Yeo).

6.2.4 Vegetation

The proposed action area is located within the Central subregion of the Great Victorian Desert (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."

Pre-European vegetation mapping shows that the proposed action area encompasses 13 vegetation associations defined by Beard *et al* (2013; Table 6-4; Figure 6-7). 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 (Government of Western Australia, 2019).

LEGEND

Proposed Action Area

Threatened and Priority Flora (DBCA)

- Calytrix warburtonensis
- Eremophila undulata
- Korthalsella leucothrix
- Verticordia mirabilis

Threatened and Priority Flora (WA Herbarium)

- Abutilon sp. Warburton (A.S. George 8164)
- Calytrix warburtonensis
- Dampiera eriantha
- Eragrostis sp. Lake Carey (J. Paterson & J. Warden WB 40825)
- Eremophila undulata
- Korthalsella leucothrix
- Olearia arida
- Sporobolus blakei
- Thryptomene nealensis
- Verticordia jamiesonii
- Verticordia mirabilis

Pre-European Vegetation

- GIBSON DESERT_139
- GIBSON DESERT_39
- GREAT VICTORIA DESERT_1239
- GREAT VICTORIA DESERT_125
- GREAT VICTORIA DESERT_18
- GREAT VICTORIA DESERT_19
- GREAT VICTORIA DESERT_239
- GREAT VICTORIA DESERT_24
- GREAT VICTORIA DESERT_39
- GREAT VICTORIA DESERT_45
- GREAT VICTORIA DESERT_4621
- GREAT VICTORIA DESERT_676
- GREAT VICTORIA DESERT_84
- GREAT VICTORIA DESERT_85

Roads

- Secondary Road
- Track

0 25 50

Kilometres

N

A4 1:1,300,000

GDA2020 MGA Zone 51

Figure 6-7: Beard Vegetation Associations and Significant Flora Records

Data Sources: Geosciences Australia (2006); Pre-European Vegetation - DPIRD; Threatened and Priority Flora - DBCA Imagery Sources: ESRI Online Imagery Services
\\ausyd0vs01\GISDefence\IS489800_Laverton_NTDA\Apps\ArcPro\Figures\IS489800_FIGURES.aprx/IS489800_RCA_Fig2.5_VegAssocFlora_A4L | Date: 29/10/2024

Table 6-4. Beard vegetation associations and extent

Vegetation association	Description	Extent within the proposed action area (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 & mallee steppe; marble gum & mallee over hard spinifex on sandplain	1,040,840.98	6,351,699.56	6,349,770.63	99.97
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 & mallee steppe; marble gum & 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 & mallee steppe; marble gum & 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

The ecological survey undertaken for the proposed action found the vegetation communities present reflect the low sand dune and sandy inter-dune swale landforms that dominate the proposed action area. 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. Vegetation communities recorded during the survey are detailed in Table 6-5. All survey locations were identified as being in 'Excellent' condition in accordance with the Trudgen (1988) scale.

Table 6-5. Vegetation communities defined during ecological survey

Vegetation Community	Description	Recorded at	Disturbances observed
Grevillea juncifolia tall open shrubland with emergent *Eucalyptus youngiana* +/- *E. gonglyocarpa* over *Triodia basedowii*/*T. schinzii* 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. gonglyocarpa* (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.	T1 Impact Site T3 Impact Site	Ranged from five years post fire to approximately 15 years. Disturbance levels were low with occasional camel tracks and very low total grazing pressure.
Triodia basedowii/*T. schinzii* hummock grassland with scattered shrubs and emergent *Grevillea juncifolia* and *Eremophila forrestii*	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).	T2 Impact Site Site 3 Working Accommodation Site	**T2 Impact site:** Ranged from 10 years post fire to approximately 15 years at T2 impact site and estimated to be less than 5 years post-fire at Site 3 Working Accommodation Site. Disturbance levels were low with occasional camel tracks and very low total grazing pressure.
Eremophila forrestii low open shrubland over *Triodia basedowii* 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.	T4 Impact Site	Ranged from five years post fire to approximately 15 years. Disturbance levels were low with occasional camel tracks and very low total grazing pressure.
Acacia pachyachra open shrubland over *Triodia schinzii* hummock grassland with scattered low shrubs	Sandplains with *Acacia pachyac*hra (Shiny-pod Wattle) open shrubland over *Triodia schinzii* (Feather-top Spinifex) hummock grassland with juvenile *Acacia abrupta* (Blunt-leaf Wattle). Low shrubs including *Bonamia erecta* (Bonamia) and *Androcalva loxophylla* (Rulinga) common throughout.	T5 Impact Site	Ranged from five years post fire to approximately 10 years. Disturbance levels were low with occasional camel tracks and very low total grazing pressure.

Vegetation Community	Description	Recorded at	Disturbances observed
Triodia basedowii hummock grassland with emergent *Acacia pruinocarpa* 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	W1 Working Accommodation Site W2 Working Accommodation Site	Ranged from three to five years post fire. Disturbance levels were low with occasional camel tracks and very low total grazing pressure.
Triodia schinzii hummock grassland with emergent *Eucalyptus youngiana* 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 Spiderflower). Low shrubs include *Scaevola basedowii* (Leafless Fanflower) and *Androcalva loxophylla* (Rulinga).	W3 Working Accommodation Site	Ranged from 10 years post fire to approximately 15 years. Disturbance levels were low with occasional camel tracks and very low total grazing pressure.
Eucalyptus gongylocarpa 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.	T1, T2 and T3 Impact Sites Access Track	The site has been burnt approximately 15 years ago and includes old growth Marble Gum with some trees with hollows.
Eucalyptus youngiana low open mallee and emergent *Eucalyptus gongylocarpa* with mixed tall shrubs over *Triodia schinzii/T. basedowii* hummock grassland	Low sand dunes with *Eucalyptus youngiana* (Ooldea Mallee) low open mallee and 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).	Dune (access track)	Ranged from approximately 10 to 15 years post fire. Disturbance levels were low with occasional camel tracks and very low total grazing pressure noted.

Vegetation Community	Description	Recorded at	Disturbances observed
Acacia aptaneura / A. aneura 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)	Mulga (access track - Nangaanya-Ku)	Typically more than 15 years post fire. Disturbance levels were low with occasional camel tracks and very low total grazing pressure.
Triodia basedowii hummock grassland with emergent *Acacia pruinocarpa*	Sandplains and interdune swales with *Triodia basedowii* (Hard Spinifex) hummock grassland with emergent *Acacia pruinocarpa* (Black Gidgee). Shrub cover is patchy and includes *Eremophila forrestii* (Forrest's Emubush) and *Androcalva loxophylla* (Rulinga). Scattered patches of *Eucalyptus youngiana* (Ooldea Mallee) and *E. gongylocarpa* (Marble Gum) also occur.	Site 1 Working Accommodation Site	Estimated at 15 years post-fire. Disturbance levels were low with occasional camel tracks and very low total grazing pressure noted.
Aluta maisonneuvei / Androcalva loxophylla low open shrubland over *Triodia basedowii* hummock grassland with emergent *Acacia aptaneura*	Sandplains (interdune swales) with *Aluta maisonneuvei* (Desert Heath-myrtle)/ *Androcalva loxophylla* (Rulingia) low shrubland over *Triodia basedowii* (Hard Spinifex) hummock grassland with emergent *Acacia aptaneura* (Narrow-leaf Mulga). Includes scattered *Eremophila forrestii* (Forrest's Emubush) and *Acacia pachyachra* (Shiny-pod Wattle). *Triodia schinzii* (Feather-top Spinifex) is also common in the ground storey together with *Amphipogon sericeum* (Grey-beard Grass) and *Solanum centrale* (Bush Tomato).	Site 10 Impact Site	Ranged from 10 years post fire to approximately 15 years. Disturbance levels were low with occasional camel tracks and very low total grazing pressure.

Vegetation Community	Description	Recorded at	Disturbances observed
Triodia schinzii hummock grassland with scattered *Eremophila forrestii* and emergent *Eucalyptus youngiana*	Sandplains of interdune swales with *Triodia schinzii* (Feather-top Spinifex) hummock grassland with emergent *Eucalyptus youngiana* (Ooldea mallee) with scattered taller shrubs including *Grevillea juncifolia* (Honeysuckle Spider-flower), *Acacia ligulata* (Sandhill Wattle) and *A. pachyacra* (Shiny-pod Wattle). Moderately dense stands of the low shrub *Androcalva loxophylla* (Rulingia) are present throughout together with scattered *Eremophila forrestii* (Forrest's Emubush) and *Dicrastylis exsuccosa* (Rusty Sand Sage).	Site 9 Impact Site	Approximately 15 years post fire. Disturbance levels were low with occasional camel tracks and very low total grazing pressure noted.

6.2.5 Flora and fauna

The ecological survey did not identify any EPBC Act or Western Australian *Biodiversity Conservation Act 2016* (BC Act) listed Threatened species, nor any flora species listed as Priority by DBCA. The ecological survey did record tracks and diggings of the Brush-tailed Mulgara.

A search of the DBCA Threatened and Priority flora database and the WA Herbarium database identified 33 flora species listed as Priority species by DBCA (Figure 6-7). No Threatened flora listed under the BC Act or the Commonwealth EPBC Act were identified in the search. Those species identified from the DBCA searches are detailed in Table 6-6. Of these 11 were assessed as potentially occurring in the proposed action area.

Table 6-6. Priority listed flora species identified from State databases

Species Name	Conservation Status	Species Name	Conservation Status
Eremophila aureivisca	Priority 1	*Acacia eremophila* var. Numerous-nerved variant (A.S. George 11924)	Priority 3
Korthalsella leucothrix	Priority 1	*Bossiaea eremaea*	Priority 3
Neurachne lanigera	Priority 1	*Elatine macrocalyx*	Priority 3
Verticordia mirabilis	Priority 1	*Eleocharis papillosa*	Priority 3
Abutilon sp. Warburton (A.S. George 8164)	Priority 1	*Goodenia lyrata*	Priority 3
Aenictophyton anomalum	Priority 1	*Grevillea obliquistigma* subsp. *cullenii*	Priority 3
Eragrostis sp. Lake Carey (J. Paterson & J. Warden WB 40825)	Priority 1	*Melaleuca apostiba*	Priority 3
Grevillea sp. Victoria Desert (R. Davis et al. RD 11611)	Priority 1	*Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94)	Priority 3
Labichea deserticola	Priority 1	*Sporobolus blakei*	Priority 3
Micromyrtus helmsii	Priority 1	*Thryptomene nealensis*	Priority 3
Calytrix warburtonensis	Priority 2	*Verticordia jamiesonii*	Priority 3
Dampiera eriantha	Priority 2	*Conospermum toddii*	Priority 4
Eremophila undulata	Priority 2	*Comesperma viscidulum*	Priority 4
Caesia sp. Great Victoria Desert (C. Tauss 2835)	Priority 2	*Frankenia glomerata*	Priority 4
Calytrix gypsophila	Priority 2	*Grevillea secunda*	Priority 4
Eremophila jamesiorum	Priority 2	*Olearia arida*	Priority 4
Grammosolen odgersii subsp. *odgersii*	Priority 2		

Green highlighting indicates species potentially occurring within the proposed action area.

A search of the DBCA Threatened and Priority fauna database identified 15 conservation significant species potentially occurring within the proposed action area (Table 6-7; Figure 6-8). Additionally, DBCA advised that the proposed action area is within the potential range of the Arid Bronze Azure Butterfly's host ant. The ecological survey did not identify any Eucalypts that are habitat for the host ant of the Arid Bronze Azure Butterfly.

Table 6-7. Conservation significant fauna species identified from State databases

Species Name	Common Name	Conservation Status	Likelihood of occurrence
Mammals			
Dasycercus blythi	Brush-tailed Mulgara	Priority 4 (DBCA)	Likely
Dasycercus cristicauda	Crest-tailed Mulgara	Priority 4 (DBCA)	Potential
Notoryctes typhlops	Southern Marsupial Mole	Priority 4 (DBCA)	Potential
Birds			
Falco peregrinus	Peregrine Falcon	Other Specially Protected Fauna (BC Act)	Potential
*Amytornis striatus striatus**	Striated Grasswren (sandplain)	Priority 4 (DBCA)	Likely
Amytornis textilis textilis	Western Grasswren	Priority 4 (DBCA)	Unlikely
Reptiles			
Anilios margaretae	Buff Snouted Blind Snake (Lake Throssell)	Priority 2 (DBCA)	Unlikely

*A taxonomic revision for the species was completed in 2020. The WA subspecies found in the Great Victoria Desert is now known as *Amytornis striatus rowleyi*. This species is not listed under the EPBC Act

A search of the WA Museum records was undertaken to identify any invertebrates within the proposed action area that may represent Short-Range Endemic (SRE) species. The results consisted of specimens from 25 families of spider, three families of pseudoscorpions and two families of millipede. None are considered likely to be SREs, through Harvey (2002) notes that the two millipede families recorded are considered 'unknown' in their potential to be SREs. None of the invertebrate families listed include species that are listed under the EPBC Act or BC Act. The ecological survey did not record any habitats that are suitable for SREs to occur.

Fauna habitats within the disturbance footprint for the proposed action consist of sandplain (interdunal swales), dunes and shrublands. In general, fauna habitats were considered to be in good condition with minimal weeds present and little grazing pressure evident. The proposed action area and particularly the development footprint have been subject to recent fires which reduces their suitability for a range of fauna species, in particular the Tjakura, Greater Bilby, Malleefowl and Sandhill Dunnart, all of which prefer larger spinifex clumps, increased structural diversity and higher litter levels associated with long unburnt habitat. The maximum time since fire at any of the sites was estimated to be less than 20 years with many sites last experiencing fire in the last five to 10 years. The quality of the fauna habitats present was considered to be consistent across the generally area. With no areas noted to be in better or worse condition than the surrounding landscape. Areas of higher value for fauna, such as large trees, trees with hollows and denser stands of vegetation, have been avoided during siting and will continue to be avoided during the construction phase.

LEGEND

Proposed Action Area

Threatened and Priority Fauna (DBCA)

- Amytornis striatus striatus
- Amytornis textilis textilis
- Anilios margaretae
- Dasycercus blythi
- Dasycercus cristicauda
- Dasyurus geoffroii
- Falco hypoleucos
- Falco peregrinus
- Leipoa ocellata
- Liopholis kintorei
- Notoryctes sp.
- Notoryctes typhlops
- Polytelis alexandrae

Roads

- Secondary Road
- Track

0 25 50

Kilometres

N

A4 1:1,300,000

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Figure 6-8: State Threatened and Priority listed fauna records

Data Sources: Geosciences Australia (2006); Threatened and Priority Fauna - DBCA. Imagery Sources: ESRI Online Imagery Services
\\ausyd0vs01\GISDefence\IS489800_Laverton_NTDA\Apps\ArcPro\Figures\IS489800_FIGURES.aprx/IS489800_RCA_Fig2.6_SigFaunaRecs_A4L | Date: 29/10/2024

6.2.6 Bushfire

With the exception of Yeo Lake, the entire proposed action area is declared bushfire-prone land. The bushfire season for southern WA is usually declared for October to April. Higher afternoon wind speeds are predominantly from the west and north-west during late spring, swinging around to the south-east and east during summer when conditions are dry, and temperatures rise. Easterly winds predominate during the final months of the bushfire season.

The topography of the proposed action area is largely flat to gently undulating, with east-west aligned dunes (Figure 6-3). A line of escarpments running north-south in the central-east of the proposed action area may act as a barrier to fire spread under moderate fire weather conditions, otherwise topography is not likely to be a major factor in determining bushfire spread.

The Great Victora Desert is subject to cycles of hot spring/summer fires over very large areas, followed by periods of lower fire activity (Burrows and Chapman, 2018; Moro et al, 2022). This cycle is predominantly driven by post-fire fuel accumulation with rainfall. The dominant vegetation of spinifex grasslands, mulga and mallee eucalypts are highly flammable, when fuel has been left to accumulate and in dangerous fire weather. Spinifex communities rely on fire, at appropriate intervals (minimum 5-10 years; Burrows & Chapman, 2018), for persistence. Conversely, mulga and Callitris groves found in the region are not likely to carry a low-intensity fire due to low fuel cover, but can be killed by hot, intense fires. Mulga communities may regenerate from a soil-stored seed bank but require at least 26 years between such lethal fires.

Burrows and Chapman (2018) suggests the current regime of large-scale fires in the Great Victoria Desert is due to the lack of bushfire fuel management in the region post-European colonisation. Traditional fire management involved smaller and more frequent fires, creating fine-grained habitat mosaics and preventing the accumulation of bushfire fuel to the extent needed to support large-scale, hot fires. Available records indicate fires prior to the displacement of the Traditional Owners were several orders of magnitude smaller than those experienced subsequently. Reinstatement of traditional fire management practices in the region is likely to have biodiversity and carbon sequestration benefits, as well as avoiding impacts to human health or assets associated with large fires in the region. Moro et al. (2022) imply this reinstatement is beginning to occur, which may reduce the risk of landscape fire and subsequent bushfire risk to and from Defence activities. The bushfire history of the proposed action area shows that the time since the last burn ranges from 24 years to 1 year (Figure 6-9).

Sources of ignition in the Great Victorian Desert include:

- Lightning
- Arson/skylarking
- Discarded cigarettes (e.g. along roads)
- Planned burns in Indigenous Protected Areas and on conservation lands.

LEGEND

Proposed Action Area

Time Since Last Burnt 2000-2022 (NAFI)

Years

1.0

24

Roads

Secondary Road

Track

0 25 50

Kilometres

N

A4 1:1,300,000

GDA2020 MGA Zone 51

Figure 6-9: Bushfire History

Data Sources: Geosciences Australia (2006); Fire Data - NAFI. Imagery Sources: ESRI Online Imagery Services
\\ausyd0vs01\GISDefence\IS489800_Laverton_NTDA\Apps\ArcPro\Figures\IS489800_FIGURES.aprx/IS489800_RCA_Fig3.3_BushfireHistory_A4L | Date: 29/10/2024

6.2.7 Heritage

6.2.7.1 Native title

There are two Native Title determinations over the proposed action area (Figure 6-10):

- The Nangaanya-ku people hold native title over the western port of the proposed action area.
- The Ngaanyatjarra people hold native title over the eastern portion of the proposed action area.

The Nangaanya-ku are represented by the Barra Parrapi Aboriginal Corporation (BPAC) while the Ngaanyatjarra Council represents the interests of the Ngaanyatjarra people.

6.2.7.2 Indigenous occupation

Despite being one of the harshest environments in the world for sustaining human populations, the Western Desert has been occupied by Indigenous people for many thousands of years. Excavation of rock shelters across the arid zone show that Indigenous people were occupying the landscape as early as around 50,000 years ago. Investigations at Karnatukul (Serpent's Glen) in the Wiluna area resulted in the excavation of a lithic assemblage of over 25,000 artefacts, including a geometric backed artefact dated to 45,570-41,650 cal. BP (McDonald et al. 2018). Other early dates of 35,000-20,000 BP from rock shelters include those from Puritjarra and Kulpi Mara (Smith et al. 1997; Thorley et al. 2011), and sites in the Pilbara region (e.g. Morse et al. 2014). Ochre mines were also being exploited in the region by 32,000 years ago (Smith et al. 1998).

6.2.7.3 Ethnographic information

According to Tindale's (1974) map of Indigenous group boundaries existing at the time of first European settlement in Australia, the proposed action area was occupied by the Ngadadjara (Ngaanyatjarra) in the west, and the Mandjindja in the east, with Waljen bordering the Ngadadjara to the south of Laverton, the Tjalkadjara west of Lake Throssell, and the Nana bordering the Ngadadjara and Mandjindja to the north and west, respectively (Figure 6-11).

The lands of the Ngadadjara are described by Tindale (1974) as covering an area of 78,000 square kilometres, including the Warburton Ranges and extending east to Fort Welcome, the Blackstone Ranges, Murray Range and Mount Hinckley; south to Wangalina; north to the Mural Crescent Range, Rawlinson Ranges and Carnegie Range; and west to Alfred Marie Ranges. The lands of the Mandjindja are described as covering an area of 54,600 square kilometres across sandhill country south of the Warburton Range, extending from Papakula (Babbagoola Rockhole) west to Lake Gillens and Lake Throssell; south to Amy Rocks and the Saunders Range; east to Lengarma to the east of Sydney Yeo Chasm; and south-east to Wardadikanja, an emu totem place (Tindale, 1974). The Waljen are described as covering an area of 15,600 square kilometres, including east of Lake Raeside from Malcom, Morgans, Lavery and Burtville; southeast to Edjudina Soaks and Lake Lightfoot; at Lake Carey; and east to beyond Lake Minigwal (Tindale, 1974).

The Tjalkadjara covered an area of 29,400 square kilometres, including the lands northeast of Laverton to Lake Throssell west toward Darlot, at Erlistoun; and north to Lake Wells (Tindale, 1974). Tindale notes the Tjalkadjara were driven north-westward to Darlot after 1900 by pressure from Nangatadjara, and that 'possession of their red ochre mine at Taralguta, north of Laverton, was a cause of conflict with other tribespeople. The lands of the Nana covered 52,000 square kilometres to the east and northeast of Lake Carnegie and Wells; west of Lake Gillen to around the Timperley Range; south to the Ernest Giles Range, north near the Hutton Range; and east near the Browne Range (Tindale, 1974).

Ngaanyatjarra is a Western Desert language of the Wati branch of the Pama-Nyungan languages (Central Desert Native Title Services 2024a). Traditional society of the Ngaanyatjarra was organised into several bands, typically made up of about a dozen individuals. The Ngaanyatjarra had a moiety system split into sun-side (Tjirntulukultul(pa)) and shade-side (Ngumpalurrungkatja), with a classification of six sections.

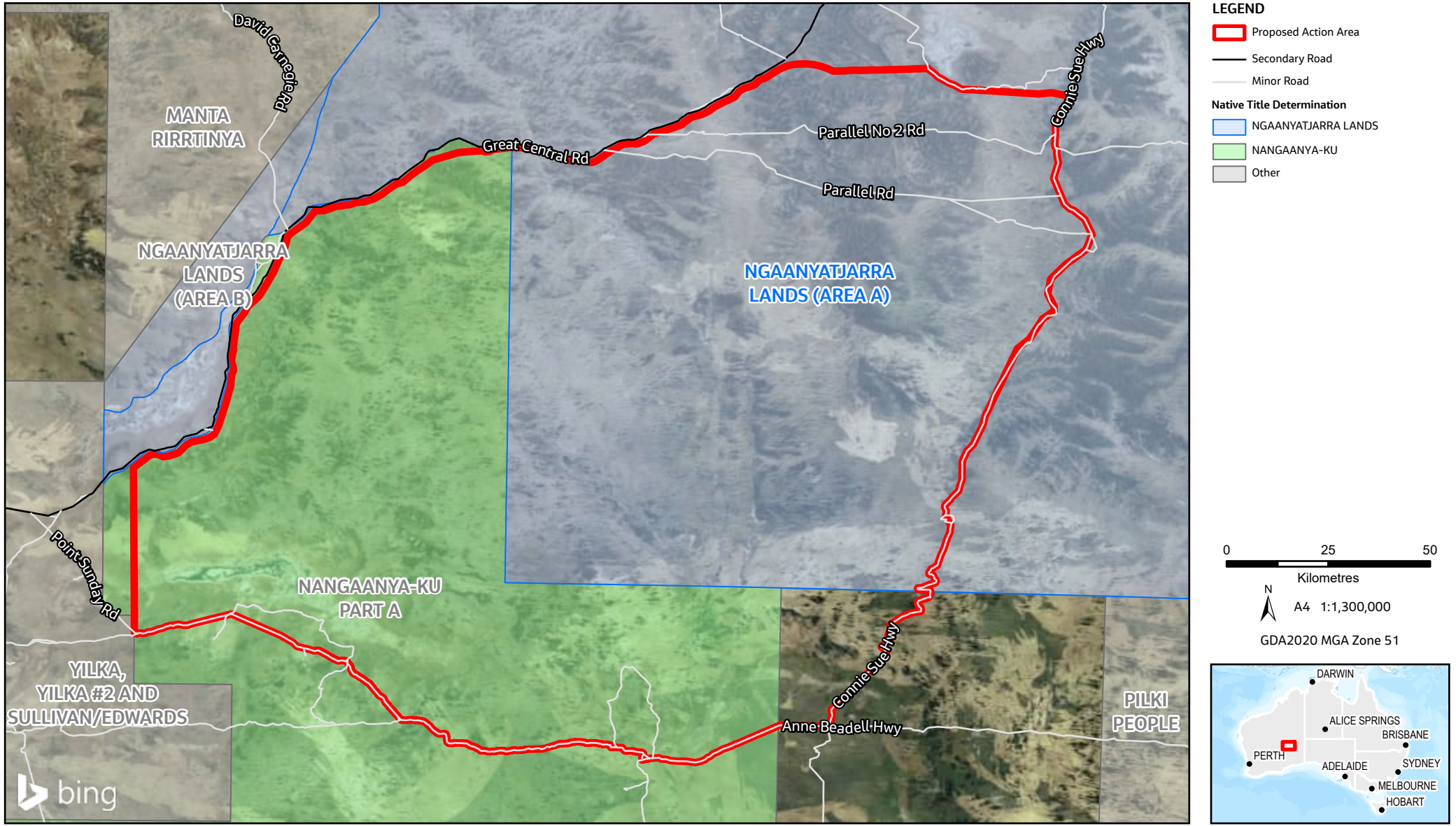

Figure 6-10: Native Title Boundaries

Data Sources: Geosciences Australia (2006); Native Title Determination - Landgate. Imagery Sources: ESRI Online Imagery Services
\\ausyd0vs01\GISDefence\IS489800_Laverton_NTDA\Apps\ArcPro\Figures\IS489800_FIGURES_ER.aprx/IS489800_HER_2_NGA_NativeTitle_A4L_RevA | Date: 30/08/2024

The Nangaanya-ku Native Title holders of the west of the proposed action area identify as Wongatha people and/or Spinifex people (Pila Nguru). Wongatha is a language group and identity of eight Indigenous peoples of the north-eastern Goldfields region: Maduwongga, Waljen, Ngurlutjarra, Ngaantatjarra, Bindinni, Madatjarra, Koara (Kuwarra) and Tjalkatjarra, originating from what is now known as Coolgardie, Kalgoorlie, Menzies, Leonora and Laverton. Several Western Desert language dialects are spoken, including Wongatha, Ngaanyatjarra and Pitjantjatjara. Pila Nguru people's lands extends to the border with South Australia and to the north of the Nullabor Plain, and is centred at Tjuntjunjarra in the Great Victoria Desert (Cane, 2002). Pila Nguru speak southern western dialects of the Wati language division of the Parma-Nyungan languages (Central Desert Native Title Services, 2024b).

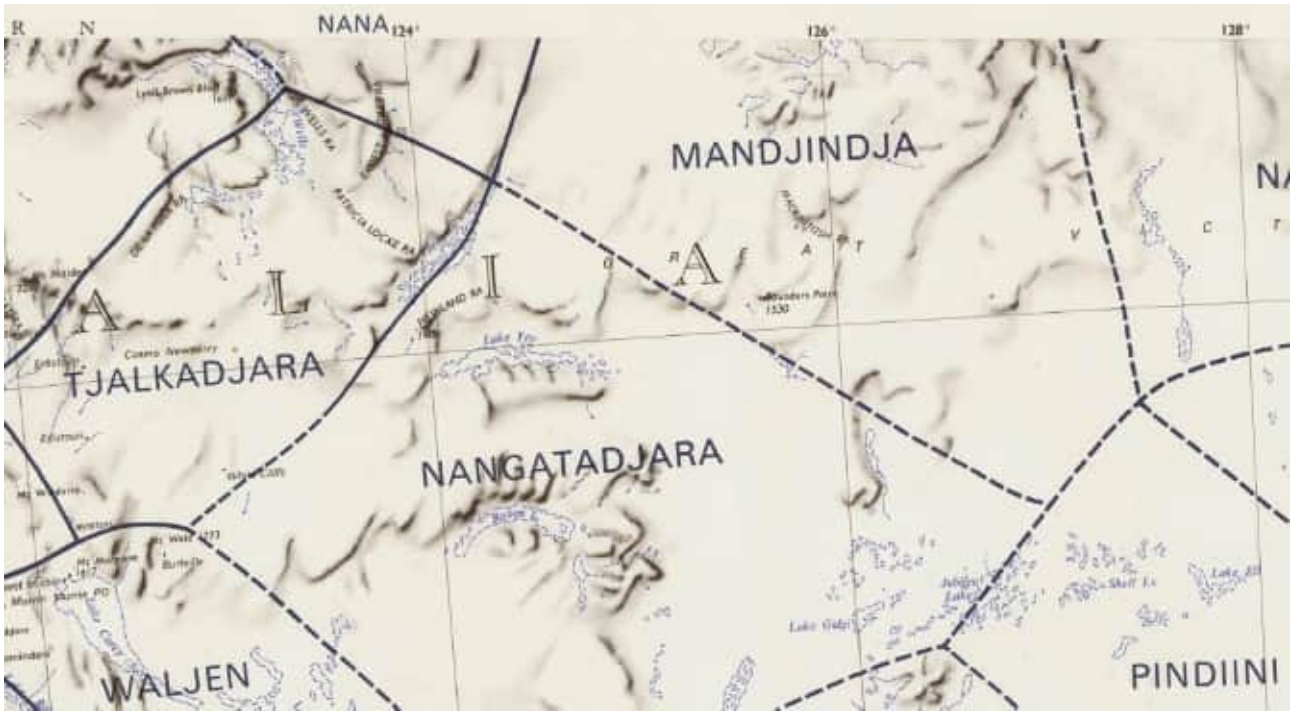

Figure 6-11. Detail of Tindale's (1974) Tribal Boundaries in Aboriginal Australia map

6.2.7.4 Contact and post-contact period

Post-contact history began in the late 19th century when European explorers including Forrest (1869), Giles (1875) and Carnegie (1893) travelled through the region. However, up until the 1890s and early 20th century, interactions between Indigenous people and Europeans were infrequent and without the major disruption and displacement caused across other parts of Australia.

In 1921, a mission was established by the United Aborigines Mission at Mount Margaret, 20 km south-west of Laverton, which drew Indigenous people from surrounding areas, including many Wongatha people (Morgan, 1986). By the end of the 1920s, a school, dormitories and various business ventures had been established. During this time, numerous children were taken from their families by force and sent to the mission in accordance with government policy; in some cases, entire families were admitted (DLGSCI, 2024). For more than fifty years, many families came through the mission, with some staying briefly and others for a longer duration. The mission attracted individuals from as far east as the Warburton Ranges, from Wiluna in the north, and a smaller group from the south coast and south-west regions (DLGSCI 2024). The number of families residing there had diminished significantly by the end of the 1950s, and the mission was closed in 1975.

On Ngaanyatjarra Lands, the most significant European influence began in the early 1930s when William Wade and Fred Jackson established a mission in Warburton (Brooks 2013). The mission brought about profound changes to the lifestyle of Indigenous people, including the incorporation of Christianity into their traditional belief system and increased sedentism. Wade attracted Indigenous people to the mission with the offer of food, with helpers from the Goldfields who contacted small groups of desert people in the nearby hinterland (Brooks, 2011). Ngaanyatjarra people also travelled west to the Goldfields during this time, likely to seek food but also out of curiosity and to learn about white people and their ways. The mission was in fact established with the aim of halting the migration of Ngaanyatjarra people to the Goldfields region (Noble, 2002). While some people stayed at the mission, especially during 1937-1960 when it was formalised as the 'mission Home', most continued to live a traditional lifestyle (Brooks, 2011). However, by the late 1960s, the lives of most desert people in Ngaanyatjarra Lands were centred on the mission, until its closure in the 1970s. Today, Warburton (Mirlirrtjarra) remains the largest and most central of the Ngaanyatjarra communities.

6.2.8 Contamination and Unexploded Ordinance (UXO)

The proposed action area is outside Defence managed land and there is therefore no Contaminated Sites Register maintained by Defence for the proposed action area.

As search of the WA Contaminated Sites Database was undertaken on 6 August 2024. No recorded contaminated sites exist within the proposed action area. The nearest site (I.D No. 63425 – mining tenement M39/980) is located in Plumridge Lakes approximately 120 km to the southwest of the proposed action area's southern extent. The site is classified as 'Contaminated – remediation required' due to the presence of hydrocarbon-impacted soils and groundwater. Given the distance of the site from the proposed action area (more than 100 km) it is not likely that the proposed action area will be affected by contamination from this site.

No historical activities, commercial/industrial uses of the land or storage of pollutants, chemicals and toxic substances which could represent a potential source of contamination are known to have occurred in the proposed action area. Tjukayirla Roadhouse is located on the northern boundary of the proposed action area, along the Great Central Road. While no contamination investigations have been undertaken for the roadhouse, there is a potential for hydrocarbon contamination from underground fuel storage tanks. Given the depth the groundwater is generally greater than 20 m below ground level, it is not likely that any contamination from the roadhouse would have reached the groundwater table, resulting in a contaminated plume. Any contamination present is therefore likely to be contained to the immediate vicinity of the underground storage tanks.

The presence of small arms ammunition, explosive ordnance waste and/or UXO has not been recorded within the proposed action area based on the mapping available.

7. Matters of National Environmental Significance

7.1.1 EPBC Act Protected Matters summary

A summary of Matters of National Environmental Significance (MNES) from the EPBC Act Protected Matters Search Tool (PMST) report is provided in Table 7-1. The PMST search area extent comprised the proposed action area and a 10 km buffer (the original PMST search area).

A new search of the PMST was undertaken on 28/08/2024 to confirm the relevant MNES and other protected matters. The search area consisted of the portion of the proposed action area which encompasses the disturbance footprint (revised search area). Both reports are provided in Appendix C along with a screenshot of the PMST search tool showing the original PMST search area and the revised PMST search area.

Table 7-1. Summary of PMST report

MNES	Relevance to the proposed action
World Heritage Properties	**Not relevant to the proposed action** There are no World Heritage Properties within the PMST search area. The closest World Heritage Area to the proposed action area is the Uluru - Kata Tjuta National Park, approximately 450 km northeast of the proposed action area. Given the distance and nature of the proposed action, it is not likely that the proposed action would significantly damage the Uluru - Kata Tjuta National Park.
National Heritage Places	**Not relevant to the proposed action** There are no National Heritage Places within the PMST search area. The closest National Heritage Place to the proposed action area is the Uluru - Kata Tjuta National Park, approximately 450 km northeast of the proposed action area. Given the distance and nature of the proposed action, it is not likely that the proposed action would significantly damage the Uluru - Kata Tjuta National Park.
Wetlands of International Importance (Ramsar wetlands)	**Not relevant to the proposed action** There are no Wetlands of International Importance (Ramsar wetlands) within the PMST search area. The closest Ramsar wetland to the proposed action area is Eighty-mile Beach, approximately 840 km northwest of the proposed action area. Given the distance and nature of the proposed action, it is not likely that the proposed action would significantly damage the Eighty-mile Beach Ramsar wetland.
Listed Threatened Ecological Communities (TEC)	**Not relevant to the proposed action** There are no listed TECs within the PMST search area. The closest listed TEC to the proposed action area is approximately 480 km southwest of the proposed action area. Given the distance and nature of the proposed action, it is not likely that the proposed action would significantly damage listed TECs.
Listed Threatened species	**Relevant to the proposed action** The PMST search identified eleven listed Threatened species within PMST search area, including six birds, two mammals, one reptile and two plants. These species are listed in Section 7.1.2. Of note, the revised PMST search did not return the two Threatened flora species.

MNES	Relevance to the proposed action
Listed Migratory species	**Relevant to the proposed action** The PMST search identified seven listed Migratory bird species within the PMST search area. These species are listed in Section 7.1.3.
Commonwealth Marine Area	**Not relevant to the proposed action** No Commonwealth Marine Areas are recorded within the PMST search area. The proposed action area is over 400 km away from the nearest marine environment. The proposed action is being entirely being undertaken within the proposed action area and is not expected to impact on listed marine species.
Great Barrier Reef Marine Park	**Not relevant to the proposed action** The proposed action is located in WA, over 2,000 km from the Great Barrier Reef Marine Park. Given the distance and nature of the proposed action, it is not likely that the proposed action would significantly impact the Great Barrier Reef Marine Park.
Nuclear actions	**Not relevant to the proposed action** The proposed action is not a nuclear action.
A water resource, in relation to coal seam gas development and large coal mining development.	**Not relevant to the proposed action** The proposed action is not a coal seam gas development or a large coal mining development.

7.1.2 EPBC Act listed Threatened species

7.1.2.1 Fauna

No direct sightings and no secondary evidence (such as tracks, scats, burrows or calls) of species listed as Threatened under the EPBC Act were recorded during the field surveys.

The following nine Threatened fauna species listed under the EPBC Act were identified through the PMST search:

- Night Parrot (*Pezoporus occidentalis*) – Endangered;
- Sharp-tailed Sandpiper (*Calidris acuminata*) – Vulnerable, Migratory;
- Grey Falcon (*Falco hypoleucos*) – Vulnerable;
- Malleefowl (*Leipoa ocellata*) – Vulnerable;
- Princess Parrot (*Polytelis alexandrae*) – Vulnerable;
- Southern Whiteface (*Aphelocephala leucopsis*) – Vulnerable;
- Sandhill Dunnart (*Sminthopsis psammophila*) – Endangered;
- Greater Bilby (*Macrotis lagotis*) – Vulnerable; and
- Tjakura, Great Desert Skink (*Liopholis kintorei*) – Vulnerable.

Based on the habitat preferences of the species, modelled distributions and results of the ecological survey, a likelihood of occurrence assessment was completed for EPBC Act listed Threatened fauna species (Appendix D). The following species are considered to potentially occur within the proposed action area:

- Sandhill Dunnart;
- Southern Whiteface;
- Grey Falcon;
- Malleefowl;
- Princess Parrot; and
- Tjakura (Great Desert Skink).

Habitat for the Tjakura was present at the working accommodation and impact sites as well as along the access track. Habitat for the Sandhill Dunnart was confined to the access track, where it potentially crosses dunes. The Southern Whiteface, Malleefowl and Princess Parrot could potentially be found in shrubland vegetation communities along the access track but would not be present in the *Triodia* hummock grasslands typically found at the working accommodation and impact sites. The exception being Impact site T1, which is adjacent to mature Marble Gum open woodland with tree hollows which provides nesting habitat for the Princess Parrot. The Grey Falcon would make use of the entire proposed action area for hunting.

7.1.2.2 Flora

No flora listed as Threatened under the EPBC Act were recorded during the ecological survey.

The original PMST search identified the following Threatened plant species listed under the EPBC Act within the PMST search area:

- Mt Finke Grevillea (*Grevillea treueriana*) – Vulnerable
- Ooldea Guinea-flower (*Hibbertia crispula*) – Vulnerable

Grevillea treueriana has not been recorded by the WA herbarium within the State. The South Australian Herbarium record for the species includes a note stating "*Mr D. McGillivray reports that WA. populations formerly placed with this species are separate species*" (Department of Environment, Water and Natural Resources, 2007). It is therefore considered that the species does not occur within the proposed action area.

Hibbertia crispula was not identified in the revised PMST search and is therefore unlikely to occur within the disturbance footprint of the proposed action.

7.1.3 EPBC Act listed Migratory species

No direct sightings and no secondary evidence (such as tracks, scats, burrows or calls) of migratory fauna species were recorded during the field surveys.

The PMST identified the following seven Migratory bird species listed under the EPBC Act within the PMST search area:

- Sharp-tailed Sandpiper (*Calidris acuminata*) – Vulnerable, Migratory
- Common Sandpiper (*Actitis hypoleucos*) – Migratory
- Fork-tailed Swift (*Apus pacificus*) – Migratory
- Grey Wagtail (*Motacilla cinerea*) – Migratory
- Oriental Plover (*Charadrius veredus*) – Migratory
- Pectoral Sandpiper (*Calidris melanotos*) – Migratory

- Yellow Wagtail (*Motacilla flava*) – Migratory.

Based on the habitat preferences of the species, modelled distributions and results of the ecological survey, a likelihood of occurrence assessment was completed for EPBC Act listed Migratory fauna species (Appendix D). Only the Fork-tailed Swift was identified as having the potential to occur. If this species does occur it will likely to be overflying the proposed action area. The species spends the majority of its time in the air, feeding, roosting and sleeping on the wing (Birdlife Australia, 2023). The remainder of the Migratory bird species are unlikely to occur.

8. Environmental risk assessment

An environmental risk assessment was undertaken for the proposed action, in accordance with the requirements of the Environmental Report Guidelines (Draft V4, 2024) and the Defence Estate and Infrastructure Group's Risk Management Framework (V1, 2016a) and Risk Management Process (V1 2016b). For the potential impacts identified, the risk assessment including ratings for the initial risk (without any mitigations) and the residual risk (once mitigations have been applied). The full risk assessment is provided in Appendix E.

A total of 28 potential impacts have been identified with 15 of these having an initial risk rating of low and 13 medium risks. No high or severe risks have been identified.

Potential risks are discussed further in Section 9. Mitigation measures proposed to manage the potential impacts are discussed in Section 10 and the residual risks described in Section 11.

9. Potential impacts

9.1 Matters of National Environmental Significance

The potential impacts to MNES identified in the risk assessment are shown in Table 9-1.

Table 9-1. Potential impacts to MNES

Risk, threat or hazard	Potential impacts
Clearing for access track, working accommodation site or impact site	▪ Clearing of trees with breeding hollows for Princess Parrot ▪ Clearing of shrubland habitat for Malleefowl, Southern Whiteface ▪ Clearing of tall trees that could be used by Grey Falcon for nesting or roosting ▪ Clearing of sandplain habitat occupied by Tjakura ▪ Clearing of hunting habitat for Grey Falcon ▪ Mortality of Tjakura, Princess Parrot, Sandhill Dunnart, Malleefowl
Dune crossing for access track	Clearing of dune habitat occupied by Sandhill Dunnart
Vehicle traffic along access track (day and night)	Mortality of Tjakura, Princess Parrot, Sandhill Dunnart, Malleefowl
[redacted]	Mortality of Tjakura or Grey Falcon
Excavation [redacted]	▪ Clearing of sandplain habitat occupied by Tjakura ▪ Clearing of hunting habitat for Grey Falcon ▪ Mortality of Tjakura
Presence of access track	Barrier to movement of Tjakura and Sandhill Dunnart
Introduction of weeds to proposed action area	Degradation of habitat for Threatened fauna

9.2 Whole of environment

The potential impacts to the whole of the environment identified in the risk assessment are provided in Table 9-2

Table 9-2. Potential whole of environment impacts

Risk, threat or hazard	Potential impacts
Presence of access track	▪ Increased presence of feral predators via access track providing access to proposed action area
Clearing for access track, working accommodation site or impact site	▪ Previously unknown Aboriginal artifacts are encountered and disturbed
Dune crossings for access track	▪ Mortality of burrowing species (blind snakes, southern marsupial mole) ▪ Destabilisation and erosion of dune
Vehicle traffic along access track (day and night)	▪ Mortality of fauna
Noise and light emissions from working accommodation sites	▪ Avoidance of working accommodation sites by fauna

Risk, threat or hazard	Potential impacts
[redacted]	▪ Mortality of fauna ▪ Bushfire ignition
[redacted]	▪ Localised soil contamination
Excavation [redacted]	▪ Mortality of burrowing fauna ▪ Previously unknown Aboriginal artifacts are encountered and disturbed
Storage and use of hydrocarbons and other chemicals	▪ Soil contamination from spills and leaks of hydrocarbons or other chemicals
Launch areas for UAVs/aircraft	▪ Soil contamination from propellant used to launch
Leak of sewerage from self-contained units	▪ Contamination of soils, death of adjacent vegetation and health risk to fauna
Compaction of access track and working accommodation sites	▪ Flora are unable to establish once the proposed action area is no longer required for Defence operations (or by Traditional Owners)
Putrescible waste stores	▪ Attraction of fauna to working accommodation sites (including feral fauna)
Exclusion of non-Defence personnel from proposed action area	▪ Traditional Owners are unable to access sites

10. Mitigation measures

The mitigation measures proposed to manage the potential impacts of the proposed action along with timeframes for implementation and targets or outcomes to be achieved are detailed in Table 10-1. It is noted that an Environmental Clearance Certificate will be required for the proposed action and that the mitigation measures noted below will be incorporated into either a Construction Environmental Management Plan (CEMP) and/or RAAF Standard Operating Procedures (SOPs) [redacted] the DA.

Table 10-1. Proposed mitigation measures

Category	Mitigation measure	Timeframe	Target/outcome	Management Plan
Vegetation	Areas to be cleared will be clearly marked on the ground and communicated to personnel prior to commencing works.	Prior to and during clearing activities.	No clearing outside of required areas.	CEMP
Vegetation	Clearing will be minimised to the extent required for safe operational use.	Design.	Clearing area is not larger than that required for operational use, including any bushfire risk management requirements.	CEMP
Vegetation	All machinery, vehicles, infrastructure and equipment will be inspected prior to departing for site to confirm no soil or vegetative matter is attached. Should soil or vegetative matter be identified, the relevant item shall be cleaned to remove the soil/vegetative matter.	Prior to mobilisation.	All machinery, vehicles, infrastructure and equipment inspected and confirmed clean.	CEMP RAAF SOPs/[redacted]
Vegetation	Unless otherwise authorised, vehicles (other than those required for clearing operations or [redacted]) shall remain on defined roads/tracks to avoid spreading existing weed occurrences.	All site-based phases.	No incidents of unauthorised off-road driving.	CEMP RAAF SOPs/[redacted]

Category	Mitigation measure	Timeframe	Target/outcome	Management Plan
Vegetation and Fauna	Clearing of large trees will be minimised through micro-siting of working accommodation and impact sites and micro-adjustments to the access track alignment. A tree is defined as a woody plant more than 5m tall with a stem diameter larger than 10 cm at 1.4 m above the ground. A large tree is defined as having a stem diameter larger than 20 cm at 1.4 m above the ground (diameter at breast height)	Design and during clearing activities.	Clearing of large trees avoided where practical.	CEMP
Vegetation and Fauna	Clearing of shrubland/woodland habitat associated with Impact Sites T1, T2 and T3 will be minimised through micro-siting [redacted].	Design and during clearing activities.	Clearing of shrubland habitat at impact sites avoided where practical.	CEMP
Vegetation and Fauna	The CEMP for the proposed action will include measures that support the decommissioning of the site and reestablishment of vegetation. This may include the following measures: ▪ Topsoil removal and stockpiling methodology, including locations of stockpiles. It is expected that topsoil will be windrowed at the edges of Working Accommodation and Impact sites and along one side of the access track. Based on typical soils of the Great Victoria Desert, topsoil is nominally considered to be the top 80 cm of the soil profile. ▪ Vegetation clearing and stockpiling methodology, including locations of stockpiles. It is expected that cleared	Prior to clearing activities and reviewed prior to the end of the proposed action.	All sites and tracks not handed over to Traditional Owners for their ongoing use have been treated in accordance with the CEMP.	CEMP

Category	Mitigation measure	Timeframe	Target/outcome	Management Plan
	vegetation will be windrowed at the edges of working accommodation and impact sites and along one side of the access track. ▪ Consultation with Traditional Owners in accordance with the ILUA and/or relevant RAAF Standard Operating Procedure (SOP) ▪ Remediation of contamination at the completion of the proposed action in line with requirements under the WA *Contaminated Sites Act 2003* and Contaminated Sites Regulation 2006. ▪ Earthworks requirements and methodology to address soil compaction and/or changes to topography resulting from the project. The specific methods to be implemented will depend upon the equipment and machinery available and may include: - deep ripping/tillage of compacted areas to break up compaction improve water penetration and roughen the surface to promote retention of organic matter and seeds on site. - reshaping of disturbed areas with dozers, graders, or similar to blend with the surrounding topography and reinstate surface water (sheet) flow to avoid ponding and waterlogging of soils. ▪ Methodology for respreading of topsoil and retained vegetation to promote natural regeneration of vegetation, provide			

Category	Mitigation measure	Timeframe	Target/outcome	Management Plan
	cover/habitat for fauna and minimise erosion risk. The specific methods to be implemented will depend upon the equipment and machinery available and may include: - Once other earthworks activities are complete, respreading of stockpiled topsoil to a minimum depth of 50 mm using a dozer, grader or similar. - Following topsoil respreading, distribute stockpiled vegetation across the disturbed area using a dozer or similar. Density of vegetation may vary and will depend upon the type of vegetation and topology of the area. It is expected that areas that are likely to be at higher risk of erosion (e.g. dunes or other high points) will have a higher density of respread vegetation to manage this risk.			
Fauna	A walkover of the area to be cleared will be undertaken to identify if fauna individuals are present. Where fauna are present, the animal/s will be encouraged, through movement or noise, to move away from the clearing area. This may include the use of engine noise as a deterrent or 'shepherding' the individual/s from the clearing area. Capture and relocation of individuals may be used if other methods are not successful. Such action is to be undertaken by a person qualified	Immediately prior to initial clearing.	Fauna presence minimised so far as reasonably practicable prior to clearing activities.	CEMP

Category	Mitigation measure	Timeframe	Target/outcome	Management Plan
	in handling the relevant fauna (e.g. trained snake catchers).			
Fauna	Impact sites will be assessed by an ecologist prior to initial clearing to confirm area of least impact to burrow dwelling fauna (e.g. Tjakura, Mulgara) is cleared.	Four to six weeks prior to initial clearing/controlled burning of impact sites. Note: this assessment can be undertaken in advance of mobilisation of construction contractor.	All impact sites assessed by ecologist .	CEMP
Fauna	All fauna mortalities and injuries will be reported as required under environmental incident reporting procedures. Where Threatened fauna are injured or killed, additional reporting to DCCEEW may be required. This reporting will be undertaken by DEPAC.	All site-based phases.	All fauna mortalities and injuries are reported as required by environmental incident reporting procedures. Records of injuries/mortalities reviewed at completion of each operational period to identify trends and/or if changes to procedures may be required to reduce these incidents.	CEMP RAAF SOPs/[redacted]
Fauna	All personnel are aware of reasons for and requirement not to feed animals.	All site-based phases.	No feeding of fauna (including feral fauna).	CEMP RAAF SOPs/[redacted]
Fauna	All excavations will be undertaken slowly with a spotter present to identify if any burrowing species are present. Should live burrowing fauna be observed, excavations will cease for a period of 5 – 10 minutes to allow the animal time to burrow away from the excavation. Burrowing fauna likely to be encountered will primarily be	[redacted] activities requiring excavation.	Spotter present for all excavation activities.	RAAF SOPs/[redacted]

Category	Mitigation measure	Timeframe	Target/outcome	Management Plan
	blind snakes or marsupial moles. Both are known to move rapidly through sandy soils. Should dead burrowing fauna be observed, this will be reported as an environmental incident. Note: The spotter does not need to be a trained ecologist as no identification or handling of fauna is expected.			
Fauna	Driving at dusk and dawn will be minimised so far as reasonably practical as these times present a higher risk of vehicle/animal collisions.	All site-based phases.	Non-essential vehicle movements minimised at dawn and dusk.	CEMP RAAF SOPs/[redacted]
Fauna	External lighting will be minimised to reduce potential for negative effects to nocturnal fauna	All site-based phases.	Review of site setup confirms no unnecessary external lighting.	CEMP RAAF SOPs/[redacted]
Fauna	Putrescible wastes contained within enclosed/sealed waste containers to minimise potential to attract fauna.	All site-based phases.	Site inventory includes lids for all bins/waste containers that may include food or other organic wastes. All wastes removed from site.	CEMP RAAF SOPs/[redacted]
Clearing, Sedimentation and erosion	Where water is required to be applied to cleared areas or during construction to reduce dust generation, this will be undertaken at a rate that minimises or eliminates runoff.	During construction.	Ponding or runoff during construction minimised.	CEMP
Clearing, Sedimentation and Erosion	The access track will not cross dunes unless unavoidable. Where clearing of dune habitat is required, cleared area to be reduced to the minimum viable for safe transit	Design and during clearing activities.	Disturbance of dune habitats minimised to extent necessary.	CEMP

Category	Mitigation measure	Timeframe	Target/outcome	Management Plan
Clearing, Sedimentation and Erosion	Dune crossings will be stabilised to minimise the risk of erosion of the dune. This may consist of using rock/gravel armouring, geotextile fabric, covering exposed areas with cleared vegetation, or a combination of these approaches.	During access track construction.	Erosion of dunes as a result of dune crossings is minimised so far as reasonably practicable.	CEMP
Heritage	Consult with Traditional Owners regarding the final alignment of the access track to determine if any additional survey or mitigations are required.	Design.	Consultation with Traditional Owners undertaken.	N/A
Heritage	Cultural heritage awareness training included as part of DA induction. Training should be present by or in collaboration with Traditional Owner representative.	All site-based phases.	Cultural heritage awareness training included in induction.	CEMP RAAF SOPs/[redacted]
Heritage	Heritage monitors to be on site during initial clearing and topsoil removal. Impact sites have been reviewed by Traditional Owners as part of site optioneering field investigations and confirmed to be low risk in relation to cultural heritage value [redacted]	During initial clearing and topsoil removal activities.	Heritage monitors on site during initial clearing and topsoil removal activities.	CEMP RAAF SOPs/[redacted]
Heritage	[redacted] Traditional Owners will be consulted as to the potential presence of cultural heritage values at the location [redacted] and access route, and appropriate measures to be put in place [redacted]	[redacted]	Traditional Owners consulted as part of planning [redacted]	RAAF SOPs/[redacted]

Category	Mitigation measure	Timeframe	Target/outcome	Management Plan
Heritage	Annex F of the Defence Heritage Management Manual (Chance Finds Protocol 2: Discovery of Possible Archaeological Artifacts) shall be implemented for instances where previously unknown Aboriginal cultural heritage artifacts are uncovered during the proposed action.	All site-based phases.	Annex F of the Defence Heritage Management Manual implemented as required and Aboriginal cultural heritage artefacts protected in accordance with legislative requirements.	CEMP RAAF SOPs/[redacted]
Traditional Owners	Defence will inform Traditional Owners of each [redacted] operations period ahead of time to allow Traditional Owners to advise of any cultural requirements to access to proposed action area during that time.	As agreed in the ILUA.	Traditional Owners notified of each operational period.	RAAF SOPs/[redacted]
Traditional Owners	Open communications will be maintained with Traditional Owners during operational periods to manage any unexpected access needs.	During each operational period.	Requests for site access and decision on request documented.	RAAF SOPs/[redacted]
Bushfire	Bushfire planning will be incorporated into RAAF SOPs and/or [redacted] applicable to activities with a risk of causing accidental ignitions [redacted]. This should include postponing/cancelling activities on days of total fire bans.	Operational periods.	Bushfire planning incorporated into RAAF SOPs and/or [redacted]	RAAF SOPs/[redacted]
Chemicals and pollutants	All hydrocarbons to be stored in self-bunded containers or on bunded pallets in accordance with AS1940-2004 (The storage and handling of flammable and combustible liquids)	All site-based phases.	Hydrocarbon/chemical storages in compliance with AS1940-2004.	CEMP RAAF SOPs/[redacted]
Chemicals and pollutants	Spill kits stocked with appropriate materials for the chemicals to be used and stored on site will	All site-based phases.	Spill kits present and appropriately stocked.	CEMP

Category	Mitigation measure	Timeframe	Target/outcome	Management Plan
	be available in areas where they are stored and used. Drip trays will be used during hydrocarbon/chemical transfers.			Operational Procedures/[redacted]
Chemicals and pollutants	Ablutions and related infrastructure will be inspected in accordance with supplier/manufacturer schedule to confirm the integrity of the units	All site-based phases.	Ablutions and related infrastructure maintained in accordance with supplier/manufacturer specifications.	CEMP RAAF SOPs/[redacted]
Chemicals and pollutants	Potentially contaminated soils at working accommodation sites will be assessed and, if required, remediated prior to demobilisation	Prior to demobilisation.	All potential contamination assessed and remediated where required.	RAAF SOPs/[redacted]
Excavations[redacted]	[redacted]	[redacted]	[redacted]	RAAF SOPs/[redacted]
Excavations[redacted]	Where excavation is required, topsoil will be removed separately to subsoils (if not previously removed during the construction phase). Topsoil is nominally the top 80 cm of the soil profile. Soils within the Great Victoria Desert are typically Deep Red Sands and Red Sandy Earths, which are uniform throughout the soil profile (below the topsoil) and no further separation of excavated spoil is required. All excavations[redacted] will be filled to the extent feasible and the surface	[redacted]	All excavations[redacted] filled to the extent feasible and shaped to match the surrounding landscape.	RAAF SOPs/[redacted]

Category	Mitigation measure	Timeframe	Target/outcome	Management Plan
	shaped to match the surrounding landform. [redacted]			
Excavations [redacted]	[redacted], planning [redacted] will include an assessment of likely environmental and heritage values and impacts at the impact site and access routes. Access to the [redacted] location will avoid known heritage sites and environmental values where practical.	[redacted]	Documented assessment of likely environmental and heritage values and impacts [redacted]	RAAF SOPs/[redacted]

11. Residual impacts

11.1 Matters of National Environmental Significance

To identify the residual risks of the proposed action, the initial risk assessment detailed in Section 8 was revisited and the risks reassessed assuming effective implementation of the proposed mitigation measures. All potential impacts could be reduced to low risk with implementation of the recommended management measures. Areas that are cleared for the proposed action will be remediated unless there is an agreement with the Traditional Owners that particular sites or access tracks will be handed over for their ongoing use and maintenance. However, re-establishment of vegetation will take a number of years once initial rehabilitation activities are completed. As such, the impact of clearing will remain as a residual impact until such a time as the vegetation has established. In hummock grassland communities, successful establishment of *Triodia* species has been recorded within a year of respreading of previously cleared vegetation (Strategen, 2012) though a number of years growth will be required until large clumps are present. Shrubland communities require more time to establish and provide the same level of habitat value as pre-clearing.

Expected habitat clearing required for the proposed action is detailed in Table 11-1 and Table 11-2.

Table 11-1. Fauna habitat clearing requirements - Nangaanya-Ku Lands

Habitat	Vegetation Community	Species	Clearing footprint (ha)			
			Preferred options	Preferred and secondary options	Alternate options	All options
Sandplains with hummock grassland	▪ *Triodia basedowii/T schinzii* hummock grassland with emergent *Grevillea juncifolia* and scattered low shrubs ▪ *Triodia basedowii* hummock grassland with emergent Acacia pruinocarpa and scattered low shrubs ▪ *Triodia schinzii* hummock grassland with emergent *Eucalyptus youngiana* and scattered low shrubs ▪ *Eremophila forrestii* low open shrubland over *Triodia basedowii* hummock grassland ▪ *Acacia pachyacra* open shrubland over *Triodia schinzii* hummock grassland with and scattered low shrubs ▪ *Grevillea juncifolia* tall open shrubland with emergent *Eucalyptus youngiana / E. gongylocarpa* over *Triodia basedowii/T schinzii* hummock grassland	Tjakura Grey Falcon	15.8	25.9	10.0	35.8
Sand dunes	▪ *Eucalyptus youngiana* low open mallee +/- emergent *E. gongylocar*pa with mixed tall shrubs over *Triodia schinzii/T. basedowii* hummock grassland	Sandhill Dunnart Grey Falcon	0.2	0.2	0.1	0.3

Habitat	Vegetation Community	Species	Clearing footprint (ha)			
			Preferred options	Preferred and secondary options	Alternate options	All options
Mulga Tall Shrubland	▪ *Acacia aneura/ A. aptaneura* tall shrubland to low woodland over scattered shrubs and tussock grasses	Southern Whiteface Grey Falcon Malleefowl Princess Parrot	0.4	0.4	0.9	1.3
Open Woodland	▪ *Eucalyptus gongylocarpa* low open woodland over *Triodia schinzii/T. basedowii* hummock grassland	Southern Whiteface Grey Falcon Malleefowl Princess Parrot	2.8	6.3	5.3	11.6
Total clearing footprint			**19.3**	**32.7**	**16.3**	**49.0**

Table 11-2. Fauna habitat clearing requirements - Ngaanyatjarra Lands

Habitat	Vegetation Community	Species	Clearing footprint (ha)	
			Preferred options	Preferred and secondary options
Sandplains with hummock grassland	▪ *Triodia basedowii* hummock grassland with scattered shrubs and emergent *Acacia pruinocarpa* and *Eremophila forrestii* ▪ *Triodia schinzii* hummock grassland with scattered *Eremophila forrestii* and emergent *Grevillea juncifolia* ▪ *Triodia schinzii* hummock grassland with scattered *Eremophila forrestii* and emergent *Eucalyptus youngiana* ▪ *Aluta maisonneuvei / Androcalva loxophylla* low shrubland over *Triodia basedowii* hummock grassland with emergent *Acacia aptaneura*	Tjakura Grey Falcon	8.2	17.5
Open Woodland	▪ *Eucalyptus gongylocarpa* low open woodland over *Triodia schinzii/T. basedowii* hummock grassland	Southern Whiteface Grey Falcon Malleefowl Princess Parrot	8.5	8.5
Total clearing footprint			**16.7**	**26.0**

11.2 Whole of Environment

To identify the residual risks of the proposed action, the initial risk assessment detailed in Section 8 was revisited and the risks reassessed assuming effective implementation of the proposed mitigation measures. No medium rated risks remained with all risks reduced to Low.

12. EPBC Act significant impact tests and permits

12.1 Matters of National Environmental Significance

12.1.1 Listed Threatened species

Significant impact tests have been undertaken for all EPBC Act listed Threatened species identified as 'potentially' or 'likely' to occur within the proposed action's disturbance footprint. The significant impact tests assume all mitigation measures identified in Section 10 are implemented and are effective. Significant Impact Criteria, as defined by the EPBC Act Significant Impact Guideline 1.1, have been used to confirm the significance of potential impacts to listed Threatened species. Table 12-1 details the assessment for Endangered species, namely the Sandhill Dunnart, while Table 12-2 details the assessment for Vulnerable species.

Table 12-1. Significant impact test for Sandhill Dunnart (Endangered)

Criteria	Assessment
Lead to a long-term decrease in the size of a population	**Significant impact not likely**. There are no known records of the species from or within 10 km of the proposed action area. The preferred options are located on the edge of the modelled range for the species in an area identified as 'may occur'. The alternate options are not within the modelled range. The core population of the species in WA is known to occur in the Queen Victoria Spring Nature Reserve (Woinarski *et al*, 2014), over 230 km south west of the proposed action area. Spotters will be used during clearing activities to confirm if fauna are within the area to be cleared and encourage fauna to move out of the clearing footprint. If required, physical relocation of the animal may be undertaken, however this will be used as a last resort. Additionally, dune crossings and clearing of habitat for the Sandhill Dunnart will be avoided where feasible. Working accommodation and impact sites have been located outside of Sandhill Dunnart habitat. These mitigation measures are considered sufficient to minimise the risk of direct mortality of individuals and a resultant decrease in the size of the population. Additionally, only a small amount of habitat for the species habitat (0.3 ha - Nangaanya-Ku Lands) will be cleared in the context of the proposed action area as a whole.
Reduce the area of occupancy of a population	**Significant impact not likely**. There are no known records of the species from or within 10 km of the proposed action area. Clearing for the preferred and secondary site options will occur on the edge of the modelled range for the species while the alternate sites are outside of the modelled range. Only a small amount of dune habitat (0.3 ha - Nangaanya-Ku Lands) will be cleared in the context of the proposed action area as a whole, and clearing will be avoided where feasible. Dune systems are extensive throughout the proposed action area and in the Great Victoria Desert bioregion. It is estimated that over 600,000 ha of dune habitat occurs within the proposed action area. The access track will be designed and constructed to minimise the risk of it presenting a physical barrier to movement for the Sandhill Dunnart or fragment its habitat.

Criteria	Assessment
	Cleared areas will be remediated when no longer required, unless an agreement is reached with the Traditional Owners for the access track or sites to be handed over for their ongoing use and maintenance. The proposed action is not likely to reduce the area of occupancy of the Sandhill Dunnart.
Fragment an existing population into two or more populations	**Significant impact not likely.** There are no known records of the species from or within 10 km of the proposed action area and the preferred options are on the edge of the modelled range for the species in an area identified as 'may occur'. Additionally, the core population of the species in WA is known to occur in the Queen Victoria Spring Nature Reserve (Woinarski *et al*, 2014), over 230 km south west of the proposed action area. Where dune crossings are required for the access track, mitigation measures will be implemented to avoid the track becoming a physical barrier to movement of the Sandhill Dunnart, should it occur.
Adversely affect habitat critical to the survival of the species	**Significant impact not likely.** Habitat critical to the survival of the species has not been defined for the Sandhill Dunnart. As there are no known records of the species from or within 10 km of the proposed action area and the preferred options are on the edge of the modelled range for the species in an area identified as 'may occur', along with the small amount of habitat clearance required in the context of the proposed action area as a whole, the proposed action is not likely to adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of a population	**Significant impact not likely.** There are no known records of the species from or within 10 km of the proposed action area. The preferred options are located on the edge of the modelled range for the species in an area identified as 'may occur'. The alternate options are not within the modelled range. Further, the core population of the species in WA is known to occur in the Queen Victoria Spring Nature Reserve (Woinarski *et al*, 2014), over 230 km south west of the proposed action area. Mitigations measures include the use of spotters prior to clearing to confirm no fauna is present within the clearing footprint.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Significant impact not likely.** A small amount of habitat clearance is required in the context of the proposed action area as a whole. Mitigation measures are in place to minimise the risk of introducing weed species or causing degradation of habitat through erosion of dunes.
Result in invasive species that are harmful to the species becoming established in the species' habitat	**Significant impact not likely.** Cat tracks were recorded at many of the proposed action sites. The proposed action is not likely the increase the presence of feral cats or other predators in the proposed action area. Mitigation measures will be implemented to minimise the risk of introducing weed species that may compete with *Triodia* species and degrade habitat.
Introduce disease that may cause the species to decline	**Significant impact not likely.** No diseases have been identified as threats to the Sandhill Dunnart.

Criteria	Assessment
Interfere with the recovery of the species	**Significant impact not likely.** The proposed action is not inconsistent with the conservation actions detailed in the Conservation advice for the species.

Table 12-2. Significant impact test for Vulnerable species

Species	Nangaanya-Ku Lands	Ngaanyatjarra Lands
Tjakura (Great Desert Skink)	**Significant impact not likely.** The Nangaanya-Ku lands are not considered to contain a key population of the Tjakura (TSSC, 2016c). Therefore, any individuals occurring within the sites and access track on Nangaanya-Ku lands are not considered to be a part of an important population. The proposed action disturbance footprint that is on Nangaanya-Ku lands will therefore not: ▪ Lead to a long-term decrease in the size of an important population; ▪ Reduce the area of occupancy of an important population; ▪ Fragment an existing important population into two or more populations; or ▪ Disrupt the breeding cycle of an important population. Habitat critical to the survival of the Tjakura has not been defined (TSSC, 2016c, DCCEEW, 2023b). The hummock grassland sandplains habitat within the working accommodation and impact sites as well as along the access track provides suitable habitat for the Tjakura (DCCEEW, 2023b). A maximum of 35.8 ha of this habitat is likely to be cleared with an estimated over 1,000,000 ha likely to occur within the proposed action area. The species was not detected during the survey and if it is present, it is likely to be within a small number of burrows. The species is less likely to occur in recently burnt sites and according to DBCA fire history (DBCA-060), all sites and the access track were burnt in 2013 with a large portion of the disturbance footprint within Nangaanya-Ku lands also burnt in 2017/2018. Most areas have therefore been burnt between seven and 12 years ago. A small amount of habitat clearance is required in the context of the proposed action area as a whole. Mitigation measures are in	**Significant impact not likely.** The Ngaanyatjarra Lands are considered to contain key populations of the Tjakura (TSSC, 2016a). These populations are found within the Ngaanyatjarra Indigenous Protected Area, which is outside of the proposed action area and more than 68 km from the disturbance footprint. While the proposed action area contains suitable habitat, any individuals that may occur within the disturbance footprint are therefore, unlikely to be part of these important populations. Habitat critical to the survival of the Tjakura has not been defined (TSSC, 2016c, DCCEEW, 2023b). The hummock grassland sandplains habitat provides suitable habitat for the Tjakura (DCCEEW, 2023b). The species was not detected during the survey and if it is present, it is likely to be within a small number of burrows. Fauna spotters will be employed during clearing activities (including backburning) to confirm no individuals or burrows are within the area to be cleared. Impacts areas will be reviewed to confirm they are located in areas that present a low risk of impact to the species. Where burrows are identified, micro-siting will be undertaken to modify the location of the sites or alignment of the access track. These mitigation measures are considered sufficient to minimise the risk of direct mortality of individuals and a resultant decrease in the size of the population. Only a small amount of habitat for the species will be cleared in the context of the proposed action area as a whole. A maximum of 17.5 ha of habitat for the Tjakura is likely to be cleared with an estimated over 1,000,000 ha likely to occur within the proposed action area. The disturbance footprint will be remediated once no longer required by Defence, unless it is agreed with the Traditional Owners that some areas (such as the access track) will be handed over for their ongoing use and maintenance.

Species	Nangaanya-Ku Lands	Ngaanyatjarra Lands
	place to minimise the risk of introducing weed species that would cause degradation of habitat. It is not likely that the proposed action will: ▪ adversely affect habitat critical to the survival of the Tjakura; ▪ modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; or ▪ Result in invasive species that are harmful to the species becoming established in the species' habitat. No diseases have been identified as threats to the species. The national recovery plan for the Tjakura lists the following as key threats to the species: ▪ Unmanaged fire ▪ Predation ▪ Disturbance from development ▪ Weeds ▪ Feral herbivores ▪ Overharvesting ▪ Climate change ▪ Loss of knowledge, capacity and motivation to manage country. The proposed action would not introduce or exacerbate identified threats to the species, and with specific mitigation measures implemented, would not be inconsistent with the national recovery plan for the species.	Cat tracks were recorded at many of the proposed action sites. The proposed action is not likely to increase the presence of feral cats or other predators in the proposed action area. Mitigation measures will be implemented to minimise the risk of introducing weed species that may compete with *Triodia* species and degrade habitat. It is not likely that the proposed action will: ▪ Lead to a long-term decrease in the size of an important population; ▪ Reduce the area of occupancy of an important population; ▪ Fragment an existing important population into two or more populations; or ▪ Disrupt the breeding cycle of an important population. ▪ adversely affect habitat critical to the survival of the Tjakura; ▪ modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; or ▪ Result in invasive species that are harmful to the species becoming established in the species' habitat. No diseases have been identified as threats to the species. The proposed action would not introduce or exacerbate threats to the species identified in the Recovery Plan and with specific mitigation measures implemented would not be inconsistent with the national recovery plan for the species.

Species	Nangaanya-Ku Lands	Ngaanyatjarra Lands
Grey Falcon	**Significant impact not likely.** Important populations for the Grey Falcon have not been identified in the Conservation Advice for the species, however given the estimated population size of less than 1,000 mature individuals (Birdlife International, 2024a) and its highly mobile nature, the entire species population is likely to be important. The proposed action will require clearing of a small amount of habitat that would be used for hunting by the species. A maximum of 49 ha in Nangaanya-Ku Lands or 26 ha in Ngaanyatjarra Lands of this habitat is likely to be cleared with over 1,000,000 ha likely to occur within the proposed action area. In the context of the proposed action area as a whole, and the broader bioregion, this small amount of clearing is not likely to reduce the total area over which the species can hunt. The disturbance footprint will be remediated once no longer required by Defence unless it is agreed with the Traditional Owners that some areas (such as the access track) will be handed over for their ongoing use and maintenance. Cat tracks were recorded at many of the proposed action sites. The proposed action is not likely to increase the presence of feral cats or other predators in the proposed action area. No tall trees that could be used by the species for nesting or roosting will be cleared for the proposed action. Active operational use of the proposed action area currently consists of [redacted] periods between [redacted] and late 2028. The risk of direct mortality of the species through collisions [redacted] is therefore considered Low with such an event considered a rare occurrence. The proposed action is therefore not likely to: ▪ Lead to a long-term decrease in the size of an important population; ▪ Reduce the area of occupancy of an important population; ▪ Fragment an existing important population into two or more populations; ▪ Disrupt the breeding cycle of an important population; ▪ Adversely affect habitat critical to the survival of the species; ▪ Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; ▪ Result in invasive species that are harmful to the species becoming established in the species' habitat; ▪ Introduce disease that may cause the species to decline; or ▪ Interfere substantially with the recovery of the species. The proposed action is not inconsistent with the conversation and management priorities outline in the Conservation Advice (TSSC, 2020)	

Species	Nangaanya-Ku Lands	Ngaanyatjarra Lands
Malleefowl	**Significant impact not likely.** Important Malleefowl populations are not identified in the Recovery Plan for the species (Benshemesh, 2007). Current estimates put the population at about 25,000 adult birds (Birdlife International 2024b) suggesting all populations are important. The recovery plan does not specifically define critical habitat for the species and notes the "habitat critical to the survival of the species is known only in broad terms" (Benshemesh, 2007). The species primarily inhabits semi-arid shrublands and low woodlands, usually dominated by mallee eucalypts and/or acacias. Sandy soils and abundant leaf litter is required for construction of nest mounds (Birdlife International 2024b). Areas of suitable habitat for the species are found along the access track and at Impact sites T1, T2 and T3, however this will be avoided where possible [redacted]. Where this habitat type is intersected by the proposed action it is along the existing edges of the habitat. A small amount of habitat clearance (12.9 ha) is required in the context of the proposed action area as a whole. It is estimated that over 900,000 ha of shrubland habitat occurs within the proposed action area. Mitigation measures will be implemented to minimise the risk of introducing weed species that would cause degradation of habitat. The disturbance footprint will be remediated once no longer required by Defence unless it is agreed with the Traditional Owners that some areas (such as the access track) will be handed over for their ongoing use and maintenance. No nest mounds were observed during the survey. Fauna spotters will be employed during clearing activities to confirm no individuals or nests are within the area to be cleared. Where nest	**Significant impact not likely.** Areas of suitable habitat for the species are found along the access track within Ngaanyatjarra Lands. Where this habitat type is intersected by the proposed action it is generally along the existing edges of the habitat. A small amount of habitat clearance (8.5 ha) is required in the context of the proposed action area as a whole. It is estimated that over 900,000 ha of shrubland habitat occurs within the proposed action area. Mitigation measures will be implemented to minimise the risk of introducing weed species that would cause degradation of habitat close to the disturbance footprint. The disturbance footprint will be remediated once no longer required by Defence unless it is agreed with the Traditional Owners that some areas (such as the access track) will be handed over for their ongoing use and maintenance. Cat tracks were recorded at many of the proposed action sites. The proposed action is not likely to increase the presence of feral cats or other predators in the proposed action area. No diseases relevant to the Malleefowl have been identified. The proposed action is not likely to: ▪ Lead to a long-term decrease in the size of an important population; ▪ Reduce the area of occupancy of an important population; ▪ Fragment an existing important population into two or more populations; ▪ Disrupt the breeding cycle of an important population; ▪ Adversely affect habitat critical to the survival of the species; ▪ Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; ▪ Result in invasive species that are harmful to the species becoming established in the species' habitat;

Species	Nangaanya-Ku Lands	Ngaanyatjarra Lands
	mounds are observed the access track will be realigned to avoid these and the surrounding habitat. Cat tracks were recorded at many of the proposed action sites. The proposed action is not likely to increase the presence of feral cats or other predators in the proposed action area. No diseases relevant to the Malleefowl have been identified. The proposed action is not likely to: ▪ Lead to a long-term decrease in the size of an important population; ▪ Reduce the area of occupancy of an important population; ▪ Fragment an existing important population into two or more populations; ▪ Disrupt the breeding cycle of an important population; ▪ Adversely affect habitat critical to the survival of the species; ▪ Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; ▪ Result in invasive species that are harmful to the species becoming established in the species' habitat; ▪ Introduce disease that may cause the species to decline; or ▪ Interfere substantially with the recovery of the species. Key recovery objectives in relation to the Malleefowl population include reducing permeant habitat loss, reducing fire threats and reducing predation and road mortalities. The proposed action is not inconsistent with these objectives and includes mitigations measures that manage specific risks in relation to these threats.	▪ Introduce disease that may cause the species to decline; or ▪ Interfere substantially with the recovery of the species. Key recovery objectives in relation to the Malleefowl population include reducing permeant habitat loss, reducing fire threats and reducing predation and road mortalities. The proposed action is not inconsistent with these objectives and includes mitigations measures that manage specific risks in relation to these threats.
Princess Parrot	**Significant impact not likely.** The Princess Parrot is considered to occur as a single population (TSSC, 2018). The entire population of the species is therefore considered important. No critical habitat for the species has been	**Significant impact not likely.** Areas of suitable habitat for the species are found along the access track within Ngaanyatjarra Lands. Where this habitat type is intersected by the proposed action it is generally along the existing

Species	Nangaanya-Ku Lands	Ngaanyatjarra Lands
	defined. General habitat preferences is for shrublands on sandplains or interdune swales (TSSC, 2018). Areas of this habitat are found along the access track and at Impact sites T1, T2 and T3, however this will be avoided where possible [redacted] at the Impact Sites. Where this habitat type is intersected by the proposed action it is along the existing edges of the habitat. A maximum of 12.9 ha of this habitat is likely to be cleared. It is estimated that over 900,000 ha of shrubland habitat occurs within the proposed action area. Potential nesting trees have been recorded adjacent to Impact Site T1, however this is not currently a preferred or secondary site. Should this site be used in the future, it is possible for the boundary to be relocated away from potential nesting trees for the species. [redacted] locations within the impact site can also be managed such that they are situated away from these trees and the risk of impact [redacted] is minimised. A small amount of foraging habitat clearance is required in the context of the proposed action area as a whole. Mitigation measures will be implemented to minimise the risk of introducing weed species that would cause degradation of habitat. The disturbance footprint will be remediated once no longer required by Defence unless it is agreed with the Traditional Owners that some areas (such as the access track) will be handed over for their ongoing use and maintenance. Cat tracks were recorded at many of the proposed action sites. The proposed action is not likely the increase the presence of feral cats or other predators in the proposed action area. Psittacine Circoviral Disease is an identified threat for the species (TSSC, 2018), however the proposed action does not include any activities that could introduce this disease to the proposed action area.	edges of the habitat. A small amount of habitat clearance (8.5 ha) is required in the context of the proposed action area as a whole. Mitigation measures will be implemented to minimise the risk of introducing weed species that would cause degradation of habitat close to the disturbance footprint. The disturbance footprint will be remediated once no longer required by Defence unless it is agreed with the Traditional Owners that some areas (such as the access track) will be handed over for their ongoing use and maintenance. Cat tracks were recorded at many of the proposed action sites. The proposed action is not likely to increase the presence of feral cats or other predators in the proposed action area. Psittacine Circoviral Disease is an identified threat for the species (TSSC, 2018), however the proposed action does not include any activities that could introduce this disease to the proposed action area. The proposed action is therefore not likely to: ▪ Lead to a long-term decrease in the size of an important population; ▪ Reduce the area of occupancy of an important population; ▪ Fragment an existing important population into two or more populations; ▪ Disrupt the breeding cycle of an important population; ▪ Adversely affect habitat critical to the survival of the species; ▪ Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; ▪ Result in invasive species that are harmful to the species becoming established in the species' habitat; ▪ Introduce disease that may cause the species to decline; or ▪ Interfere substantially with the recovery of the species.

Species	Nangaanya-Ku Lands	Ngaanyatjarra Lands
	The proposed action is therefore not likely to: ▪ Lead to a long-term decrease in the size of an important population; ▪ Reduce the area of occupancy of an important population; ▪ Fragment an existing important population into two or more populations; ▪ Disrupt the breeding cycle of an important population; ▪ Adversely affect habitat critical to the survival of the species; ▪ Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; ▪ Result in invasive species that are harmful to the species becoming established in the species' habitat; ▪ Introduce disease that may cause the species to decline; or ▪ Interfere substantially with the recovery of the species. The conservation and management priorities identified in the Conservation Advice are related to: ▪ Fire management to support the maintenance of grasslands and hollow bearing trees ▪ Management and control of invasive species (weeds and predators) and stocking rates to avoid degradation of habitat ▪ Suppression of locations of nests and colonies to avoid illegal collection of birds; and ▪ Engagement with stakeholders to conserve habitat. The proposed action is not inconsistent with these priorities.	The conservation and management priorities identified in the Conservation Advice are related to: ▪ Fire management to support the maintenance of grasslands and hollow bearing trees ▪ Management and control of invasive species (weeds and predators) and stocking rates to avoid degradation of habitat ▪ Suppression of locations of nests and colonies to avoid illegal collection of birds; and ▪ Engagement with stakeholders to conserve habitat. The proposed action is not inconsistent with these priorities.
Southern Whiteface	**Significant impact not likely.** According to the Conservation Advice for the species (TSSC, 2023), the species is considered to be a single population. The entire species population is therefore important.	**Significant impact not likely.** Areas of suitable habitat for the species are found along the access track within Ngaanyatjarra Lands. Where this habitat type is intersected by the proposed action it is generally along the existing

Species	Nangaanya-Ku Lands	Ngaanyatjarra Lands
	Critical habitat for the species is identified in the Conservation Advice as: ▪ relatively undisturbed open woodlands and shrublands with an understorey of grasses or shrubs, or both; ▪ habitat with low tree densities and an herbaceous understory litter cover which provides essential foraging habitat; and ▪ living and dead trees with hollows and crevices which are essential for roosting and nesting. Areas of this habitat are found along the access track, however this will be avoided where possible. Where this habitat type is intersected by the access track it is along the existing edges of the habitat. The proposed action is therefore not likely to: ▪ Adversely affect habitat critical to the survival of the species; or ▪ Fragment an existing important population into two or more populations. A small amount of habitat clearance (12.9 ha) is required in the context of the proposed action area as a whole. It is estimated that over 900,000 ha of shrubland habitat occurs within the proposed action area. Mitigation measures will be implemented to minimise the risk of introducing weed species that would cause degradation of habitat. The disturbance footprint will be remediated once no longer required by Defence unless it is agreed with the Traditional Owners that some areas (such as the access track) will be handed over for their ongoing use and maintenance. Cat tracks were recorded at many of the proposed action sites. The proposed action is not likely the increase the presence of feral cats or other predators in the proposed action area. No diseases relevant to the Southern Whiteface have been identified.	edges of the habitat. A small amount of habitat clearance (8.5 ha) is required in the context of the proposed action area as a whole. Mitigation measures will be implemented to minimise the risk of introducing weed species that would cause degradation of habitat close to the disturbance footprint. The disturbance footprint will be remediated once no longer required by Defence unless it is agreed with the Traditional Owners that some areas (such as the access track) will be handed over for their ongoing use and maintenance. Cat tracks were recorded at many of the proposed action sites. The proposed action is not likely to increase the presence of feral cats or other predators in the proposed action area. No diseases relevant to the Southern Whiteface have been identified. The proposed action is not likely to: ▪ Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; ▪ Lead to a long-term decrease in the size of an important population; ▪ Reduce the area of occupancy of an important population; ▪ Disrupt the breeding cycle of an important population. ▪ Result in invasive species that are harmful to the species becoming established in the species' habitat. ▪ Introduce disease that may cause the species to decline ▪ Interfere substantially with the recovery of the species The conservation and management priorities identified in the Conservation Advice are related to: ▪ Habitat loss caused by clearing for agriculture; and ▪ Habitat degradation caused by domestic livestock grazing The proposed action is not inconsistent with these priorities.

Species	Nangaanya-Ku Lands	Ngaanyatjarra Lands
	The proposed action is not likely to: ▪ Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; ▪ Lead to a long-term decrease in the size of an important population; ▪ Reduce the area of occupancy of an important population; ▪ Disrupt the breeding cycle of an important population. ▪ Result in invasive species that are harmful to the species becoming established in the species' habitat. ▪ Introduce disease that may cause the species to decline ▪ Interfere substantially with the recovery of the species The conservation and management priorities identified in the Conservation Advice are related to: ▪ Habitat loss caused by clearing for agriculture; and ▪ Habitat degradation caused by domestic livestock grazing The proposed action is not inconsistent with these priorities.	

12.1.2 Listed migratory species

The only migratory species identified as 'potentially' or 'likely' to occur within or adjacent to the disturbance footprint is the Fork-tailed Swift. An assessment against the Significant Impact Criteria, as defined by the EPBC Act Significant Impact Guideline 1.1, has been undertaken to confirm the significance of potential impacts to the Fork-tailed Swift. The significant impact test assumes all mitigation measures identified in Section 10 are implemented and are effective.

Table 12-3. Significant impact test for Fork-tailed Swift

Criteria	Assessment
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	**Significant impact not likely.** The Fork-tailed Swift is a predominantly aerial species, spending the majority of its lifecycle on the wing at heights of up to 300 m. It forages across a broad range of habitats and land types. It is a non-breeding visitor to Australia (Birdlife Australia, 2023). The habitats of the proposed action area are not likely to be important habitats for the species. The proposed action is therefore not likely to substantially modify destroy or isolate an area of important habitat for the species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	**Significant impact not likely.** The primary introduced/invasive species that may be a threat to the Fork-tailed Swift is introduced predators. Cat tracks were recorded at many of the proposed action sites. The proposed action is not likely the increase the presence of feral cats or other predators in the proposed action area.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	**Significant impact not likely.** The Fork-tailed Swift is a non-breeding visitor to Australia. The proposed action does not involve any activities that could present a barrier to migration of the species. The small amount of clearing required in relation to the proposed action area as a whole and the broader bioregion is not likely to reduce the availability of the insects upon which the species feeds.

12.2 The environment affected by a Commonwealth agency action

12.2.1 Overview

A summary of the components of the environment, as detailed in Significant Impact Guideline 1.2 (DSEWPAC, 2013), and their relevance to the proposed action is provided in Table 12-4. For those components that are relevant to the proposed action, significant impact tests have been undertaken and the results detailed in the following sections.

Table 12-4. Summary of components of the environment relevant to the proposed action

Component	Relevance to the proposed action
Landscape and soils	**Relevant.** The proposed action will involve clearing, topsoil removal and may require dune crossings.
Coastal landscapes and processes	**Not relevant.** The proposed action is located in the Great Victoria Desert, approximately 430 km from the coast.
Ocean forms, ocean processes and ocean life	**Not relevant.** The proposed action is located in the Great Victoria Desert, approximately 430 km from the coast.
Water resources	**Relevant.** While the proposed action area is in an arid area there are salt lakes present within the proposed action area.
Pollutants, chemicals, and toxic substances	**Relevant.** The proposed action includes activities that could result in contamination of soils within the proposed action area.
Plant	**Relevant.** The proposed action will involve clearing of native vegetation.
Animals	**Relevant.** The proposed action will involve clearing of fauna habitat.
People and communities	**Relevant.** While there are no towns or communities within the proposed action area there are potential impacts through exclusion of Traditional Owners from the proposed action area during [redacted] active operational periods.
Heritage	**Relevant.** There are known Aboriginal cultural heritage values within the proposed action area.

12.2.2 Landscapes and soils

An assessment against the Significant Impact Criteria, as defined by the EPBC Act significant impact guideline 1.2, has been undertaken to confirm the significance of potential impacts to landscapes and soil (Table 12-5). Based upon the assessment, the proposed action is not likely to have a significant impact on landscapes and soils.

Table 12-5. Significant impact test - landscapes and soils

Significant impact criteria	Assessment
Is there a real chance or possibility that the action will:	
Substantially alter natural landscape features	The disturbance footprint and immediate surrounds largely consists of sand plains and sand dunes. Sand dunes are recognised to be sensitive landscape features that may be susceptible to erosion if disturbed. ***Working Accommodation Sites*** The working accommodation sites are located on sandplains away from dunes. As infrastructure at the working accommodation sites consists of deployable units, it is unlikely that deep excavations, such as those traditionally required for building footings/pads, will be required. ***Impact Sites*** The impact sites are located on sandplains away from dunes. Excavations [redacted] will be filled to the extent feasible and the final surface levelled to blend into the surrounding area. ***Access Tracks*** Access tracks will not cross sand dunes unless it is unavoidable. Where dune crossings are required, excavation of the dune will be minimised to that required to facilitate safe passage for vehicles. The disturbed area will be stabilised to reduce the risk of wind or water erosion of the dune. Where access tracks are no longer required at the completion of Defence activities, they will be remediated in accordance with the actions outlined in Section 10. Should access tracks be handed over to the Traditional Owners for their ongoing use, they will be made aware of any dune crossings that may require ongoing monitoring or maintenance. **Outcome** The proposed action is not likely to cause a substantial alteration to landscape features.
Cause subsidence, instability or substantial erosion.	***Working Accommodation Sites*** Respread of cleared vegetation or other methods of protection will be undertaken to minimize the potential for erosion of cleared areas. ***Impact Sites*** Respread of cleared vegetation, or other methods of protection will be undertaken to minimize the potential for erosion of cleared areas. Excavations [redacted] will be filled to the extent feasible and the final surface levelled to blend into the surrounding area. ***Access Tracks*** Where access tracks are no longer required at the completion of Defence activities, they will be remediated in accordance with the actions outlined in Section 10. Should access tracks be handed over to the Traditional Owners for their ongoing use, they will be made aware of any dune crossings that may require ongoing monitoring or maintenance.

Significant impact criteria	Assessment
	Outcome The proposed action will be designed by qualified engineers with consideration given to existing soil conditions and the design control measures required to reduce the likelihood of erosion. Given the proposed action will avoid areas with significant changes gradient (<2%), the salt lakes will be avoided, site rehabilitation including the respread of topsoil and vegetation, treatment of compacted areas, and the inclusion of erosion and sediment controls, it is not likely that the proposed action would cause subsidence, instability or substantial erosion.
Involve medium or large-scale excavation of soil or minerals.	The proposed action does not involve medium or large-scale excavation of soil or minerals.

12.2.3 Water resources

An assessment against the Significant Impact Criteria, as defined by the EPBC Act significant impact guideline 1.2, has been undertaken to confirm the significance of potential impacts to water resources (Table 12-6). Based upon the assessment, the proposed action is not likely to have a significant impact on water resources.

Table 12-6. Significant impact test - water resources

Significant impact criteria	Assessment
Is there a real chance or possibility that the action will:	
Measurably reduce the quantity, quality or availability of surface or ground water.	The proposed action area is located within an arid, desert environment with minimal surface water features. Lake Yeo and Lake Throssell (Wetlands of National Importance) are located in or adjacent to the western extent of the proposed action area, however, are not within the disturbance footprint. The disturbance footprint does not intersect the catchments for these wetlands. Groundwater across the proposed action area is between 22.2 to 83 m below ground level. ***Working Accommodation Sites*** The working accommodation sites will avoid ephemeral waterbodies and drainage lines. Due to the small disturbance footprint, runoff is not expected to be substantially altered as a result of the proposed action. Potable water to support the working accommodation sites and construction water will be trucked to site. No deep excavations are required for the working accommodation sites and groundwater will not be intersected during construction. ***Impact Sites*** The impact sites are not located adjacent to ephemeral waterbodies or drainage lines. [redacted] unlikely to be of a depth that would intersect the groundwater table.

Significant impact criteria	Assessment
	Access Tracks The access track will avoid ephemeral waterbodies and drainage lines. The access track will be graded and designed to minimise obstruction to overland flows. Construction water will be trucked to site. Where water application is required to reduce dust generation, this will be undertaken at a rate that does not result in runoff. The works do not involve major earthmoving or have components that may require the use of significant amounts of water for construction. It is therefore not expected to substantially alter groundwater quality or availability. **Outcome** The proposed action is not expected to measurably reduce the quantity, quality or availability of surface or ground water.
Channelise, divert or impound rivers or creeks, or substantially alter drainage patterns.	The working accommodation sites, impact sites and access track will avoid Lake Yeo and Lake Throssell and their catchments. These salt lakes are listed Wetlands of National Importance. The working accommodation sites, impact sites and access track will also avoid other ephemeral waterbodies including drainage lines, floodplains and watercourses. Therefore, the proposed action does not involve substantial modification of existing natural drainage patterns. **Outcome** The proposed action will not channelise, divert or impound rivers or creeks, or substantially alter drainage patterns.
Measurably alter water table levels.	Potable water to support the working accommodation sites and construction will be trucked to site. The works do not involve Deep excavations that would intersect the groundwater table. **Outcome** The proposed action is not expected to measurably alter water table levels.

12.2.4 Pollutants, chemicals, and toxic substances

An assessment against the Significant Impact Criteria, as defined by the EPBC Act significant impact guideline 1.2, has been undertaken to confirm the significance of potential impacts from pollutants, chemicals and toxic substances (Table 12-7). Based upon the assessment, the proposed action is not likely to have a significant impact on the environment as a result of pollutants, chemicals and toxic substances.

Table 12-7. Significant impact test - pollutants, chemicals and toxic substances

Significant impact criteria	Assessment
Is there a real chance or possibility that the action will:	
Generate smoke, fumes, chemicals, nutrients, or other pollutants which will substantially reduce local air quality or water quality.	The proposed action does not involve activities that generate quantities of smoke, fumes, chemicals, nutrients, or other pollutants that could impact the local air quality. The proposed action area is located within an arid, desert environment with minimal surface water features. Lake Yeo and Lake Throssell (Wetlands of National Importance) are located in or adjacent to the western extent of the

Significant impact criteria	Assessment
	proposed action area, however, are not within the disturbance footprint. The disturbance footprint does not intersect the catchments for these wetlands. Groundwater across the proposed action area is between 22.2 to 83 m below ground level. Mitigation measures will be implemented to minimise the risk of soil or water contamination, including remediation of potential contamination at working accommodation sites prior to demobilisation.
Result in the release, leakage, spillage, or explosion of flammable, explosive, toxic, radioactive, carcinogenic, or mutagenic substances, through use, storage, transport, or disposal.	The proposed action will require the storage, transportation and handling of hydrocarbons and other chemicals. Mitigations measures will be implemented to minimise the risk of spills occurring and to respond to spill should they occur. [redacted] a risk assessment will be undertaken to confirm the risk to the environment from potential contamination is low. **Outcome** The proposed action is not likely to result in the release of flammable, explosive, toxic, radioactive, carcinogenic, or mutagenic substances.
Increase atmospheric concentrations of gases which will contribute to the greenhouse effect or ozone damage.	The proposed action is likely to use diesel generators for supply of electricity at the working accommodation sites. Generation of electricity is not expected to generate large quantities of greenhouse gasses, given the short duration of active operations. Ozone Depleting Substances may be present in refrigeration and air-conditioning units. These units will be maintained in line with manufacturer specifications to ensure no leaks of refrigerants. **Outcome** The proposed action is not expected to increase atmospheric concentrations of gases which will contribute to the greenhouse effect or ozone damage.
Substantially disturb contaminated or acid-sulphate soils (ASS).	Areas of high probability of ASS occurring within the proposed action area are associated with Lake Yeo, Lake Throssell and areas that are regularly inundated following large rainfall events. The disturbance footprint does not intersect any of these areas and is located within areas mapped as extremely low probability of ASS occurring. There are no recorded contaminated sites in the vicinity of the working accommodation sites, impact sites and access tracks. **Outcome** The proposed action is not expected to disturb contaminated or acid-sulphate soils.

12.2.5 Plants

An assessment against the Significant Impact Criteria, as defined by the EPBC Act significant impact guideline 1.2, has been undertaken to confirm the significance of potential impacts plants (Table 12-8). Based upon the assessment, the proposed action is not likely to have a significant impact on plants.

Table 12-8. Significant impact test - plants

Significant impact criteria	Assessment
Is there a real chance or possibility that the action will:	
Involve medium or large-scale native vegetation clearance	The estimated disturbance footprint under the worst-case scenario is 49 ha in Nangaanya-Ku Lands or 26 ha in Ngaanyatjarra Lands. This is not considered medium or large-scale vegetation clearing. Additionally, the vegetation associated mapped by Beard *et al* (2013) retain at least 99% of their pre-European extent.
Involve any clearance of any vegetation containing a listed threatened species which is likely to result in a long-term decline in a population or which threatens the viability of the species	No listed Threatened species are known from the proposed action area or disturbance footprint.
Introduce potentially invasive species	Mitigations will be implemented to reduce the risk that weeds are introduced to the proposed action area. This includes confirming all machinery, vehicles, plant and deployable buildings brought to site are clean of soil or vegetative matter prior to mobilisation. **Outcome** The risk of invasive species being introduced to the proposed action area is considered low.
Involve the use of chemicals which substantially stunt the growth of native vegetation	No herbicides will be used by the proposed action. Mitigation measures will be implemented to minimise the risk of soil contamination, including remediation of potential contamination at working accommodation sites prior to demobilisation. [redacted] localised contamination may occur, however this is expected to be well below the root zone of the *Triodia* species and shrubs that are found at the impact sites. **Outcome** No significant impact to vegetation growth is expected due to the chemicals used by the proposed action.
Involve large-scale controlled burning or any controlled burning in sensitive areas, including areas which contain listed threatened species	No large-scale burning will be undertaken for the proposed action. Small areas (100 m by 100 m) within the impact sites may be burnt (using traditional, cool burn methods) in order to reduce the risk of bushfire [redacted]

12.2.6 Animals

An assessment against the Significant Impact Criteria, as defined by the EPBC Act significant impact guideline 1.2, has been undertaken to confirm the significance of potential impacts to animals (Table 12-9). Based upon the assessment, the proposed action is not likely to have a significant impact on animals.

Table 12-9. Significant impact test - animals

Significant impact criteria	Assessment
Is there a real chance or possibility that the action will:	
Cause a long-term decrease in, or threaten the viability of, a native animal population or populations, through death, injury or other harm to individuals	No native animal populations are known to be exclusively reliant on the habitats available within the proposed action area and none are known to occur in sufficient numbers/density with in the disturbance footprint such that the proposed action would result in a long-term decrease in, or threaten the viability of, a native animal population. Spotters will be used during clearing activities to confirm no fauna are within the area to be cleared. Where fauna are encountered, they will be encouraged to move outside of the area to be cleared or relocated by a qualified personnel. Driving at dawn and dusk, when fauna are more active, will be minimised. Spotters will be employed during excavations [redacted] to identify if any burrowing fauna (such as marsupial moles) are present and excavations will be undertaken slowly to minimise the risk of injury to burrowing fauna. **Outcome** The proposed action will not result in a long-term decrease in, or threaten the viability of, a native animal population or populations, through death, injury or other harm to individuals.
Displace or substantially limit the movement or dispersal of native animal populations	No native animal populations are known to be exclusively reliant on the habitats available within the proposed action area. The small area of clearing required at any individual site (2.0 ha for working accommodation sites and 1.0 ha for impact sites) will not result in the displacement of or substantially limit the movement or dispersal of native animal populations. The habitats present at the sites extend into the broader area and will not be fragmented by the required clearing at the sites. Fauna will be able to continue their movement patterns through the landscape in these adjacent areas. The access track will be designed such that it does not preset a barrier to fauna movement. **Outcome** The proposed action will not displace or substantially limit the movement or dispersal of native animal populations.
Substantially reduce or fragment available habitat for native species;	A small amount of habitat clearance is required in the context of the proposed action area as a whole (49 ha in Nangaanya-Ku Lands or 26 ha in Ngaanyatjarra Lands – less than 0.001% of the proposed action area). The habitats present are extensive across the proposed action area and clearing will not result in fragmentation.

Significant impact criteria	Assessment
Reduce or fragment available habitat for listed threatened species, which is likely to displace a population, result in a long-term decline in a population, or threaten the viability of the species	While no State listed Threatened species were recorded during the ecological survey, tracks of the Brush-tailed Mulgara (DBCA Priority 4) were recorded. This species inhabits hummock grasslands, burrowing in interdune swales (Woolley 2008). This habitat occurs extensively through the proposed action area and the Bioregion. The small amount of habitat clearance required (49 ha in Nangaanya-Ku Lands or 26 ha in Ngaanyatjarra Lands) in the context of the proposed action area as a whole (over 1,000,000 ha of similar habitat) will not reduce or fragment available habitat available habitat for this species to the extent that the viability of the species is threatened.
Introduce exotic species which will substantially reduce habitat or resources for native species, or	Cat tracks were recorded at many of the proposed action sites. Camels or their tracks were also frequently observed. As the proposed action area is sparsely vegetated fauna, including feral predators and herbivores, are able to move through the landscape with relative ease. **Outcome** The proposed action is not likely the increase the presence of feral cats, other predators or introduced herbivores (e.g. camels) in the proposed action area.
Undertake large-scale controlled burning or any controlled burning in areas containing listed threatened species	No large-scale burning will be undertaken for the proposed action. Small areas (100 m by 100 m) within the impact sites may be burnt (using traditional, cool burn methods) in order to reduce the risk of bushfire [redacted].

12.2.7 People and communities

An assessment against the Significant Impact Criteria, as defined by the EPBC Act significant impact guideline 1.2, has been undertaken to confirm the significance of potential impacts to people and communities (Table 12-10). Based upon the assessment, the proposed action is not likely to have a significant impact to people and communities.

Table 12-10. Significant impact test – people and communities

Significant impact criteria	Assessment
Is there a real chance or possibility that the action will:	
Substantially increase demand for, or reduce the availability of, community services or infrastructure which have direct or indirect impacts on the environment, including water supply, power supply, roads, waste disposal, and housing	The proposed action area is remote from towns, with the closest towns being Laverton (173 km southwest) and Warburton (85 km northeast). The closest Aboriginal community is Kanpa, 95 km to the north. Tjukayirla Roadhouse is adjacent to the proposed action area, however it is not expected that Defence will not rely on the services supplied by the roadhouse (e.g. fuel, accommodation, food) but will be self-sufficient. Deployable working and living accommodation will be used during operations periods with all wastes (including wastewater) contained within enclosed, self-contained unit. Should Defence choose to use the services provided by the roadhouse, Defence will engage with the roadhouse owner/manager to confirm Defence's needs can be met without

Significant impact criteria	Assessment
	compromising the roadhouse's ability to meet the needs of the community and those travelling along Great Central Road
Affect the health, safety, welfare or quality of life of the members of a community, through factors such as noise, odours, fumes, smoke, or other pollutants	There are no communities close to the proposed action area that are likely to be adversely impacted by noise, odours, fumes, smoke, or other pollutants.
Cause physical dislocation of individuals or communities	There are no residents or communities within the proposed action area. Access to the proposed action area will be limited to Defence personnel only during active operations periods. There periods [redacted] are expected to occur [redacted] between [redacted] and late 2028. Defence will enter into an ILUA with the Traditional Owners. It is expected that the ILUA will include requirements to maintain communication with the Traditional Owners, keep them informed of periods when access will be restricted and confirm they do not require access during these periods for cultural reasons. Traditional Owner exclusion would only occur voluntarily, though the mechanism that will be defined in the ILUA.
Substantially change or diminish cultural identity, social organisation or community resources	Defence has and will continue to work with the Traditional Owners to avoid impacting the cultural values of the proposed action area.

12.2.8 Heritage

An assessment against the Significant Impact Criteria, as defined by the EPBC Act significant impact guideline1.2, has been undertaken to confirm the significance of potential impacts to heritage (Table 12-11). Based upon the assessment, the proposed action is not likely to have a significant impact on heritage.

Table 12-11. Significant impact test - heritage

Significant impact criteria	Assessment
Is there a real chance or possibility that the action will:	
Permanently destroy, remove or substantially alter the fabric (physical material including structural elements and other components, fixtures, contents, and objects) of a heritage place	No heritage places are known to be within the disturbance footprint. Heritage monitors will be employed during initial clearing activities to confirm the area to be cleared does not contain heritage artifacts or values that could be impacted. Where unknown buried artifacts are uncovered, Annex F of the Defence Heritage Management Manual (Chance Finds Protocol 2: Discovery of Possible Archaeological Artifacts) will be implemented.
Involve extension, renovation, or substantial alteration of a heritage place in a manner which is inconsistent with the heritage values of the place	No extension, renovation, or substantial alteration of a heritage place will occur for the proposed action.
Involve the erection of buildings or other structures adjacent to, or within important sight lines of, a heritage place which are inconsistent with the heritage values of the place	There are no known heritage places that will be impacted by the disturbance footprint. Defence was and will continue to work with the Traditional Owners to avoid impacting the cultural values of the proposed action area.

Significant impact criteria	Assessment
Substantially diminish the heritage value of a heritage place for a community or group for which it is significant	There are no known heritage places that will be impacted by the disturbance footprint. Defence was and will continue to work with the Traditional Owners to avoid impacting the cultural values of the proposed action area.
Substantially alter the setting of a heritage place in a manner which is inconsistent with the heritage values of the place, or	There are no known heritage places that will be impacted by the disturbance footprint.
Substantially restrict or inhibit the existing use of a heritage place as a cultural or ceremonial site?	Access to the proposed action area will be limited to Defence personnel only during active operations periods. There periods [redacted] are expected to occur [redacted] between [redacted] and late 2028. Defence will maintain communication with the Traditional Owners to keep them informed of periods when access will be restricted and confirm they do not require access during these periods for cultural reasons.

12.3 Summary of impact assessment findings

The proposed action is not likely to result in a significant impact to MNES or the whole of the environment. Although there is suitable habitat for EPBC Act listed threatened fauna, the proposed action is not likely to adversely impact the survival of these species given the small impact area on a local scale with less than 0.001% of the habitats present within the proposed action area to be cleared. There are potential impacts that may occur during vegetation clearing [redacted], such as fauna injury/mortality, weed invasion and unexpected finds of Aboriginal heritage artifacts. Mitigation measures have been recommended to reduce the level of impact.

13. Conclusions and recommendations

This ER has assessed the proposed scope of works associated with establishment and use of the Laverton NDTA. A number of potential impacts have been identified and mitigation measures proposed to reduce the risks associated with the impact to as low as reasonably practical. The residual risk for all impacts was reduced to 'Low'. This outcome was due to the time lag associated with rehabilitation of the sites once no longer required by Defence and re-establishment of vegetation to a state approaching the pre-clearing situation. While *Triodia* species can re-establish within a year of rehabilitation activities occurring (Strategen, 2012), it will take many years (10+) for the large mature clumps to form that are the preferred habitat for many of the MNES species identified in this ER. Shrubland vegetation may take longer to attain a state approaching the pre-clearing condition. No further mitigations were identified that would reduce the risk rating further.

Significant impact tests were undertaken for relevant MNES (listed threatened and migratory species) and the whole of the environment. No significant impacts as a result of the proposed action were identified.

Based on the assessments conducted in preparing this ER, the need for an EPBC Act permit is not triggered by the proposed action. While accidental impacts on individual members of species that may be protected under the EPBC Act are possible, such impacts are not predictable. Existing reporting protocols would treat such impacts as incidents, and these would be reported to DCCEEW (via DEPAC) for investigation whenever appropriate.

It is recommended that a Construction Environmental Management Plan (CEMP) be prepared to address construction risks. Mitigation of potential impacts during active operations will be managed through Defence procedures and [redacted] The CEMP, procedures and [redacted] will include the relevant mitigation measures proposed in the ER to manage the potential impacts.

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