

# Blamey Barracks Kapooka Redevelopment Project (EPBC 2023/09649)

Department of Defence

Preliminary Documentation Report  
August 2024, Final Rev 1



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## Acronyms and abbreviations

Reference	Definition
1RTB	1 <sup>st</sup> Recruit Training Battalion
ADF	Australian Defence Force
AHD	Above Height Datum
ALARP	As Low As Reasonably Practical
APZ	Asset Protection Zone
ASC	Assessment of Site Contamination
ASS	Acid Sulfate Soil
AWMA	Albury Wodonga Military Area
BAL	Bushfire Attack Level
BAM	Biodiversity Assessment Method
BBK	Blamey Barracks Kapooka – redevelopment area
BC Act	Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
CAMBA	China Australian Migratory Birds Agreement
CDR	Concept Design Review
CEMP	Construction Environment Management Plan
CES	Community Engagement Strategy
CFI	Capital Facilities and Infrastructure
CHL	Commonwealth Heritage List
CSM	Conceptual Site Model
DAWE	Department of Agriculture, Water and the Environment
DBC	Detailed Business Case
DCARM	Directorate of Contamination Assessment, Remediation and Management
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DCMM	Defence Contamination Management Manual
DDR	Detailed Design Report
DEHPD	Directorate of Environment and Heritage Policy Development

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Reference	Definition
DEPAC	Directorate of Environmental Planning, Assessment and Compliance
DoE	Department of the Environment
DPC	Department of Premier and Cabinet
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
DSI	Detailed Site Investigation
ECC	Environmental Clearance Certificate
EFR	Environmental Factor Record
EMM	EMM Consulting Pty Limited
EMP	Environmental Management Plan
EO	Explosive Ordnance
EPA	Environmental Protection Agency
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ER	Environmental Report
ERA	Environmental Risk Assessment
ha	Hectare
HIA	Heritage Impact Assessment
HMP	Heritage Management Plan
HQ	Headquarters
ICT	Information and Communications Technology
JAMBA	Japan Australian Migratory Birds Agreement
km	Kilometre
KMA	Kapooka Military Area
LIA	Living-in Accommodation
m	Metre
MC	Managing Contractor
MNES	Matters of National Environmental Significance
MPFR	Master Plan and Feasibility Review
NEPM	National Environmental Protection Measures
NOA	Naturally Occurring Asbestos
NSIMS	National Spatial Information Management Systems
NSW	New South Wales
PCA	Pre-construction Contamination Assessment
PCT	Plant Community Type
PFAS	Per- and Polyfluoroalkyl Substances
PMAP	PFAS Management Area Plan
PMST	Protected Matters Search Tool
PSI	Preliminary Site Investigation

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Reference	Definition
RAAF	Royal Australian Air Force
RBW	RAAF Base Wagga
RDC	Recruit Development Company
RRJV	Riverina Redevelopment Joint Venture
RRP	Riverina Redevelopment Program
ROKAMBA	Republic of Korea Australian Migratory Birds Agreement
SDR	Schematic Design Review
SEG	Security and Estate Group
SIG1.1	DCCEEW Significant Impact Guideline 1.1
SIG1.2	DCCEEW Significant Impact Guideline 1.2
TEC	Threatened Ecological Community
UXO	Unexploded Ordnance
WE	Work Element
WHS	Work Health and Safety

## 1. Introduction

On 21 December 2023, a delegate of the Minister for the Environment and Water determined that the proposed action by the Department of Defence (Defence) involving vegetation clearing and earthworks, at Blamey Barracks, Kapooka (BBK) part of the Kapooka Military Area (KMA) near Wagga Wagga, New South Wales (NSW), is a controlled action and that it will be assessed by preliminary documentation.

Further information was required to assess the relevant impacts of the proposed action. The Minister for the Environment and Water requested, in letters dated 19 January 2024 and 04 June 2024, under s95A(2) of the *Environment Protection and Biodiversity Conservation Act 1999*<sup>1</sup> (EPBC Act), further information as outlined in **Appendix A**.

This Preliminary Information Documentation Report (PIDR) provides the information requested.

### 1.1 Table of information

Refer to **Appendix B** for a cross referencing table that stipulates where the information fulfilling this request is included in the PIDR. **Appendix C** provides a summary of technical information relied upon in producing this PIDR.

### 1.2 Project team

**Table 1-1** outlines the key contributors to the environmental technical reports supporting the preliminary information that informs this PIDR.

Table 1-1: Project team

Name	Role	Qualifications	Years of experience
Sue-Ellen Mahon	Riverina Redevelopment Joint Venture (RRJV) Environment Manager	Batchelor of Science (Environmental Management) (Hons) Southern Cross University 2005 Grad Cert Sustainability Swinburne University (Vic) 2009	25 +
Victoria Buchanan	Contaminated Land Lead (EMM Consulting)	Bachelor of Engineering (Environmental) (Hons)	28
Christopher Holloway	Environmental Approvals Lead (EMM Consulting)	Bachelor of Science Post Graduate Certificate in Water Resource Management	21
Susan Lampard	Heritage Lead (EMM Consulting)	Bachelor of Archaeology (Hons); Doctor of Philosophy (Archaeology)	19
Nathan Garvey	Biodiversity Lead (EMM Consulting)	Bachelor of Science; Graduate Diploma (Biological Science); Certified Environmental Practitioner (CEnvP)	21

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<sup>1</sup> <https://www.dcceew.gov.au/environment/epbc>



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Name	Role	Qualifications	Years of experience
<b>Tatia Zubrinich</b>	Environment review and verification (Project Management Contract Administrator (PMCA))	Bachelor of Science (Ecology) Hons, Flinders University, 1991 Doctor of Philosophy (PhD) Ecology/Environmental Management, Flinders University, 1995	25+
<b>Lia Black</b>	Environment review and verification (PMCA)	Bachelor of Science (Geographic Information Science), University of Queensland 2004 Master of Environmental Management, Griffith University 2006	20
<b>Rose Overberg</b>	Heritage review and verification (PMCA)	Bachelor of Arts (Archaeology), The University of Melbourne, 2000 Bachelor of Science (Geology) with Honours, The University of Melbourne, 2000 Best Practice in Managing Heritage Places Course, Australian National University, Port Arthur, Tasmania, 2010 Future Environmental Leaders Program, Monash University, 2006 Masters in Archaeology and Heritage Management, Flinders University 2020	20+
<b>Philip Limage</b>	Environment review and verification (PMCA) – Contaminated Land	Bachelor of Science (Environmental Science) Hons, 2007 Master of Science (Environmental Management) Hons, 2010	17

## 2. Description of proposed action (S1)

### 2.1 Summary of components of action (S1.1)

The action proposed by Defence is the Riverina Redevelopment Program (RRP). The RRP involves works to renew, modernise, and sustain services infrastructure and facilities to support capability at three major Defence bases; the Albury Wodonga Military Area (AWMA), RAAF Base Wagga (RBW) and BBK. The proposed action relates only to the redevelopment of BBK, see **Figure 2-1**.

The RRP will support Defence by aligning with the step change toward a contemporary Australian Defence Force (ADF). The RRP will provide exemplar facilities and infrastructure with the flexibility in planning to meet the demand on training facilities from Defence's recent Defence Strategic Review (2023)<sup>2</sup> and Force Structure Plan 2020 (FSP20)<sup>3</sup>. The RRP aims to posture the ADF for growth in soldiers, airmen/airwomen and specialist trades and logistics that are essential to operate future capability.

BBK is the 'front door' of the ADF delivering the first experience of Army life to enlistees and their families. The Base has a distinctive place in the Riverina community with histories spanning generations. BBK's primary function is the delivery of all Army recruit training through 1st Recruit Training Battalion (1 RTB). Established in 1942, BBK is an aging base, with major infrastructure developed as 'Blamey Barracks' in the 1960s, with limited new facility investments since that time. It lacks appropriate facilities to support contemporary training requirements.

Existing facility and infrastructure issues at BBK that the RRP seeks to improve include the following:

- Recruit and pre-recruit Living-In Accommodation (LIA) does not meet capacity or diversity requirements, current Defence Accommodation Standards, nor the National Construction Code – Building Code Australia and is currently housing significantly more recruits than the original 1960's design was intended to accommodate.
- The poor condition of roads at BBK impact the response time of emergency vehicles to respond to training injuries.
- Lack of appropriate facilities, including on-site parking, and pedestrian infrastructure to support high visitor numbers during weekly march-out parades.
- No additional training capacity in the weapon ranges, which limits recruit through-put.
- Infrastructure services including electricity, firefighting water supply, stormwater management, information and communications technology are aging, in poor condition, often exceed capacity and are not fit for purpose.
- High maintenance costs due to large proportion of aging assets.

### 2.2 Locality and description

BBK is located approximately 9.5 km west of Wagga Wagga in southern NSW, within the broader KMA. KMA is approximately 1,990 hectares (ha) in size. BBK is accessible via Camp Access Road from the Olympic Highway. Its northern and eastern borders are close to the Sturt and Olympic Highways and an adjacent railway line and shares its north-eastern border with the Wagga Wagga suburb of San Isidore. BBK is part of the Federal Electorate of Riverina.

BBK is wholly located on Commonwealth owned land, as represented by the Department of Defence. The land within BBK is classified as a Special Purpose Zone and is therefore not addressed by local planning schemes. The regional setting is presented in **Figure 2-1**.

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<sup>2</sup> <https://www.defence.gov.au/about/reviews-inquiries/defence-strategic-review>

<sup>3</sup> <https://www.defence.gov.au/about/strategic-planning/2020-force-structure-plan>

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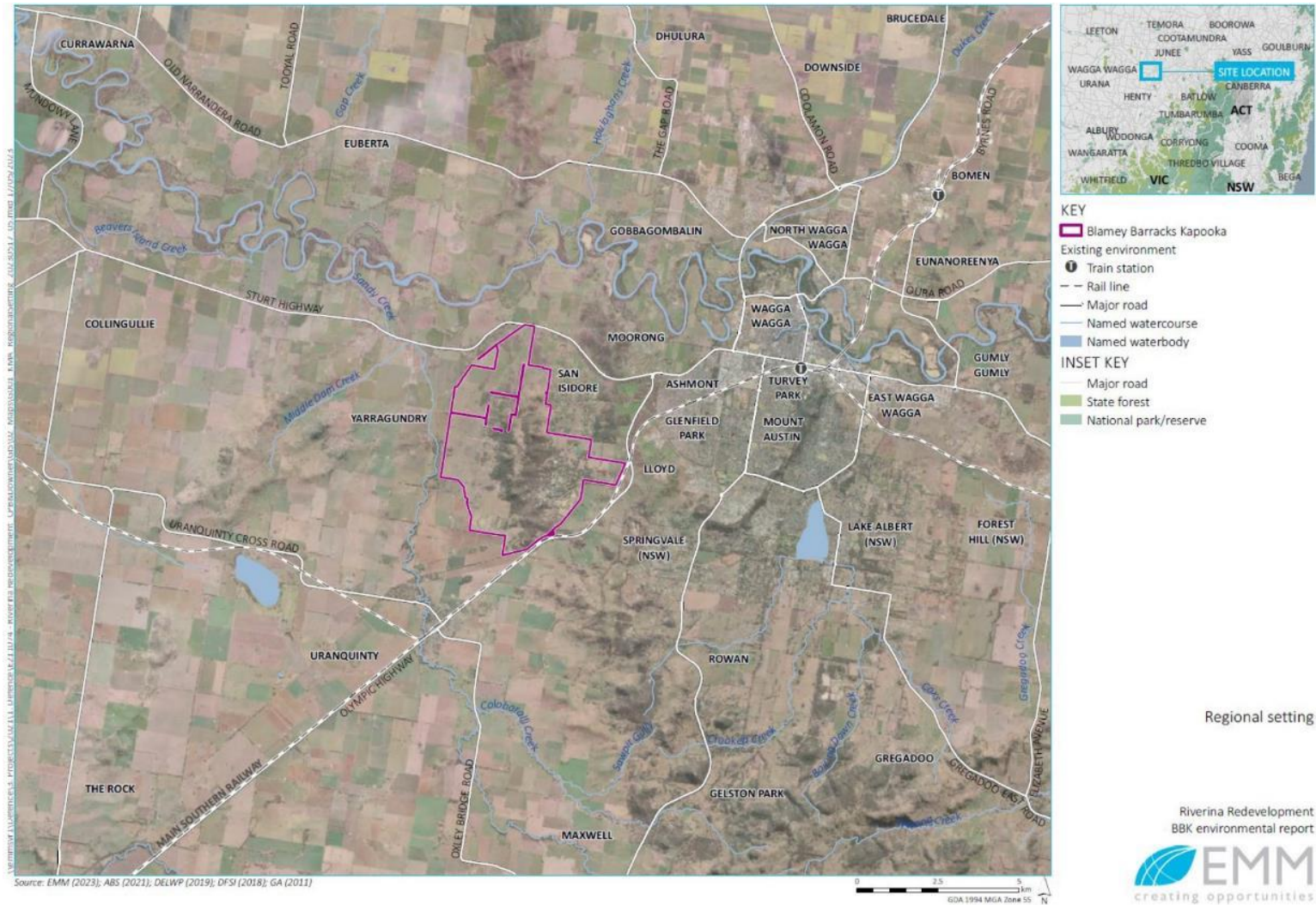


Figure 2-1: General Locality

## 2.3 Detailed description of proposed action (S1.2, 1.4)

The purpose of the proposed action is to replace aging infrastructure at BBK that is no longer fit for purpose and poses safety and security risks. Design for the proposed action has met 90% Detailed Design Report (DDR) fidelity and is fixed in terms of assets being constructed, their ground disturbance footprint and depth, and areas of enabling works such as compounds and haul routes.

Presented in **Figure 2-2**, the main activities that will form part of the proposed redevelopment works include:

- **Infrastructure:** Upgrade, replacement, consolidation and/or installation of new infrastructure services including electrical, Information Communications Technology (ICT), water, gas, fuel, wastewater, and stormwater.
- **Base wide and Security:** Upgrade and replacement of footpaths (5 kilometres (km) new, 5 km repair), internal Roads (2 km new, 5 km repair), and the demolition of aged buildings. Increasing security to control and limit access into the base by visitors, particularly during weekly March-out parades.
- **Living-in Accommodation:** Development of new LIA for Recruit Development Company and A, B, C, and D Companies.
- **Training and Working Accommodation:** Construction of new facilities and upgrades to existing including upgrades to Instructor Training Facilities, new working accommodation in the Contractor's Precinct, a new Headquarters Building for 1 RTB, Security and Estate Group and Enablers Service Connect Hub, new Medical Training Facilities.
- **Support Facilities:** Construction of a Recruit Welfare Facility, Clothing store, recruit physical training facility (gym), land management facilities, and upgrades to the existing Chaplaincy and Well-being Facilities.

Presented in **Figure 2-3**, a weapons training area is also proposed, which is separate from the main works area and will provide:

- **Weapons Training Area:** Construction of new explosive ordnance storage and distribution facilities, and re-alignment of a weapons range.

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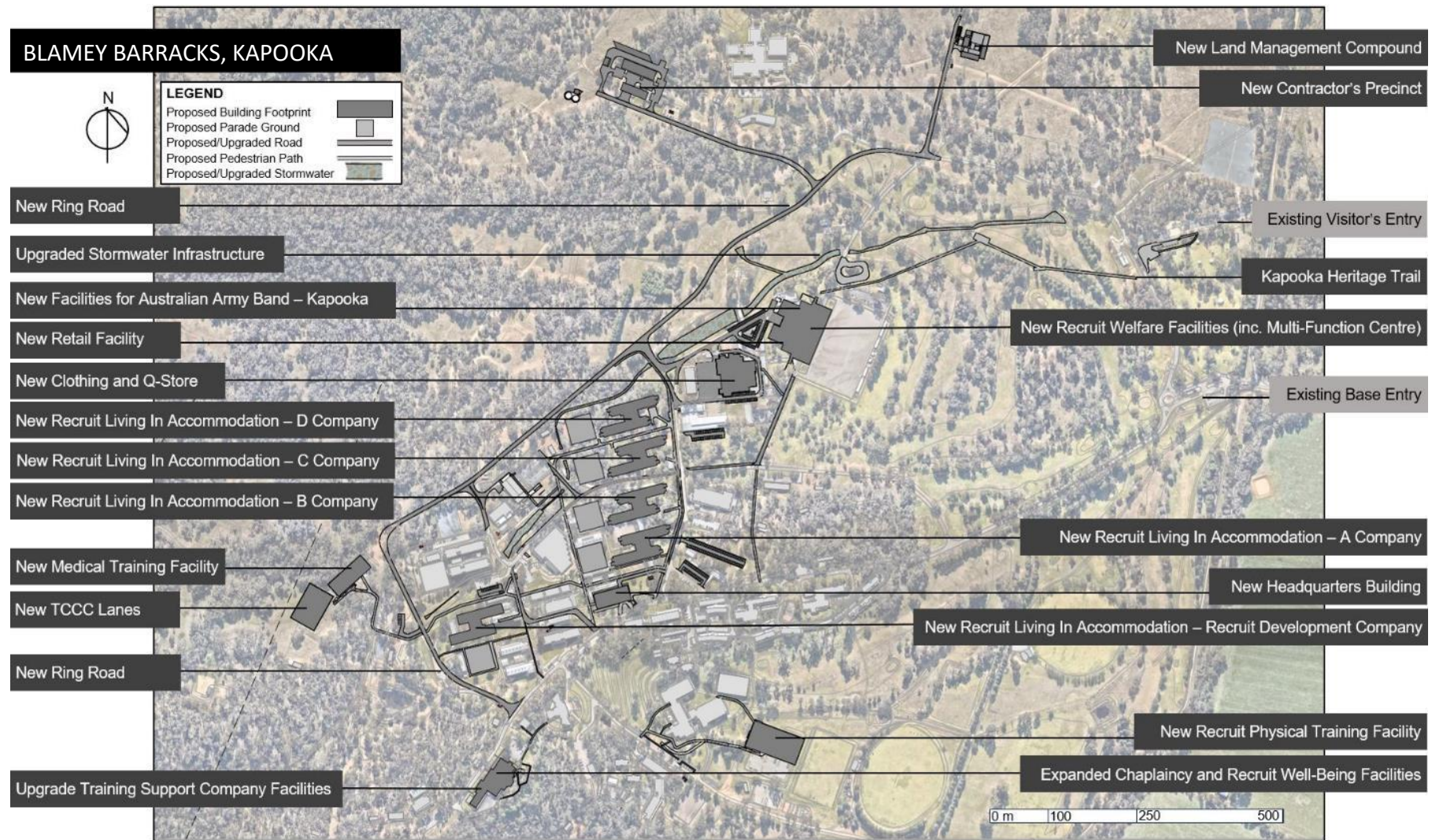


Figure 2-2. Proposed works at BBK (Main Works Area)



Figure 2-3. Proposed works at BBK (Weapons Training Area)

The proposed action involves three distinct phases: (i) preconstruction assessment and design, (ii) construction and (iii) operational, each detailed below.

### 2.3.1 Preconstruction Assessment and Design

Preconstruction activities to date have involved undertaking in-field technical investigations related to design and environmental assessments (undertaken between 2021 to 2024). The assessments have allowed the development of information to improve overall understanding of the existing environment and potential for impacts by the proposed works, as well as provide input into siting and design of the proposed infrastructure, so as to avoid where possible, and otherwise minimise impact on any MNES. Preconstruction assessment has therefore also provided the necessary information required to support the approvals required for the proposed development to proceed. It has also allowed the design team to plan for controlling ground disturbance works within the existing site conditions, when executing the proposed action.

The assessments included:

- Biodiversity field assessments (summarised in **Section 3**).
- Contamination and geotechnical assessments (summarised in **Section 4.1**).
- Heritage site assessments (summarised in **Section 4.2**).

### 2.3.2 Construction Activities

Construction activities that may interact with specific Project environmental values (as defined by DCCEEW's significant impact assessment guidelines 1.1 and 1.2) at BBK are summarised below.

#### 2.3.2.1 Vegetation Clearing (S1.5, 1.6, 1.7)

The proposed action requires some vegetation clearance to occur, in particular adjacent to the New Ring Road alignment to the north of the main works area. This activity will result in direct loss of native vegetation and will require detailed task-based construction controls to mitigate potential indirect impacts such as fragmentation, erosion, sedimentation, and weed introduction and spread.

Vegetation to be cleared is at, or close to, areas where existing BBK facilities are sited and generally already disturbed. Linear elements of the proposed action have been aligned with existing road corridors and, where that is not possible, new alignments have considered remnant vegetation during the design phase. Clearing footprints for construction will be minimised and clearly delineated; retained vegetation will be protected through exclusion fencing and signage indicating no-go zones. Vegetation clearing will be undertaken in accordance with construction plans, in accordance with the RRJV EMP.

The total Project disturbance footprint for all works associated with the action at BBK will be 25 hectares (ha). Of the 25 ha of land to be developed, the amount of native vegetation to be cleared is calculated to be 2.65 ha and potential indirect impacts to native vegetation will be 3.06 ha.

Whilst impacts to vegetation have been avoided and minimised through an iterative design process supported by detailed biodiversity field surveys, the proposed action will result in impact to a Commonwealth listed Threatened Ecological Community (TEC), being the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (determined by the DCCEEW during the referral assessment stage to be the only protected matter under the controlling provisions likely to be significantly impacted). Direct impacts to the TEC are calculated at 1.39 ha, with indirect impacts including potential fragmentation calculated to be 1.17 ha, for a potential total impact on the TEC of 2.56 ha.

**Figure 2-4** shows the extent of the proposed TEC clearance required in the main works area.

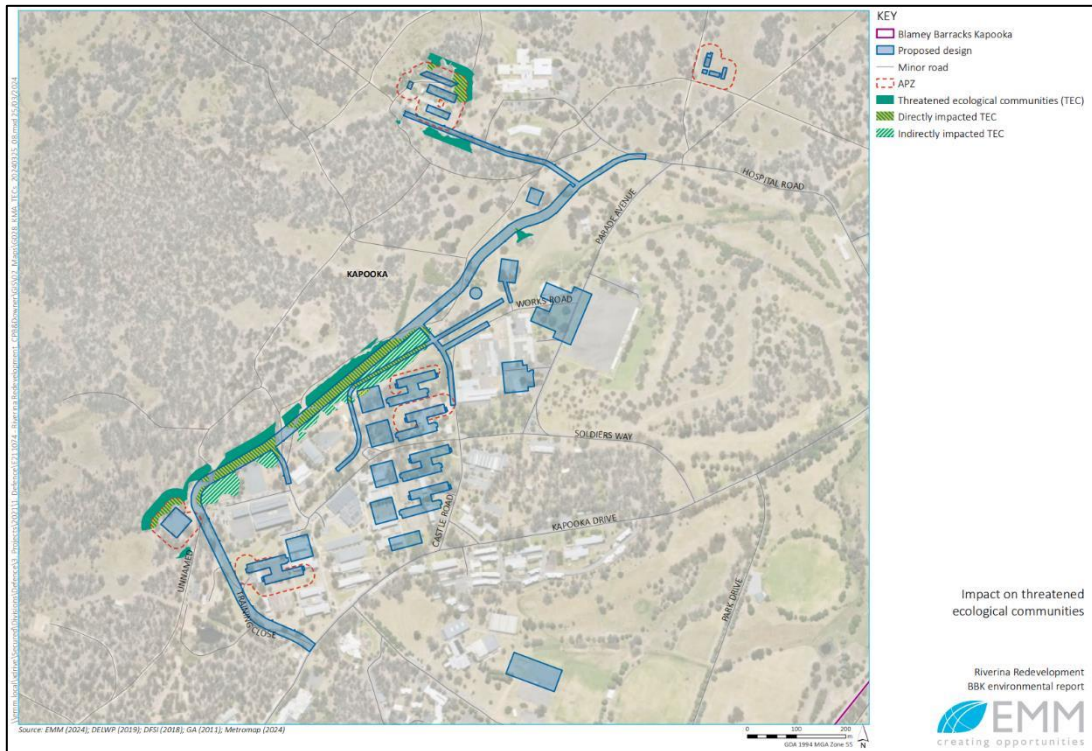


Figure 2-4: Extent of proposed TEC clearance at BBK

No remnant vegetation will be cleared to realign the Range and accordingly, no listed threatened species or ecological communities will be impacted. Vegetation to be removed comprises planted amenity trees and exotic grasslands.

Figure 2-5 shows the orientation of the proposed weapons training area realignment, relative to the existing range, as well as the extent of works disturbance required during construction. Note, whilst some vegetation will require clearance, no TEC has been identified in this area.

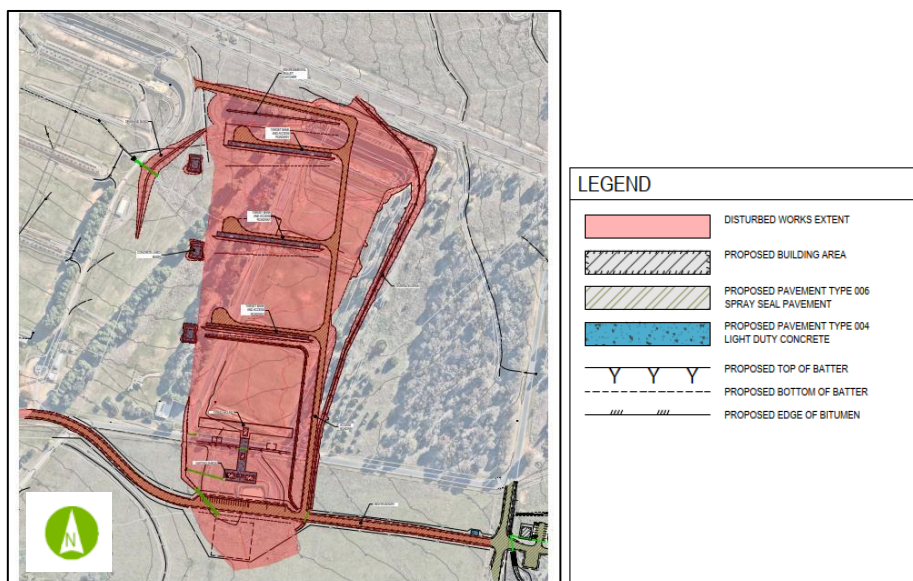


Figure 2-5: Weapons Training Area realignment showing the extent of vegetation clearance required (planted trees and exotic grasslands)



### 2.3.2.2 Earthworks and Ground Disturbance

BBK contains a ridgeline that runs north to south and splits the Base down the centre in terms of topography: the main base facilities are located on the eastern side and the range and open area are located on the west and northern sides. The site topography to the eastern side is undulating, falling from the ridgeline at 370 m AHD, and levelling towards the eastern boundary at 180 m AHD. Where required, excavation requirements varying from typically 1.0 to 1.5 m below ground level (BGL) to a maximum of 5.0 m BGL depending on topography, location and subject to requirements of each work element.

Due to several factors such as topography, utilities, geotechnical, flooding, stormwater, the proposed action is primarily a net filling activity; meaning that the existing ground surface will be below new cover material and construction of clean pavement, concrete slab or unsealed surface will be emplaced at the completion of construction.

To manipulate the existing ground surface into those elevations required by the proposed action, the total volume requirements include: 61,057 m<sup>3</sup> to be cut and used elsewhere (reducing existing ground surface) and 111,076 m<sup>3</sup> to be filled from on-Base re-used or off-Base imported material (raising the existing ground surface), equating to a net filling activity of 50,019 m<sup>3</sup>.

Table 2-1 presents a summary of the nature and extent of major earthworks required for each work area, including a description regarding the maximum extent either BGL or above ground level (AGL) and an excerpt of detail design drawings (major cut activities are highlighted with row shading). The detailed cut:fill drawings utilise the following legend.

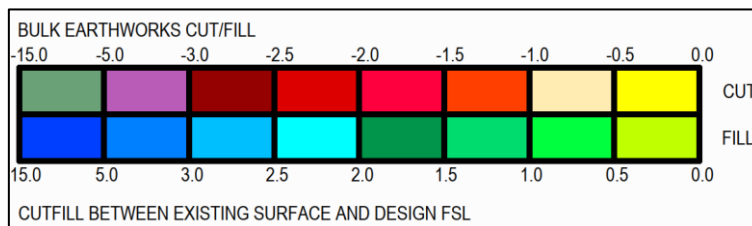
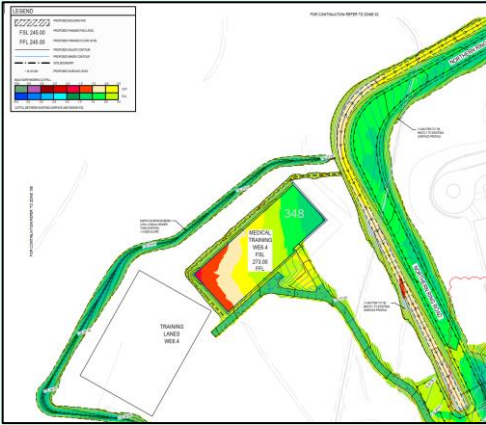

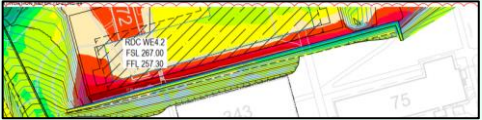

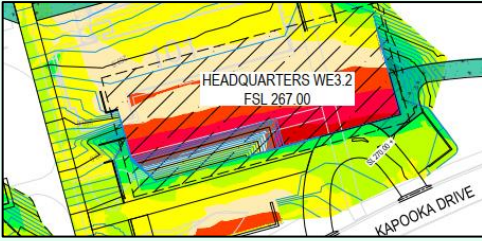
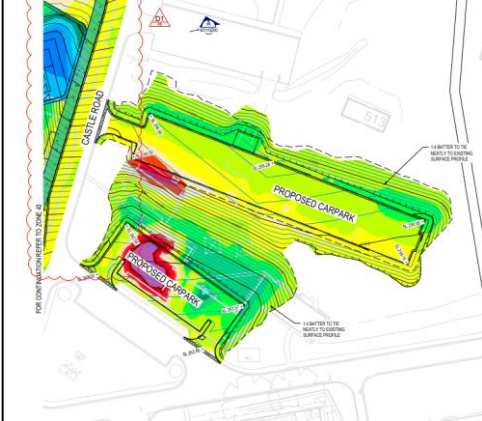
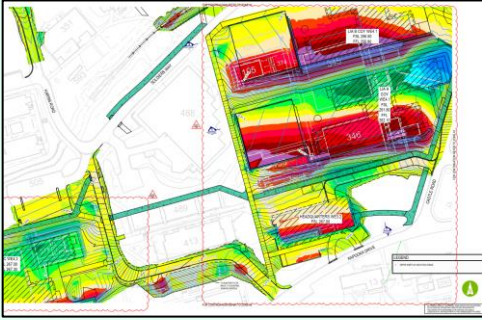
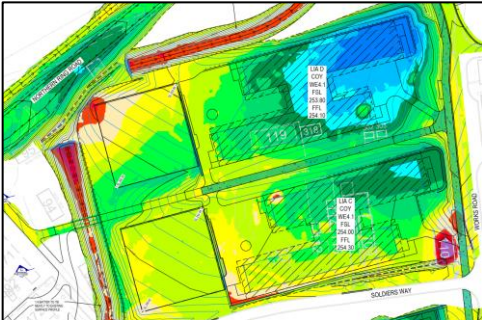
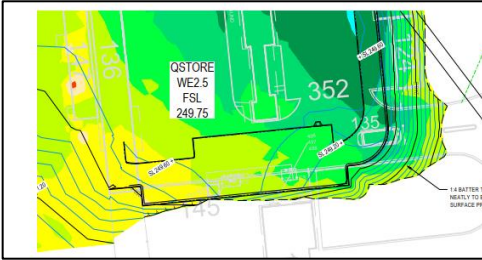
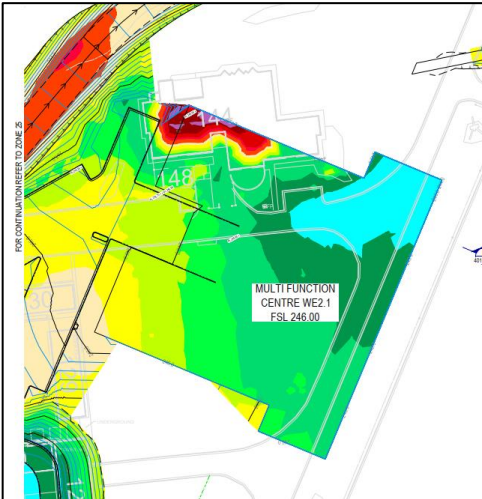


Table 2-1. Cut:fill Bulk Earthworks Detail


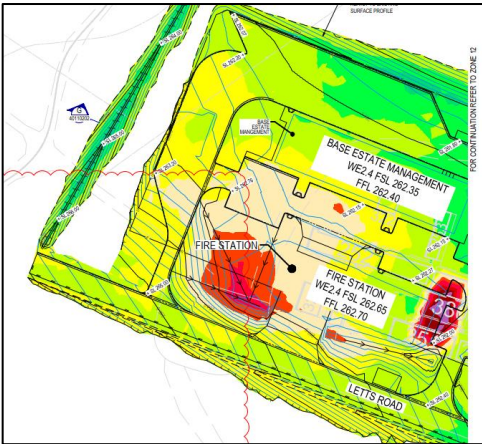
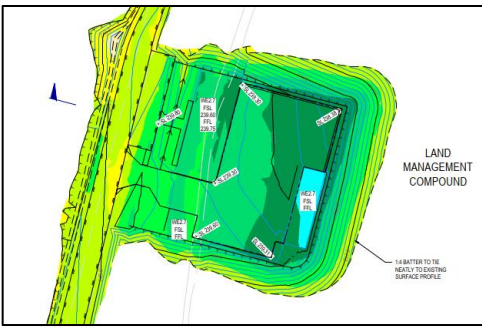

Area	Cut (m <sup>3</sup> )	Fill (m <sup>3</sup> )	Delta (m <sup>3</sup> )	Max. Extent / Rationale
<b>Cantonment Work Area</b>				
<b>Medical training</b> 	1,673	879	794 cut	1.5 m BGL (southwest of building footprint)



Area	Cut (m <sup>3</sup> )	Fill (m <sup>3</sup> )	Delta (m <sup>3</sup> )	Max. Extent / Rationale
<b>Northern Ring Road</b> 	4,647	27,178	-22,531 fill	<b>2.0 m AGL</b> (primary infill areas, will be main destination of beneficially re-used material in works areas)
<b>LIA West</b> 	4,343	4,217	126 cut	<b>2.0 m BGL</b> (along southern edge of building footprint)
<b>Road between East - West LIAs</b> 	726	217	509 cut	<b>1.5 m BGL</b> (two discrete deeper areas, generally trimming to 0.5 m BGL)
<b>HQ</b> 	2,698	1,010	1,688 cut	<b>2.0 m BGL</b> (along southern edge of building footprint)
<b>LIA Carparks</b> 	1,794	2,404	-610 fill	<b>1.0 m AGL</b> (two discrete deeper areas of cut (to 5.0 m BGL), generally raising ground to 1.0 m AGL)

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Area	Cut (m <sup>3</sup> )	Fill (m <sup>3</sup> )	Delta (m <sup>3</sup> )	Max. Extent / Rationale
<b>LIA Alpha &amp; Bravo Company</b> 	24,081	9,754	<b>14,327 cut</b>	<b>5.0 m BGL</b> (primary excavations, will be main source of beneficially re-used material in works areas)
<b>LIA Charlie &amp; Delta Company</b> 	6,266	26,112	<b>-19,846 fill</b>	<b>5.0 m AGL</b> (primary infill areas, will be main destination of beneficially re-used material in works areas)
<b>Q store warehouse</b> 	2,652	12,613	<b>-9,961 fill</b>	<b>2.0 m AGL</b> (primary infill areas, will be main destination of beneficially re-used material in works areas)
<b>Recruit Welfare Facility &amp; nearby roads</b> 	4,787	8,304	<b>-3,517 fill</b>	<b>2.5 m AGL</b> (some trimming to west of building, and isolated 3.0 m BGL excavation, but primarily fill >1.0 m AGL)

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Area	Cut (m <sup>3</sup> )	Fill (m <sup>3</sup> )	Delta (m <sup>3</sup> )	Max. Extent / Rationale
<b>WTTs</b> 	134	593	-459 fill	<b>1.0 m AGL</b> (minor filling)
<b>Contractors Precinct</b> 	3,635	5,562	-1,927 fill	<b>1.5 m AGL</b> (minor filling across building footprint, two isolated cuts to 2.0 m BGL)
<b>Land Management Compound</b> 	2	4,341	-4,339 fill	<b>2.5 m AGL</b> (major filling across building footprint)
<b>Heritage Trail</b> 	257	1,679	-1,422 fill	<b>1.0 m AGL</b> (minor filling along alignment of walking trail)

Area	Cut (m <sup>3</sup> )	Fill (m <sup>3</sup> )	Delta (m <sup>3</sup> )	Max. Extent / Rationale
<b>Fitness Training Facility &amp; Gym</b> 	1,338	2,492	-1,154 fill	<b>1.5 m AGL</b> (minor trimming to west of building footprint to raise the eastern extent)
<b>Miscellaneous (Kapooka Drive &amp; Park Drive)</b>	456	1,068	-612 fill	<b>1.5 m AGL</b> (minor filling along road corridors to raise grade)
<b>Weapons Training Area</b>				
<b>Range Road</b> 	1,111	3,244	-2,133 fill	<b>2.0 m AGL</b> (minor filling along road corridors to raise grade)
<b>EO Ranges</b>	2,130	288	<b>1,842 cut</b>	<b>3.0 m BGL</b> (land forming existing stop butts to new range fan template)
<b>Total</b>	<b>61,057</b>	<b>111,076</b>	<b>-50,019 fill</b>	

### 2.3.2.3 Imported Fill and Waste Management

#### Imported Fill

Per **Table 2-1**, approximately 65% of all material handled for the proposed action will be for filling activities and, due to the deficit in cutting excavations, a net importation of approximately 50,000 m<sup>3</sup> will be required to achieve the design grades.

Where material is imported into a work area, if it is beneficially re-used from an on-Base source, it should be assessed and determined suitable for relevant land use criteria in accordance with National Environmental Protection (Assessment of Site Contamination) Measure (ASC NEPM) and NEMP 2.0 in the destination area. Where materials are sourced off-Base, the material will meet either Virgin Excavated Natural Material or Excavated Natural Material exemption orders under the NSW Protection of the Environment Operations Act (POEO) with appropriate documentation, and when in doubt, verified upon importation via chemical testing and observations by a suitably qualified Environmental Scientist. Records will be kept per the RRJV quality system for post-construction validation. This process is documented in the Contamination Management Strategy (EMM, 2023e).

#### Waste Management

Although the proposed action is primarily a net filling exercise, meaning existing ground surfaces will generally be covered with new fill to raise grade, some existing ground surfaces have been subject to historical land use that may give rise to the presence of elevated contaminant mass. In these areas, whilst the act of covering with fill and raising the grade greatly reduces contaminant release and transport potential (i.e., removes the primary pathway of mobilisation via rainwater and migration through stormwater and ephemeral drainage

lines), it may be beneficial to long-term environmental conditions for the material to be segregated and managed as a waste off-Base (removing the contaminant mass entirely, rather than capping).

The potential presence / absence of contamination hazards in each Cantonment Work Area are presented in detail in **Section 4.1** below. The primary potential contaminant source area likely to be interacted with during the earthworks for the proposed action is the current fire station and surrounding grassed surfaces (to be the Clothing & Q Store and Multi-Function Centre in the proposed action). This area is being managed as part of a wider contamination investigation and management approach (Defence (2021), *BBK PFAS Management Area Plan (PMAP)*). Therefore, during construction of the proposed action, demolition of built structures (the fire station building, concrete slabs and pavements) and earthworks will be under a specific contamination management framework, which will likely include additional source zone characterisation, remedial options appraisal, remedial action planning, supervision and validation testing to inform validation reporting, and review by a Contaminated Site Auditor.

All off-Base waste generated by construction activities will comply with the NSW POEO Act Waste Regulation and subordinate guidance for classification assessment and transport consignment to suitably licensed waste facilities. Where interstate movement of waste is required (due to the absence of licensing in NSW), then those state regulations will be adhered to in addition during the activities. Records will be kept per the RRJV quality system for post-construction validation. This process is documented in the Contamination Management Strategy (EMM, 2023e).

#### **2.3.2.4 Dewatering requirements and water management**

The geological setting of BBK is defined as colluvial deposits and residual clays (observed from surficial soils to depths >40.0 m BGL) overlying metasedimentary bedrock (shale). The shale acts as the water bearing formation for regional groundwater. To the east, nearer the proposed action, there is understood to exist a thicker colluvium deposit with a greater depth to regional groundwater than the west side of KMA.

Key reports regarding Base-specific assessment of hydrology and hydrogeology include the following:

- Jacobs (2019). *Blamey Barracks Comprehensive PFAS Investigation: Detailed Site Investigation*, issued September 2019.
- Jacobs (2021). *Blamey Barracks Comprehensive PFAS Investigation: Human Health and Ecological Risk Assessment*, issued June 2021.

Water management categories for the proposed action have been defined as groundwater, perched water, and surface water, each presented below regarding their nature and interaction potential during construction.

##### **Groundwater**

Overall, it is unlikely that the proposed action will interact with groundwater. Defence (2021) notes that perched water lenses have not migrated into regional groundwater, indicating the efficacy of the residual clay overburden acting as an aquiclude to the underlying shale. Being a confined aquifer, the water bearing zone in the shale formation is more likely to be encountered at approximately >40.0 m BGL. Based on this understanding, during construction activities, groundwater is not considered a receptor nor a secondary transport mechanism for contamination management purposes.

##### **Perched Water**

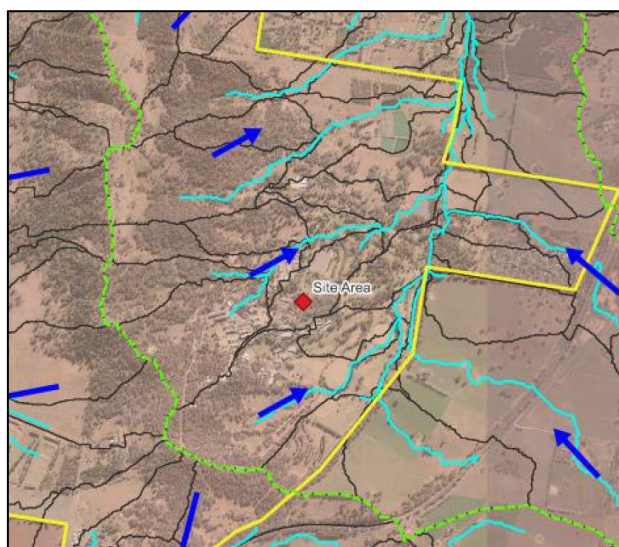
During Base-wide investigation, perched water lenses have been identified in surficial colluvial soils attributed to isolated vertical infiltration from infrastructure and natural drainage lines. Likely to be consistent with topography of the Base – that is, accumulating from vertical infiltration of rainwater surface flow at the base of slopes - by their nature perched water lenses have low productivity and are discontinuous.

As the proposed action is located at lower elevation to the east of the KMA ridgeline, perched water may be intersected during earthworks. Based on current understanding of ground conditions, it is anticipated that

perched water infiltration rates into excavations will be less than evaporation forces. Where surplus pooling occurs, water will be removed from the excavations and managed per the Contamination Management Strategy (EMM, 2023e).

### Surface and Construction Water

The ridgeline has a peak level of 370 m AHD and splits the wider KMA into two key surface water catchments, east towards BBK at approximately 180 m AHD (see **Figure 2-6** below). Water courses are typically mildly incised and moderately to sparsely grassed, accepting run-off from roadways and verges and from buildings. The majority of kerb and gutter stormwater infrastructure is east of the ridgeline with the western (and some southern portions) serviced by earthen swales.



**Figure 2-6: Surface water catchments**

Grades are relatively steep, averaging 7% with maximum of 20%, allowing for good drainage across BBK, however, during rain events where stormwater and natural draining lines are flowing, it is imperative to segregate up-gradient water from construction zones so as not to introduce construction water and sediment into “clean water” flows. As detailed in the Contamination Management Strategy (EMM, 2023e) stormwater will be diverted around excavations to the extent possible and tied into relevant existing stormwater infrastructure (per NSW Government (2004) “Blue Book” *Managing Urban Stormwater: Soils and Construction*, 4<sup>th</sup> Ed).

Where bulk removal of construction water is required from excavations, water will be held in intermediate holding tanks for assessment and the environmental management outcomes be determined on a case-by-case basis by a suitably qualified professional. However, for the purposes of approvals, the below strategy will generally be implemented where bulk removal of construction water is required under the RRJV EMP:

- **Beneficial re-use:** dust suppression for construction works and roads (>95% species protection ANZG (2018), 0.13 µg/L PFOS | 220 µg/L PFOA\*).
- **Treatment or off-Base disposal:** treatment to lower PFAS loading to consider beneficial re-use, or removal and transport to a suitably licensed liquid waste facility (>95% species protection ANZG (2018), 0.13 µg/L PFOS | 220 µg/L PFOA).

*\*Although stormwater infrastructure at BBK may be classified as a degraded / disturbed environment, to account for PFAS biomagnification potential the 95% species protection is selected in the first instance.*

### 2.3.2.5 Demolition of Built Structures

The proposed action involves the demolition of several existing buildings: as part of the proposed action - demolition of 31 of the 38 Blamey era buildings (with heritage value) is required. The management of the heritage impact of building demolition is discussed in **Section 4.2**.

Beyond impacts to heritage values of the structure themselves, demolition activities will require detailed destructive assessments into the fabric and materials present, including the presence, condition and extent of dangerous goods (chemical and fuel storage) and hazardous building materials (asbestos containing materials, metallic paints, ozone depleting substances, synthetic fibre). A detailed register for each building is to be placed in a Demolition Plan, in general accordance with NSW SafeWork (2019) *Code of Practice: Demolition Work*.

Records will be kept per the RRJV quality system for post-construction validation. This process is documented in the Contamination Management Strategy (EMM, 2023e).

### 2.3.2.6 Movement of construction vehicles, plant and equipment

Construction activities will involve the movement of construction vehicles, plant and equipment at high frequency on a daily basis over the course of the proposed action (2025 to 2031, see Timeframe in **Section 2.4**).

Management measures for construction vehicles, plant and equipment impacts are detailed within the EMP and will include:

- Traffic management plans (speed limits, heavy and light vehicle segregation, pedestrian right of way).
- Fauna awareness training.
- Site biosecurity measures (including wash protocols).
- Details on construction management practices to manage any potential impacts to nearby communities (hours of driving, covering loads, gross vehicle mass (GVM)).

### 2.3.2.7 Construction Environmental Management Planning

From the preconstruction assessment and design phase, a series of avoidance, mitigation, and management measures were developed to be implemented during construction activities. To facilitate the implementation of these measures by appointed construction and earthworks subcontractors, the overarching RRJV EMP (in **Appendix D**) was developed.

Once appointed, the construction and earthworks subcontractors will prepare subordinate task-based construction plans detailing how to avoid and manage hazards and mitigate potential risks to the specific Project environmental values. The construction and earthworks subcontractors will comply with RRJV EMP controls and the CEMP for that work element.

The RRJV EMP will be part of tender documentation for the construction subcontractors to ensure that any EPBC Act (and broader Project) approval conditions are contractually captured.

## 2.3.3 Operational Activities

During the operational phase, there will be no new activities introduced at BBK. The Operational Activities include training of Australian Regular Army Recruits and Army Reserve Officers and Recruits. This training has been developed over decades to train civilians into soldiers. Training includes the following activities:

- Physical fitness.
- Drill, and dress and bearing.



- Soldiering (including bayonet assault training, tactical manoeuvres, and field craft).
- Weapon handling and marksmanship (dry, simulated, and live-fire training, and grenade practice).
- Living in a barracks.

These activities are taught by dedicated instructional staff from 1 RTB in classrooms and in a practical environment using fit for purpose facilities delivered by the Project. These include Living-In Accommodation and training facilities, new HQ Building, Recruit Welfare Facility, roads and footpaths, Medical Training facility, Physical Training Facility, and Weapons Range. The training will culminate in a March-out Parade (held weekly) where the Recruits leave Kapooka for their next phase of training.

The Security and Estate Group support these activities with administration and logistics functions by providing messing, transport, base maintenance, and upkeep. These functions will operate from facilities provided by the Project including the Contractor's Precinct, Land Management Compound, HQ Building, EO Storage Facility, new roads, and site-wide infrastructure.

The Project is likely to have negligible environmental impact during the Operational phase as proposed works are primarily replacement/upgrade of existing operational facilities and will involve the same level of operational and maintenance activities to that currently undertaken at BBK. Operational activities will continue to be governed under Defence's existing site environmental management processes for BBK.

Benefits of the Project are outlined in **Sections 2.3.3.1 to 2.3.3.7**.

### **2.3.3.1 Facilities and Infrastructure Benefits**

The new facilities and infrastructure will enable Operational Activities to continue for the next 30 years. The infrastructure will address compliance issues currently being experienced given much of the existing infrastructure proposed for upgrade is no longer fit for purpose. The new facilities and infrastructure will also increase capacity to meet the future demand of infrastructure services including electricity, firefighting and potable water supply, stormwater management, and information and communications technology, as well EO storage and distribution.

Additionally, the Project will establish appropriate volumes of on-Base parking and pedestrian infrastructure to support high visitor numbers during the weekly March-out Parades.

### **2.3.3.2 Safety Benefits**

The Project will provide the following safety benefits in the Operational phase:

- A new ring road will direct heavy vehicle traffic around the cantonment, eliminating the interaction between heavy vehicles and pedestrians in the accommodation and mess precinct.
- New marching footpaths will minimise the requirement for Platoons to march on the roads alongside vehicles.
- Siting of infrastructure in accordance with a considered master plan that minimises pedestrian movements between buildings, reducing the likelihood or severity of lower limb injuries during Recruit training.
- Improve safety to maintenance and support staff through:
  - Reduced manual handling, reduced high risk work (working at heights, confined spaces etc), hazard response (eye wash stations and spill kits), and compliant hazardous material storage. This is achieved by constructing new fit for purpose facilities that have considered 'safety in design' for all Operational Activities.
  - Compliant site-wide and building services that are marked and known, reducing hazards during excavation or services maintenance. This is achieved by upgrading or installing new infrastructure, as well as marking and mapping existing in-ground infrastructure.

- Appropriately sited vehicle/plant parking and access, reducing the risk of vehicle accidents.
- Improve road conditions to meet response time requirements of emergency vehicles to respond to training injuries.

### 2.3.3.3 Training, Throughput Capacity and Retention Benefits

The 2024 *National Defence Strategy* provides a renewed focus on workforce, with one of the Government's immediate actions to re-prioritise Defence's capabilities in line with the Strategy's focus being 'on recruitment, retention and skilling initiatives to grow the workforce and make Defence an even more attractive employer.' Investment in modern, contemporary, and fit-for-purpose facilities in which to live, train and work, is critical to achieving this Strategy.

The Project will deliver increased Recruit accommodation capacity and increased training capacity in the weapon range area to enable improved recruit throughput rates. Additionally, new roads and footpaths will maximise the efficiency of pedestrian movements between messing, work areas, parade grounds, and accommodation. This increases the time available for training, which can reduce the length of a training program. This improved capacity supports the Strategy's intent to 'grow the workforce'.

The construction of the Recruit Welfare Facility and Expanded Chaplaincy and Well-Being Facilities will promote a positive, inclusive, and psychologically safe workplace, aligning with the 2024 *National Defence Strategy*.

### 2.3.3.4 Socio-Economic Benefits

The continuation of the Operational Activities at BBK for the next 30 years will provide ongoing socio-economic benefits. The investment in BBK offsets the requirement for a new training base in a new location, which is estimated to cost significantly more than the proposed expenditure of this Project. Continuation of new recruit training at BBK provides a long-term commitment to the City of Wagga Wagga, further enhancing the bond between Defence and the local community and the ongoing stimulus to the local economy. The forecasted 7-year construction program will also result in a substantial benefit to the local workforce.

### 2.3.3.5 PFAS Management Area Plan Implementation Benefits

Presented in more detail in **Section 4.1**, BBK is subject to a PFAS Management Area Plan (PMAP) to further investigate and manage PFAS impacts at the Base and surrounding areas. The topography of the base causes all the surface water run-off from the low concentration PFAS source areas to be focused and flow east towards Kapooka Creek and discharge off-Base. Because of this, the large area over which source areas are present and their relatively low level of contamination, achieving net beneficial remediation of contamination in a standalone project at BBK is not straightforward.

By partnering in an integrated response with the PMAP implementation project to control contaminant leaching potential from source zones in its bulk earthworks, the proposed action will be actively enabling and expediting PMAP responses at the Base.

### 2.3.3.6 Water Management Benefits

#### Quality Management

Stormwater will be managed to best practice standards. Stormwater quality management controls will be implemented throughout the base to improve water quality during the Operational phase. The Project is required to reduce the pre-construction stormwater pollutants to align with Defence's reduction targets. **Table 2-2** details the improved pollution reduction resulting from the Project's "quality devices". The post-development residual load reduction is dependent on the construction of the proposed Ring Road and vegetated swales, demonstrating additional justification for the construction of the ring road.

**Table 2-2. Pre-Development and Post-Development Stormwater Quality Reductions**

Stormwater Pollutant	Pre-development	Post-development
	<b>Reduction Achieved (% of the typical urban annual load)</b>	
Total Suspended Solids (TSS)	66.3	74.6
Gross Pollutants (GP)	100	100
Total Nitrogen (TN)	12.3	15.1
Total Phosphorus (TP)	47.7	52.8

### Quantity Management

Generally, operation of the proposed action is unlikely to cause substantial alteration to surface water moving across the Base from its current state. It incorporates swales to redirect water runoff from the ridge immediately to the west of the cantonment, away from the built-up area. This is especially effective during periods of high rainfall. The swales direct the stormwater towards detention ponds that temporarily capture the water, slowly releasing it into the existing creeks. This will improve flood levels downstream in the residential community of San Isidore via controlled water release. This was confirmed using flood modelling for a 100-year flood event and complies with Wagga Wagga City Council and Defence requirements.

### 2.3.3.7 Heritage and Ecological Communities Benefits

Whilst **heritage assessment** places emphasis on the buildings, particularly those relating to the Blamey Barracks era of development, the functional and social significance are identified by base personnel as being of greater import than the buildings. It is instead the function, the form and the social connections that is of heritage value. The heritage values, as vested in the physical fabric of KMA, need to be carefully balanced with efficiency, Defence Force growth, capability, and capacity. The heritage layout of the broader KMA would be retained, as would the function. In fact, the functional capabilities of BBK would be enhanced, providing improved training opportunities for recruits and this has been identified by base personnel as doing more to preserve the heritage values than the physical fabric.

Additionally, the Project will construct the Recruit Welfare Facility and Heritage Trail. This will honour the history of Kapooka, convey the spirit and values of the Base, and demonstrate Kapooka's singular role in the training of Army personnel. The facility and trail will be accessible to all Recruits, staff, and visitors, especially to those attending the weekly March-out Parade.

For **ecology**, the proposed action will not modify or destroy abiotic factors necessary for the survival of the TEC the project will not cause a substantial change in the species composition or reduction in the quality or integrity. Substantial effort has been placed into refinement of the design to avoid and minimise impacts to the TEC, resulting in a reduction of impacts to the TEC from an initial ~3.5 ha in early designs to 0.48 ha at final design.

## 2.4 Timeframe (S1.3)

Construction activities will take place from early 2025, through to Oct 2031. Key dates are as follows:

- Land Management Compound (demolition of existing compound) – Jan 2026 – Mar 2026
- Working Accommodation in the Contractors Precinct: Aug 2025 – Feb 2027
- Demolition of existing C Company: Oct 2025 – Mar 2026
- Recruit LIA - Training - B, C and D Company: Apr 2026 – Jul 2028
- Demolition of existing A, B and D Company: Jul 2028 – Jan 2029
- Recruit Development Company and A Company LIA: Feb 2029 – Mar 2031

- Medical Training Facilities: Jun 2027 – Dec 2028
- Northern Ring Road: May 2025 – Oct 2031.

## 2.5 Relationship of action to other developments or actions (S1.8)

### 2.5.1 Relevance of action at BBK to the Riverina Redevelopment Program

As identified earlier, the 'Riverina Redevelopment Program' (RRP) comprises redevelopment/upgrade works at AWMA, RBW and BBK. While the three Defence locations are part of the same works program, they are three distinct projects that are not interdependent, each with a separate Planning and Delivery budget, reporting streams, and delivery programs. They are discrete works that will be managed independently and are only grouped with the RRP on logistical grounds and for efficiencies in the design and delivery process. The individual projects are not reliant on each other and are located in different geographical locations.

The proposed works at AWMA and RBW were subject to separate environmental assessment processes. It was determined that the works proposed, at both of these locations, will not have a significant impact on matters protected under the EPBC Act.

Accordingly, the proposed action referred under the EPBC Act, and addressed within the PIDR, relates only to the redevelopment of BBK.

### 2.5.2 Relevance to other actions at BBK

The BBK action has no relevance to any other actions undertaken by Defence, or any other actions proposed within the Kapooka region. However, Defence is undertaking ongoing ad hoc works within BBK that may be completed concurrent with the proposed action. These works are predominately minor estate upkeep works such as rectification or minor refurbishment which do not involve major capital investment or construction activities such as vegetation clearing, excavation, demolition etc. **Table 2-3** summarises other concurrent Defence projects being undertaken at BBK.

**Table 2-3 Concurrent Defence projects being undertaken at BBK, relevant to the proposed action**

Project number/name	Scope
EST09125 – SDM BBK Land Management Revegetation	Works completed in November 2023. BBK revegetation works aimed at increasing training outcomes through provision of improved ground cover in training areas.
EST00984 – Main Water Main works	Works complete. Replace water mains from the water incomer to the main tanks.
EST06996 - Kapooka Electrical Infrastructure Works	Project is currently being tendered. The majority of scope is internal refurbishment for electrical compliance. External works include the replacement of some substations.
EST08710 - Kapooka MTR 2 Targetry Refurbishment	Minor upgrades to an existing weapons range – replacement of targetry systems. Project is in the final stages of completion. Awarded and expected to commence by Q2 2024.
NAT0570 - A/C Refurbishment of Wally Thompson Club	Internal refurbishment works
Revegetation project of BBK Training Area 2023-26	36.05 hectares (ha) with associated temporary protection fencing of 1.93 kilometres. 342 ha of direct-seeded revegetation and removal of 2.4 ha of Poplar in drainage lines to the south of the base entrance.

### 3. Controlling provision: Listed threatened species and communities (S18 & 18A)

#### 3.1 Context

As part of the referral process DCCEEW, considered the species and communities identified using the Protected Matters Search Tool (PMST) during the referral stage. DCCEEW determined that the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (herein referred to as BGW) critically endangered ecological community was the only protected matter under this controlling provision likely to be significantly impacted.

DCCEEW acknowledges that the area of BGW to be cleared exists in a modified condition, however this does not lessen the significance that clearing of 1.39 ha of BGW may have on the remnant BGW community. The National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland<sup>4</sup> (BGW Recovery Plan) (DOE, 2010\_ came into effect as the approved conservation advice under the EPBC Act from 31 August 2023. It states that given the currently highly fragmented and degraded state of this ecological community, all areas of BGW which meet the minimum condition criteria should be considered critical to the survival of this ecological community.

#### 3.2 Description of BGW within and adjacent the Project area

The BGW critically endangered ecological community (CEEC), is mapped in NSW as Plant Community Type (PCT) 267 – White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion.

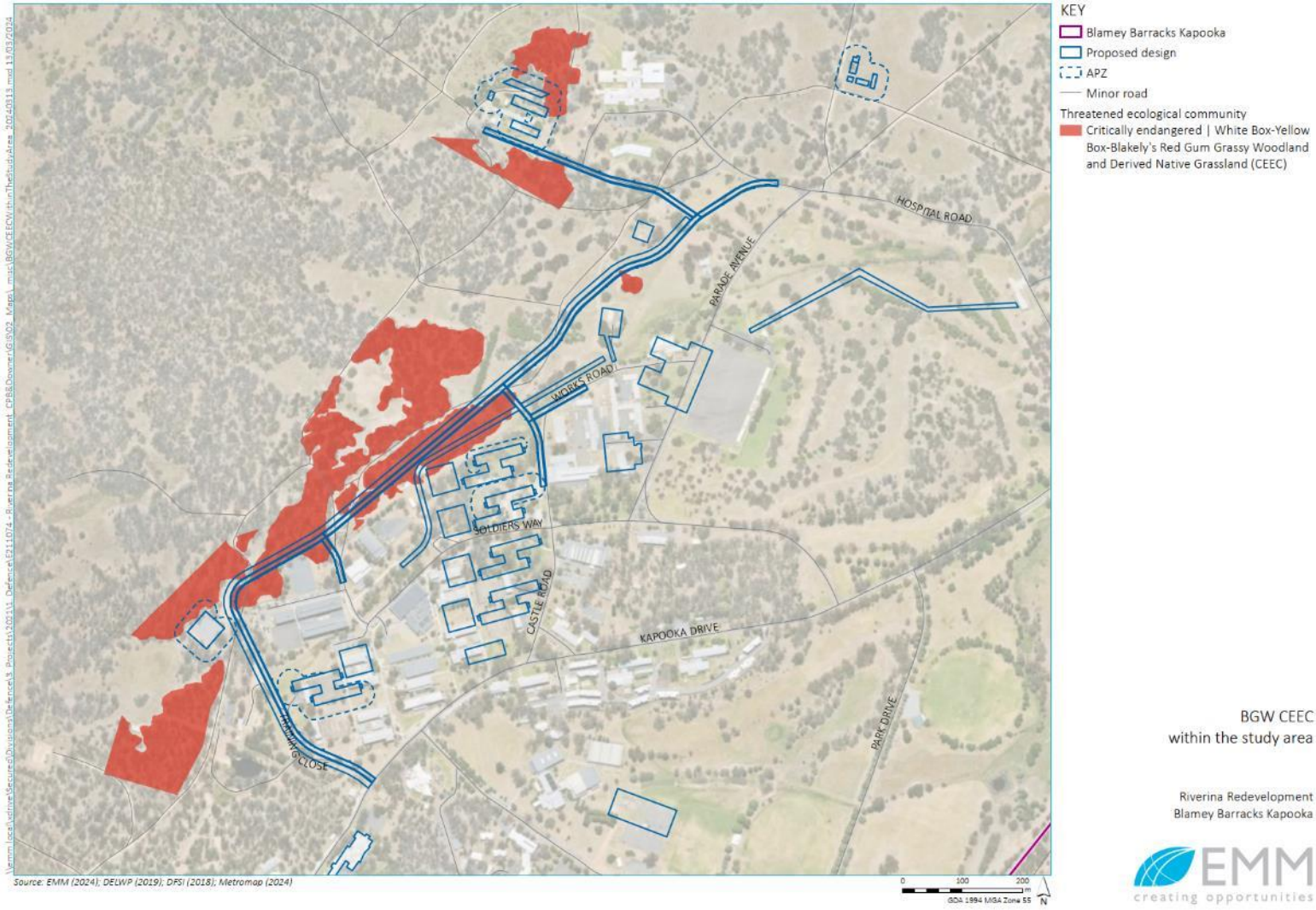
It is important to discuss the BGW in terms of its NSW classification as it provides condition classification that relates directly to its classification under the EPBC Act and in accordance with the DCCEEW BGW Conservation Advice and BGW Recovery Plan. Areas of PCT 267 in High condition meet the definition of BGW as listed under the EPBC Act. While areas of PCT 267 in Moderate condition do not meet the thresholds for listing under the EPBC Act. Within the proposed action footprint, 2.56 ha of PCT 267 has been mapped as High condition and meets the listing criteria of BGW.

The BBK area and Wagga Wagga region are known to support large areas of BGW. A total of 232 ha was modelled within the BBK area by NSW Department of Planning and Environment (2022) and 1,557 ha was modelled within the broader locality (i.e. within 10 km radius). **Figure 3-1** and **Figure 3-2** present the mapped extent of BGW for the Project area and broader locality, respectively.

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<sup>4</sup> <https://www.dcceew.gov.au/environment/biodiversity/threatened/recovery-plans/white-box-yellow-box-blakelys-red-gum-grassy-woodland-and-derived-native-grassland-national>

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BGW CEEC  
within the study area

Riverina Redevelopment  
Blamey Barracks Kapooka



Figure 3-1: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC) mapped within the Project area

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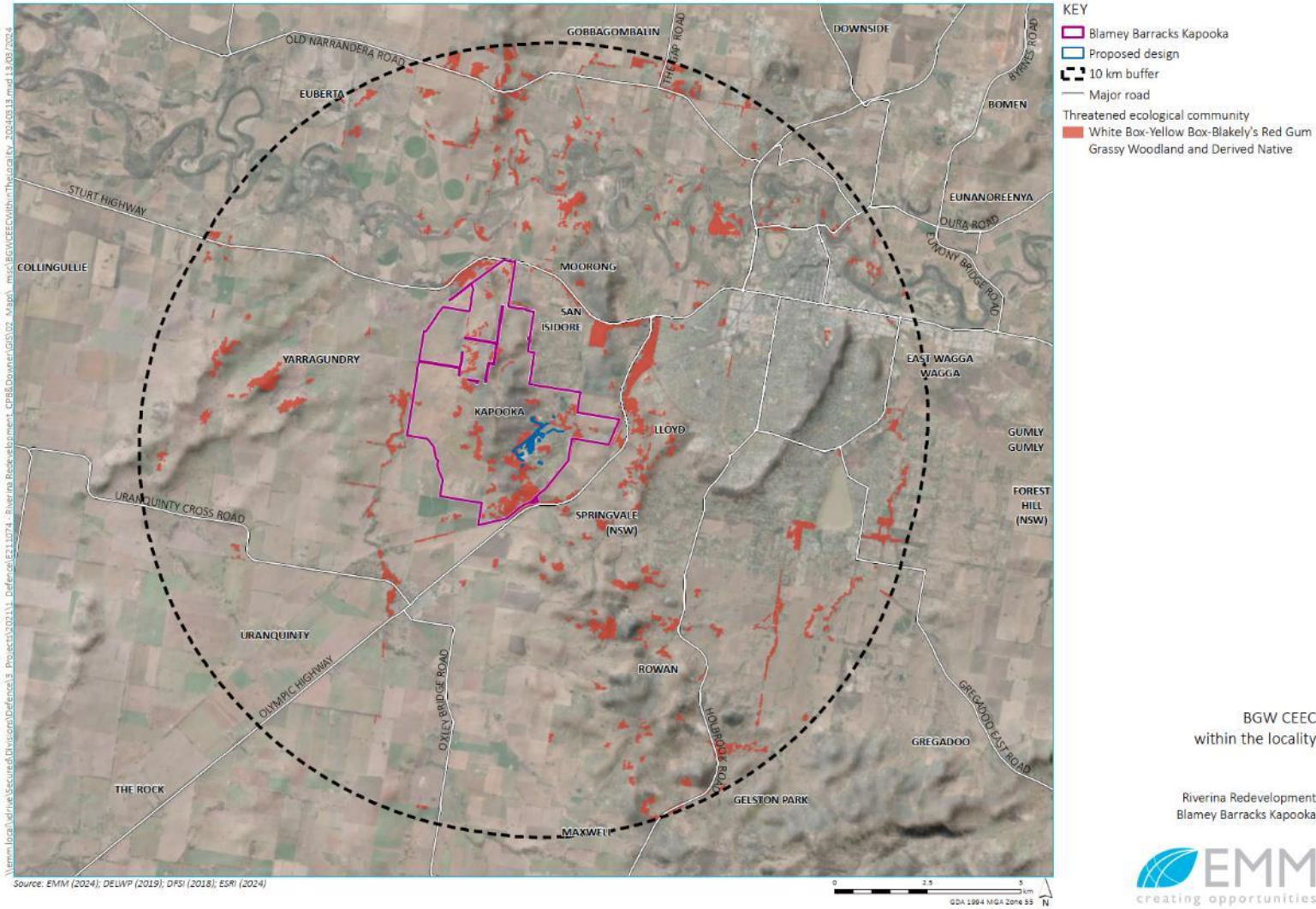


Figure 3-2: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC) mapped within the broader Project locality

### 3.2.1 General description of BGW within the Project area

#### Assessment approach

An assessment was undertaken of the potential for PCT 267 to be representative of the BGW CEEC listed under the EPBC Act. Two plots were surveyed within the PCT 267 at BBK to confirm whether the vegetation community met the criteria of BGW. **Figure 3-3** presents the location and extent of these plots at BBK.

The PCT was assessed against the flow charts outlined in National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (DECCW, 2010), which has been updated from the EPBC Act policy statement 3.5 - White box - Yellow box - Blakely's red gum grassy woodlands and derived native grasslands<sup>5</sup> (DEH, 2006). At the time of reporting the BGW Recovery Plan (October 2023) had not yet been released. However, once it was released the PCT assessment was reviewed/validated against this document. In summary:

- The most common overstorey species across PCT 267 is White Box.
- In areas of High condition, at least 50% of the ground layer is made up of perennial native species.
- The patch, comprising 12.19 ha mapped within and adjacent to the study area and connected to a much larger patch extending beyond the study area, is >0.1 ha in size.
- Within plot 2, 19 native species were recorded (excluding grasses), including Small St John's Wort (*Hypericum gramineum*), which is listed as an important species. Corrugated Sida (*Sida corrugata*) was also observed to be common in areas of PCT 267 in High condition which had previously been subject to some level of ground disturbance.

#### Vegetation that meets the criteria of BGW

Where PCT 267 is classified to be in High condition and therefore meets the criteria as BGW, the canopy is generally dominated by White Box, with occasional emergent Inland Grey Box, Blakely's Red Gum or Yellow Box. However, these species are sparse within this community. The midstorey is largely absent with no shrubs observed within plots and only a sparse cover of shrubs such as Kangaroo Thorn (*Acacia paradoxa*) observed more broadly within this community.

The ground layer is at least 50% perennial native species. dominated by tussock grasses such as Brown's Lovegrass (*Eragrostis brownii*), Rough Spear-grass, Wallaby Grass and Yanganbil, with a diverse array of forbs such as Blue Crowfoot (*Erodium crinitum*), Fuzzy New Holland Daisy (*Vittadinia cuneata*), Small St John's Wort (*Hypericum gramineum*) and Sticky Everlasting, and rushes such as Wattle Matt-rush and Finger Rush (*Juncus subsecundus*).

Areas in High condition are unlikely to have experienced regular disturbance, other than occasional, light foot traffic. As a result, the groundcover is predominantly native. These areas also tended to support a larger number of mature trees.

#### Vegetation that does not meet the criteria of BGW

Where PCT 267 is classified to be in Moderate condition and therefore does not meet the criteria of BGW, exotic species such as Flaxleaf Fleabane (*Conyza bonariensis*), Panic Veldt-grass (*Ehrharta erecta*) and St Johns Wort dominate the ground layer. Given the ground layer is not considered predominantly native, these areas do not form part of the listed BGW.

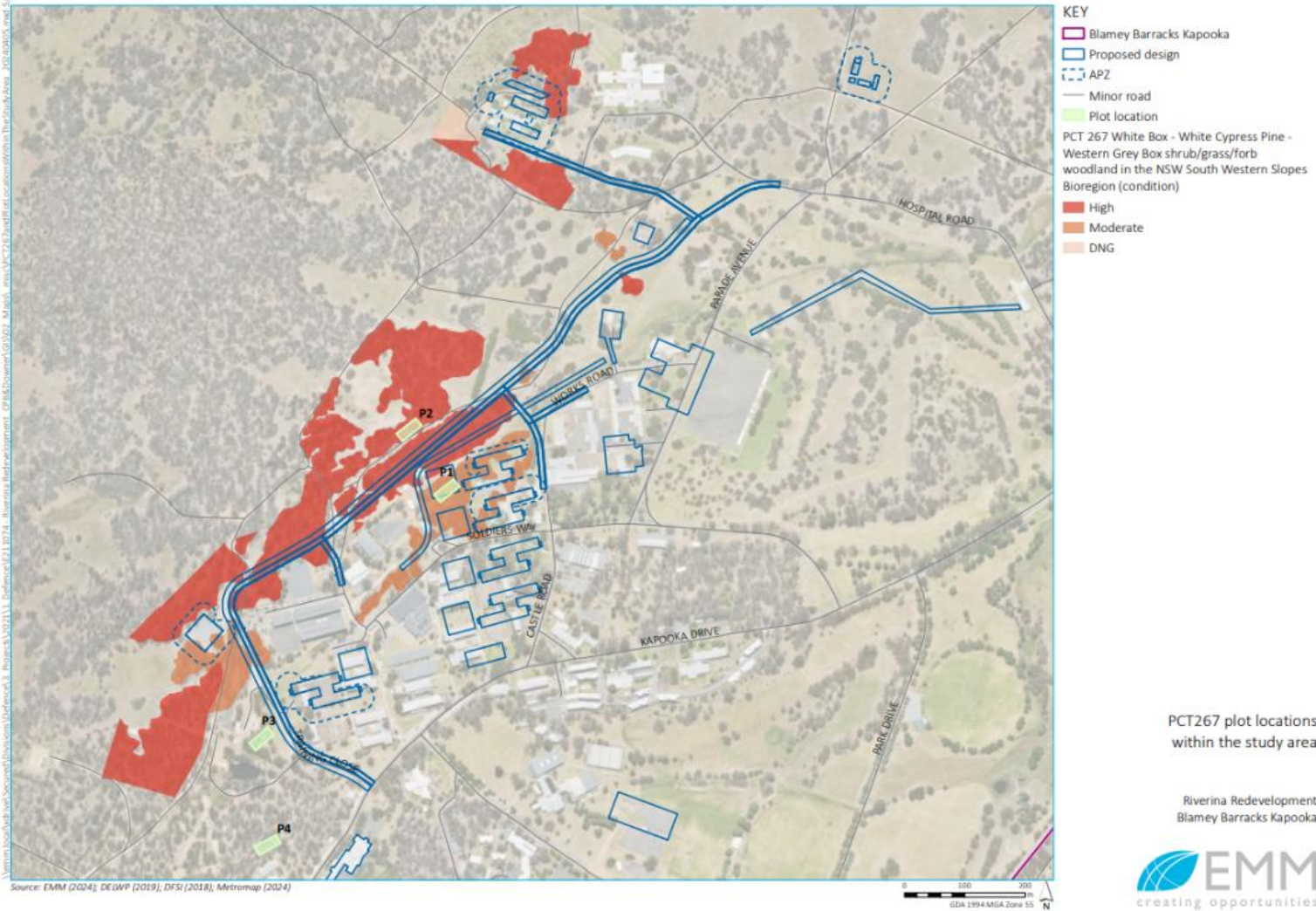
**Figure 3-4** shows the condition (high/moderate) of the PCT267 community mapped within the Project area.

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<sup>5</sup> <https://www.dcceew.gov.au/environment/epbc/publications/white-box-yellow-box-blakelys-red-gum-grassy-woodlands-and-derived-native-grasslands>



Blamey Barracks Kapooka Redevelopment Project  
(EPBC 2023/09649)



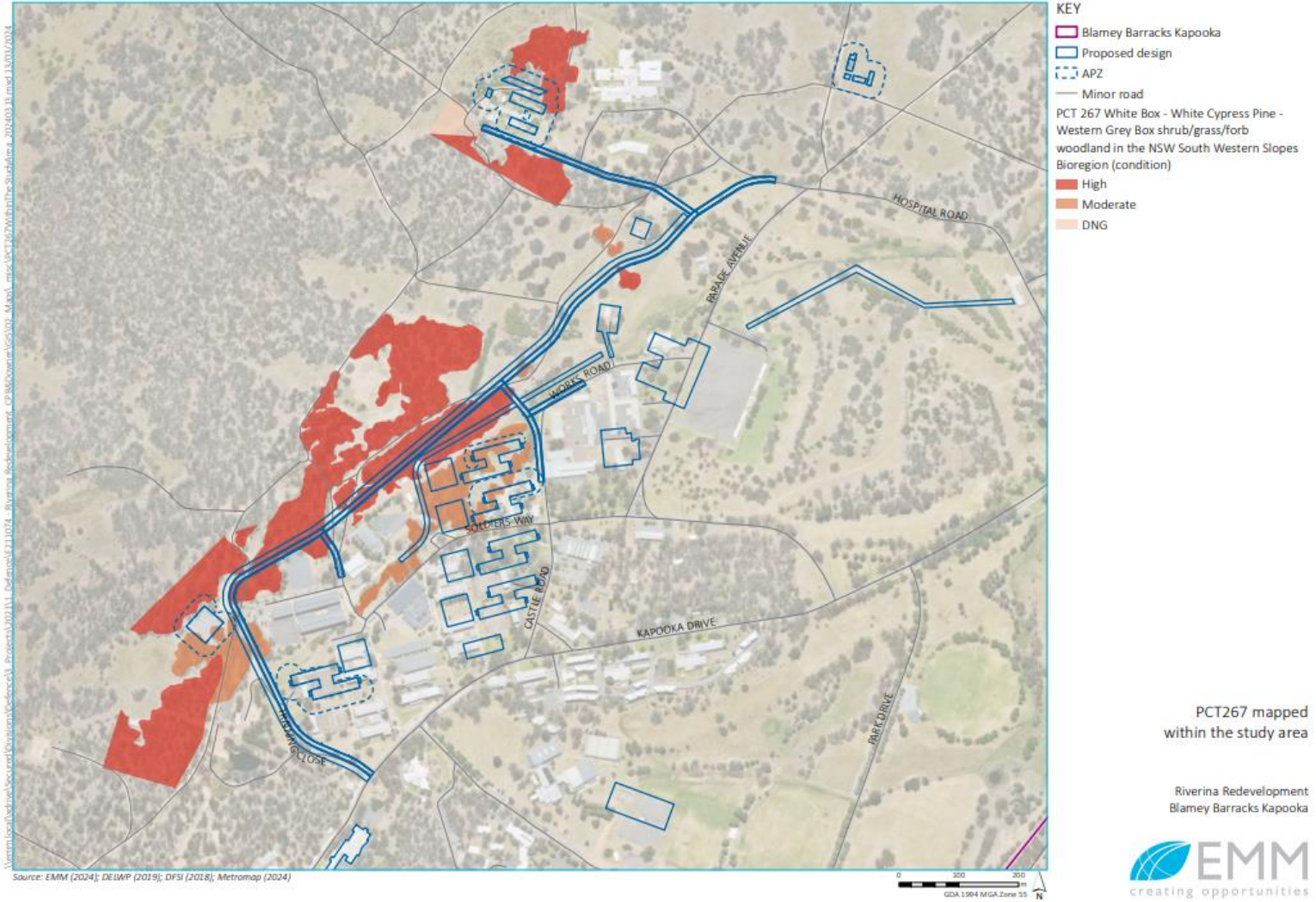
PCT267 plot locations within the study area

Riverina Redevelopment  
Blamey Barracks Kapooka



Figure 3-3. PCT267 plots within the study area

Blamey Barracks Kapooka Redevelopment Project  
(EPBC 2023/09649)



PCT267 mapped within the study area

Riverina Redevelopment  
Blamey Barracks Kapooka



Figure 3-4. PCT267 within the Project area (including condition)

Areas in Moderate condition have been impacted by past clearing and contained non-grass weeds which exceeded more than 30% of the plant cover in the ground layer. These areas are generally located closer to existing infrastructure and buildings and may have had historic or irregular disturbance such as previous earthworks to modify the ground (e.g., bunding to manage rainfall down slopes, or dams) and may include areas of planted native vegetation.

### Conclusion

Based on assessment against the BGW Recovery Plan, areas of PCT 267 in High condition are considered to form part of the BGW CEEC. Areas in Moderate condition do not meet required thresholds for listing. Refer to Figure 3-4.

## 3.3 Field surveys undertaken for the proposed action

Several site assessments have been undertaken through ongoing design of the Project. These site assessments are summarised in Table 3-1 and in the Biodiversity Assessment Report (EMM, 2023a) (Appendix E).

Table 3-1. Site assessments undertaken during the development of the Project design

Survey name	Dates	Scope of works
Ecological constraints assessment	28 September 2022	<p>An initial ecological (flora and fauna) constraints assessment was undertaken in September 2022, with the purpose of identifying biodiversity values within the study area to identify potential constraints to development and to guide design. The area surveyed included proposed infrastructure and building locations at the 5% Masterplan and Feasibility Review (MPFR) stage, with a 15 metre (m) buffer around each of the proposed building options.</p> <p>Throughout the site assessment, the assessors took general notes on land uses and biodiversity values. This included:</p> <ul style="list-style-type: none"> <li>▪ the current site uses.</li> <li>▪ ecological features such as wetlands, drains or waterways or vegetation communities.</li> <li>▪ dominant flora and fauna species.</li> <li>▪ incidental observations of threatened flora and fauna species listed under the EPBC Act or NSW Biodiversity Conservation Act 2016 (BC Act).</li> </ul> <p>Native vegetation was mapped using a hand-held tablet (accuracy +/- 5 m) with patches assessed against relevant conservation advice, listing advice or recovery plan to determine their alignment with TECs listed under the EPBC Act or BC Act. Targeted flora surveys were undertaken in areas of suitable habitat within the study area. The two assessors traversed these areas using transects spaced at 10 m intervals.</p>
Vegetation assessment	4 and 5 April 2023	<p>In April 2023, a further vegetation assessment was undertaken for the purposes of updating the previous assessment. This included mapping additional areas of native vegetation with potential to be impacted by the design due to changes in design extent and collect additional information to determine the presence of TECs more robustly within the study area.</p> <p>Native vegetation was mapped using a hand-held tablet (accuracy +/- 5 m) with patches stratified based on condition (referred to as a 'vegetation zone' in the NSW Biodiversity Assessment Method (BAM) and then further assessed against relevant conservation and listing advice to determine their alignment with any TECs listed under the EPBC Act or BC Act.</p> <p>Representative plot data was collected generally in accordance with the BAM. Plots were 50 m x 20 m in area, totalling 1,000 square metres (m<sup>2</sup>)</p> <p>At each plot location the following was undertaken:</p> <ul style="list-style-type: none"> <li>▪ one 20 x 20 m plot, for assessment of composition and structure</li> </ul>

Survey name	Dates	Scope of works
		<ul style="list-style-type: none"> <li>▪ one 20 x 50 m plot for assessment of function, including a series of five 1 x 1 m plots to assess average leaf litter cover.</li> </ul> <p>The assessment of composition and structure, based on a 20 x 20 m plot, recorded species name, stratum, growth form, cover and abundance rating for each species present within the plot. Cover (foliage cover) and abundance was measured for each species/taxa using the Braun-Blanquet cover abundance scale:</p> <ul style="list-style-type: none"> <li>▪ R = Rare, &lt;1% cover of taxa</li> <li>▪ 1 = 1-5% cover of taxa</li> <li>▪ 2 = 6-25% cover of taxa</li> <li>▪ 3 = 26-50% cover of taxa</li> <li>▪ 4 = 51-75% cover of taxa.</li> </ul> <p>The assessment of functional aspects included the visual estimation of leaf litter, rock cover and cover of lichens and mosses to the nearest 1%, and the visual assessment of the numbers of trees within each 10 centimetre (cm) increment:</p> <ul style="list-style-type: none"> <li>▪ 0-10 cm</li> <li>▪ 11-20 cm</li> <li>▪ 21-30 cm</li> <li>▪ 31-40 cm, etc.</li> </ul> <p>A total of four plots were completed including two in PCT 267 – White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion (one in an area of Moderate condition and one in an area of High condition) and two in PCT 110 – Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion (one in an area of Moderate condition and one in an area of High condition).</p> <p>All flora species observed within the study area were recorded, with the exception of planted vegetation that was not considered a ‘weed’ (i.e., planted vegetation that was not spreading or reproducing). Where a species was not able to be confidently identified in the field, a sample was collected and later identified. Plants were identified to species level wherever possible; however, some plants that were planted, cultivars, hybrids, or plants that did not contain suitable fertile material used for identification were recorded to genus level.</p> <p>The location of large trees (&gt;80cm Diameter at Breast Height (DBH) as defined in the BAM and scattered trees within habitat zones and TECs were also recorded. This included recording:</p> <ul style="list-style-type: none"> <li>▪ location using a hand-held tablet.</li> <li>▪ Species.</li> <li>▪ size (DBH).</li> </ul>
Vegetation assessment and mapping of hollow-bearing trees (HBTs)	9 May 2023	<p>In May 2023 an additional survey was undertaken to review and refine the boundaries of vegetation communities within the study area, undertake additional mapping of native vegetation in some areas due to changes in design extent, and map hollow bearing trees (HBTs) within and adjacent to the study area, particularly those suitable for the Superb Parrot. Vegetation community boundaries were refined in the field and data on HBTs was collected using GPS-enabled tablet computers using FieldMaps for ArcGIS™.</p> <p>The intent of this visit was also to work with the design team from RRJV to inform final changes to design and impacts to biodiversity values. The entire access road and some Project elements were walked with discussions on opportunities to avoid and minimise impacts.</p>

### 3.4 Condition of BGW in and adjacent the Project area

#### 3.4.1 Previous Listing Advice for White box-yellow box TEC

Prior to the publication of the updated August 2023 Approved Conservation Advice<sup>6</sup> (2023 Conservation Advice) (DCCEEW, 2023), there were no condition thresholds for BGW. In the 2006 Listing Advice<sup>7</sup> (TSSC 2006), the TEC condition class is discussed qualitatively, referring mainly to the three different states (condition) that the BGW TEC may be found in, including where:

- An overstorey of eucalypt trees exists, but there is no substantial native understorey.
- A native understorey exists, but the trees have been cleared.
- Both a native understorey and an overstorey of eucalypts exist in conjunction.

The 2006 Listing Advice (TSSC 2006) further qualifies that; “areas in which an overstorey exists without a substantially native understorey are degraded and are no longer a viable part of the ecological community.” and that “in order for an area to be included in the listed ecological community, a patch must have a predominantly native understorey”.

Additionally, the 2006 Listing Advice (TSSC 2006) summarises a number of other criteria that govern whether or not a tract of vegetation constitutes the TEC; patch size, overstorey floral species diversity, important species definition, numbers of mature trees. The condition criteria outlined are the minimum level at which patches are to be included in the listed TEC.

#### 3.4.2 2023 Conservation Advice for White box-yellow box TEC (August 2023)

Under the updated 2023 Conservation Advice (August 2023) an area of the community must meet *both* the key diagnostic criteria *and* the minimum condition thresholds to be protected as a Matter of National Environmental Significance. A summary of the condition thresholds is provided in **Table 3-2**.

**Table 3-2. BGW condition classes**

Condition Class	Patch Size	Features Present
Class A	0.1 ha (1,000 m <sup>2</sup> ) or larger	The ground layer is predominantly native; and The understorey contains at least 12 native, non-grass species (such as forbs, shrubs, ferns and sedges); and At least one of the understorey species should be a species recognised as ‘important’ (e.g. grazing-sensitive, regionally significant, listed threatened or uncommon species); and The patch contains 10 or more mature trees per hectare consistent with the key diagnostics for the ecological community.
Class B	0.1 ha (1,000 m <sup>2</sup> ) or larger	The ground layer is predominantly native; and The understorey contains at least 12 native, non-grass species (such as forbs, shrubs, ferns and sedges); and At least one of the understorey species should be a species recognised as ‘important’ (e.g. grazing-sensitive, regionally significant, listed threatened or uncommon species).

<sup>6</sup> <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/43-conservation-advice.pdf>

<sup>7</sup> <https://www.dcceew.gov.au/environment/biodiversity/threatened/conservation-advice/white-box-yellow-box-blakely-s-red-gum-grassy-woodlands-derived-native-grasslands>

Condition Class	Patch Size	Features Present
Class C	2 ha (20,000 m <sup>2</sup> ) or larger	The ground layer is predominantly native; and The patch contains 20 or more mature trees per hectare; and / or The patch contains natural recognition of dominant overstorey eucalypts.

### 3.4.3 Vegetation classification at BBK

Noting some changes in the diagnostic criteria, the vegetation at BBK listed as PCT 267 in High condition meets the key diagnostic criteria outlined in the 2023 Conservation Advice. Refer to Section for classification of the vegetation at BBK and what areas meet BGW criteria for listing.

Specifically, it is considered that the vegetation meets the condition thresholds for Class A or Class B (i.e. not Class C) based on the following:

- the understorey contains at least 12 native, non-grass species; and
- at least one of the understorey species is recognised as 'important'.

The key difference between **Class A** and **Class B** is the number of mature trees per hectare, with Class A requiring 10 or more mature trees per hectare.

It important to note that the fieldwork conducted in support of the Project was conducted between September 2022 and May 2023, which predates the release of the updated 2023 Conservation Advice. The classification of the BGW CEEC was conducted in accordance with the EPBC Act policy statement 3.5 - White box - Yellow box - Blakely's red gum grassy woodlands and derived native grasslands (DEH, 2006), which was the governing information available at the time of the fieldwork. This policy statement does not refer to condition classes, and therefore data obtained from the ecological surveys conducted in accordance with the policy statement, does not have sufficient count-based data for mature trees per hectare.

However, Project ecologists have indicated that the condition of the vegetation would indicate that reaching 10 mature trees per hectare is highly unlikely as the vegetation is regenerating after being cleared prior to 1960. While the available to undertake a full and comprehensive assessment, the. In lieu of data, their conclusion is that the vegetation is most likely to be considered **Class B**.

Further, although three condition classes are introduced and defined in the 2023 Conservation Advice, they are not referred to or used within the remainder of this 2023 Conservation Advice to provide any definition of allowable activities or restrictions. This suggests that irrespective of whether the patches of White box-yellow box TEC at BBK were categorised as either Class A, B or C, the new Conservation Advice does not:

- a) materially change the advice of the BBK Biodiversity Impact Assessment relating to the identification and assessment for the BGW CEEC, nor
- b) influence the previous BBK ecological field assessment findings or assessment of significance (i.e. change the current significant impact findings), nor
- c) change the manner in which the Mitigations Hierarchy was utilised by the Project team during siting and design of the proposed redevelopment to first and foremost, avoid the TEC and secondly, to minimise impact to this community.

## 3.5 Impact assessment

### 3.5.1 Quantification of areas to be impacted

Direct residual impacts to BGW arising from the proposed action, after all measures to avoid, minimise and mitigate impacts is calculated to be 1.39 ha. Indirect impacts to BGW, including potential fragmentation is calculated to be 1.17 ha.

The action has therefore considered a total impact to BGW of 2.56 ha.

### 3.5.2 Potential impacts associated with proposed action

Potential impacts likely to be associated with the proposed action are summarised in **Table 3-3**. The Project has proposed mitigations for all identified impacts, with the exception of the direct clearance of the BGW (refer to **Table 3-5** in **Section 3.6.2**).

**Table 3-3. Potential impacts to the BGW**

Impact	Project stage
Direct clearance of BGW for infrastructure construction	Construction
Impacts to retained BGW due to inadvertent clearing	Construction
Impacts to retained BGW due to sediment and hydrology	Construction/operation
Degradation of retained BGW due to weeds	Construction/operation
Fragmentation of remnants of BGW	Construction
Increased edge effects of BGW	Construction/operation
Noise and dust impacts to retained BGW	Construction/operation

### 3.5.3 Habitat fragmentation

Fragmentation impacts were considered extensively during the design of the Project due to the potential to fragment areas of TECs during the construction of the access road.

Significant consultation was undertaken between the design team and Project ecologists to balance direct impacts due to clearing and indirect impacts arising from fragmentation.

This resulted in the relocation of the access road from a previous location which bisected vegetation and resulted in larger indirect impacts through fragmentation, to the edge of vegetation further south. This provided opportunity to maintain the condition of remaining BGW habitat and minimise areas that would be subject to fragmentation.

Consequently, the proposed action will result in indirect impacts to 3.06 ha of native vegetation, including 1.17 ha of the BGW TEC listed under the EPBC Act.

### 3.5.4 Impact duration

The construction program for BBK will see completion of the works in October 2031. Disruption to the northern most sections of the cantonment area will take place across the following work elements from early 2025, through to October 2031.

Key dates relating to individual work elements with the potential to impact on the BGW CEEC are as follows:

- Land Management Compound (demolition of existing compound) – Jan 2026 – Mar 2026
- Working Accommodation in the Contractors Precinct: Aug 2025 – Feb 2027

- Demolition of existing C Company: Oct 2025 – Mar 2026
- Recruit LIA - Training - B, C and D Company – Dec 2025 – Apr 2028
- Demolition of existing A, B and D Company: Jul 2028 – Jan 2029
- Recruit Development Company and A Company LIA: Feb 2029 – Mar 2031
- Medical Training Facilities: Jun 2027 – Dec 2028
- Northern Ring Road – May 2025 – Oct 2031.

### 3.5.5 Other potential impacts

#### Potential for unknown, unpredictable or irreversible impacts

The extensive nature of the field investigations and the level of consultation undertaken with the design team to understand the nature and extent of the proposed development works and the way in which construction would take place, means that the specialist ecology team are confident that the potential impacts have been thoroughly examined and the potential for unforeseen impacts is therefore minimal.

### 3.5.6 Consistency with guidelines, policies and plans pertaining to BGW

#### Australia's obligations under International conventions

Not applicable to BGW or the proposed works at BBK.

#### National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland

As discussed in **Section 3.4**, DCCEEW released new Conservation Advice relating to the BGW in August 2023. **Section 3.4** provides discussion on how the biodiversity field investigations and associated assessment and report have been developed in accordance with the updated 2023 Conservation Advice.

The BGW Conservation Advice complements the National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (BGW Recovery Plan) (DECCW, 2011), effective from 22 March 2013.

The recovery objectives for the BGW TEC are to minimise risk of extinction through:

- achieving no net loss throughout its geographic distribution
- increasing the protection of sites with high recovery potential
- increasing landscape functionality of the ecological community through management and restoration of degraded sites
- increasing transitional areas around remnants and linkages between remnants
- bringing about enduring changes in participating land manager attitudes and behaviours towards environmental protection and sustainable land management practices to increase extent, integrity and function of the ecological community.

Section 5 of the 2023 Conservation Advice refers to the above BGW Recovery Plan objectives with the same primary intent to protect existing large tracts of vegetation that constitute the TEC. The 2023 Conservation Advice states that *'There should be no further clearance and damage to this ecological community on both public and private lands because it has been greatly reduced in its extent and condition.'* However, the language within this section does not advocate for 'no clearing', but instead encourages strict implementation of the Mitigations Hierarchy and ensuring cumulative impacts are 'reduced as part of broader strategic planning', prior to undertaking an action to clear BGW as a last resort.



#### **2023 Conservation Advice: Section 5.4.1.4**

*MANAGE ACTIONS TO MINIMISE IMPACTS OF DEVELOPMENT AND OTHER PROPOSED NEW ACTIVITIES specifically advises:*

*"Apply the mitigation hierarchy to avoid, then mitigate, then offset potential impacts on the ecological community from development or other actions. The priority is to avoid further clearance and fragmentation of remnants with offsetting as the last resort.*

*Plan projects to avoid the need to offset, by avoiding significant impacts to the ecological community. In circumstances where impacts cannot be totally avoided, then they should be minimised by (... series of management points)."*

This part of the 2023 Conservation Advice can be interpreted as indicating that while there should (preferably) be 'no further clearing' of the BGW, this is not a directive of the Conservation Advice to not allow any further clearing of the TEC. Rather, the demonstration of the Mitigation Hierarchy is considered the fundamental requirement before clearing of the TEC can be undertaken, and where clearance is absolutely unavoidable then management measures are required to indicate how the impact will be minimised.

The proactive and iterative works throughout the BBK design process between the ecology and design teams comfortably demonstrate a 'robust application to protecting the ecological community' as much as possible and within the remit of the design scope (refer **Section 3.5**). The RRJV EMP, (see **Appendix D**), has been developed to inform the construction subcontractor's CEMP and associated sub-plans once engaged. The RRJV EMP further demonstrates the Project, and Defence's, commitment to implementing workable and effective management measures to ensure vegetation clearance (other than that specified), does not inadvertently occur. Additionally, the RRJV EMP includes a BGW Rehabilitation sub-plan that outlines proposed measures for progressive rehabilitation of areas of BGW vegetation that comprises some elements of BGW but that is currently degraded to an extent that it does not meet the criteria of the BGW TEC. The proposed area to be rehabilitated is some 6.3 ha (refer **Section 3.7**).

Therefore, whilst the action proposes to directly remove 1.3 9ha of the BGW TEC, this clearing is not inconsistent with the BGW National Recovery Plan objectives around 'no net loss', as the Mitigations Hierarchy has been appropriately implemented during the iterative design of the ring road, reducing the impacts to the BGW community, as low as reasonably possible.

In isolation, the proposed impacts to the BGW TEC are not likely to affect the nature, health and extent of the BGW ecological community in the broader Project area; although, it is recognised that cumulative loss from clearing is a key threat to the long-term survival of the ecological community (DECCW, 2010).

As indicated above, the Project does however, propose as part of landscaping and rehabilitation works, that the areas in 'moderate' condition (and therefore not meeting the criteria for classification as BGW TEC), be retained (where not being cleared to facilitate the action), clearly delineated and rehabilitated in accordance with the current Conservation Advice (DCCEEW 2023). This would in turn ultimately lead to increasing the moderate transitional areas to meet the criteria of the TEC, thereby result over time in a positive increase in condition and extent of this ecological community locally. See **Section 3.7** for further discussion on rehabilitation works.

The following best practice management practices are identified in the Recovery Plan and have been adopted in the development of the RRJV EMP:

- Do not direct stormwater run-off into remnant areas.
- Prevent introduction of weeds.
- Ensure machinery hygiene protocols to prevent weed spread.
- Prevent stockpiling of topsoil/overburden in remnant areas.
- Implement weed control program.

- Do not plant indigenous native trees and shrubs in high quality or small derived grassland sites.
- Use high quality seed for revegetation.
- Plant trees and shrubs at natural grassy woodland densities.
- Maintain existing vegetative links.
- Control animal pest species on the Base.
- Expand remnant sites where possible.
- Avoid excessive shading (e.g. dense tree plantings).
- Although not currently observed in vegetation at the Barracks, monitoring will include visual observation for potential presence of *Phytophthora cinnamomi*, a water mould (previously considered to be a soil-borne fungus), that causes dieback in some native vegetation communities.

Relevant obligations identified in the BGW Recovery Plan include:

- Share data between Government departments.
- Development assessments to be undertaken by suitably qualified ecologist at an appropriate time of year.

The Biodiversity Assessment undertaken as part of this Project, including associated ecological site investigations have complied with the above obligations.

#### **Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi*.**

*Phytophthora cinnamomi* is a water mould listed as a key threatening process under the EPBC Act.

*Phytophthora cinnamomi* (*P. cinnamomi*) occurs in coastal Queensland and eastern NSW, although disease expression in these areas is often more cryptic and the extent of the threat is unknown (DEH 2006). Rainfall is one key factor influencing the distribution of *P. cinnamomi*; consequently, disease caused by the pathogen is generally restricted to moister regions (Statement of Intent for infection *P. cinnamomi* (NSW 2008)).

*Phytophthora cinnamomi* has not been previously identified at BBK. Further, the biodiversity assessment undertaken by EMM as part of this current Project did not identify its presence within the Barracks lands. To ensure that BBK remains clear of the pathogen, biosecurity management will be a key task of the RRJV during construction activities and has been included in the RRJV EMP, which will inform the CEMP. Defence are knowledgeable on *P. cinnamomi* and its causal impacts of vegetation dieback from other Defence properties where the disease is present. Defence have active Management Plans specific to *P. cinnamomi* for a Defence locations in Tasmania and HMAS Penguin in North Sydney.

Specific prevention management measures that align with the Threat abatement plan for *Phytophthora cinnamomi* (Commonwealth of Australia 2014), have been incorporated into the RRJV EMP for BBK (**Appendix D**) and will be prescriptively detailed in the subcontractor's CEMP. Key actions consistent with the Threat Abatement Plan include:

- support high plant species endemism, by sourcing seed mix from the locality.
- support high species diversity, while remaining consistent with those species comprising BGW.
- chose rehabilitation sites that are large and where possible ecologically intact and mostly undisturbed.
- restrict nursery material to be from *P. cinnamomi* free zones.
- Implement weed and feral animal prevention strategies.

In addition the following will be implemented:

- Access to remnant vegetation will be limited by clearly delineating boundaries of necessary construction activities, from that of vegetation to be retained.
- Locations will be designated as transport routes, parking areas and for washdown procedures.
- Vegetation health will be monitored including for any visual signs of pathogens including *P. cinnamomi*.
- Observations to include any potential dieback (that could signify presence of *P. cinnamomi*), and general health/weed infestation and regeneration of the remnant vegetation.
- A Defence risk record will be created describing the suite of high-risk species and responses including preventative controls and the Biosecurity Incursion Response Protocol.

### 3.6 Avoidance, mitigation and management

The mitigation hierarchy of avoid, minimise and mitigate has been used as the Project design has progressed.

A key focus of Project design has been to avoid and minimise impacts to biodiversity values identified during the field investigation wherever feasible, particularly TECs such as the BGW.

The process below has been followed to ensure impacts are avoided and minimised to the greatest extent possible, within the design and other limitations of the Project:

- Identification of biodiversity values through biodiversity surveys.
- Communication of identified values to the Project team.
- Consultation between the design team and Project ecologists on various elements to consider both direct and indirect impacts and work through an iterative design process, with multiple iterations of design elements to achieve best practice outcomes.
- Finalisation of measures to avoid, minimise and mitigate impacts.
- Discussion of measures to mitigate impacts during construction.

#### 3.6.1 Summary of already implemented avoidance measures (s2.1.12)

The Project has recently completed the 90% Detailed Design Review (90% DDR) stage. The measures outlined below relate to the Project design stages that have already been completed. They have been incorporated into the Project to avoid, minimise and mitigate impacts to biodiversity values.

##### Design stages

The Defence Infrastructure Life Cycle (*internal Defence document, not for publication but summarised below as applicable*) phases set out a systematic approach to infrastructure development. As part of this process, alternative locations, consisting of rigorous and comprehensive options assessment, are undertaken to arrive at the optimal design solution, considering impacts to the environment. The planning phase of this Project has consisted of the following key design activities and milestones, which include the following options assessments:

- Master Plan and Feasibility Review (MPFR): During MPFR, the design is developed to a 5% level, which has involved the assessment of multiple site options at a precinct level.
- Concept Design Review (CDR): During CDR, the design is developed to a 30% concept level. During CDR, precinct level options were refined to building footprints and associated options.
- Schematic Design Review (SDR): During SDR, the design is developed to a 50% level. Further options were assessed to minimise and avoid impacts on EPBC listed TECs and habitat areas.

An outline of the avoidance activities already undertaken at each design stage are presented in **Table 3-4**.

**Table 3-4. Avoidance process during each design stage**

Design stage	Avoidance	Impact on EPBC Act list TEC (ha) at each stage of design
5% MPFR	<p>The MPFR process was designed to allow for the balanced consideration of key criteria, including environment and heritage. Each individual aspect of the design was assessed against a set of alternatives in terms of key environmental impacts.</p> <p>The desktop assessment work undertaken for the MPFR identified areas of ecological constraint (low to very high) and recommended development focused on the study area are undertaken in those areas of lowest ecological constraint.</p>	Not quantified.
30% CDR	<p>Each element of the design was separated to allow for a reduction in direct impacts to be targeted. A preliminary assessment of bushfire risk was also undertaken to ensure asset protection zones were considered.</p> <p>Further biodiversity surveys were undertaken for CDR. These field assessments confirmed the presence of areas of significant biodiversity constraint, including TECs and threatened species habitat.</p> <p>A key recommendation was that the SDR design phase should aim to avoid patches of native vegetation and TECs wherever possible by choosing alternate building and infrastructure options or micro-siting where possible.</p>	<p>Direct impact to ~16 ha of TECs, including White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland and Grey Box Grassy Woodlands, comprising direct impact to ~9 ha and potential for a further ~7 ha as a result of bushfire asset protection zones.</p> <p>Note: indirect impacts from habitat fragmentation were not quantified at this stage.</p>
50% SDR – early design	<p>Significant revision of the design to minimise impacts on native vegetation and TECs. This stage included further site assessment and survey to support the design refinement and result in a reduction in predicted direct impacts of over 13 ha.</p>	Direct/indirect impact reduced to 2.74 ha.
50% SDR – final design	<p>For final design, an additional site visit was undertaken with discussions held between the design team and Project ecologists to optimise and refine the design to avoid and minimise impacts where feasible within the constraints of the Project. This included discussion of the costs and benefits of direct versus indirect impacts such as fragmentation and considering modifications to outbuilding locations and micro-siting to minimise impacts.</p> <p>Through this process, further refinement of the design was undertaken to reduce habitat fragmentation and minimise impacts to threatened species habitat and TECs. A key change was the relocation of the access road from a previous location which bisected vegetation and resulted in larger indirect impacts through fragmentation, to the edge of vegetation and existing impacts to maintain the condition of remaining habitat and minimise fragmentation.</p>	Direct/indirect impact reduced to 2.56 ha.

### 3.6.2 Summary of proposed mitigation and management measures (s2.1.12 & s2.1.14)

A series of mitigation and management measures have been developed as part of the preparation of the technical environmental assessment reports during the planning and design stages of the Project. As indicated previously these have been developed for implementation during construction and operation.

A summary of the key mitigation and management measures is provided in **Table 3-5** and further detail is documented in the Biodiversity Assessment Report prepared for BBK (EMMf 2023). It is worthwhile noting that the proposed mitigation measures are routinely implemented by Defence and its contactors, to manage potential impacts on native vegetation. This has led Defence to be confident in that the implementation of the below mitigation will be effective in managing potential impacts to the BGW.

**Table 3-5. Proposed mitigations and management measures relevant to BGW**

Potential Impact	Mitigation	Responsibility	Timing/Duration
Direct impacts to BGW values	<ul style="list-style-type: none"> <li>Clearing limits have been established which avoid and minimise impacts to BGW to the greatest extent practicable.</li> </ul>	Design team	Prior to construction – complete
Impacts to retained BGW due to inadvertent clearing	<ul style="list-style-type: none"> <li>All works, including ancillary facilities and laydown areas will be retained within the approved disturbance footprint.</li> <li>Area of retained BGW will be protected during construction through fencing of exclusion areas and sign-posting these areas as no-go zones.</li> <li>This will be maintained and checked daily throughout construction.</li> </ul>	Construction subcontractor	During construction – daily
Impacts to retained BGW due to sediment and hydrology	<ul style="list-style-type: none"> <li>The drainage of the road will be constructed to ensure that increased hardstand does not result in increased surface water runoff and mobilised grits and oils flowing into adjacent areas of retained BGW.</li> <li>Appropriate sediment control measures will be implemented, including sediment, erosion and pollution control measures.</li> </ul>	Construction subcontractor	During construction – throughout
Degradation of retained BGW due to weeds	<ul style="list-style-type: none"> <li>Potential for introduction of weeds will be reduced through implementation of soil and vehicle hygiene measures.</li> <li>Monthly checks of construction areas will be undertaken to document any significant growth of priority weeds (Weeds of National Significance or weeds listed as Priority weeds for Riverina Local Land Services Region in the Riverina Regional Strategic Weed Management Plan).</li> <li>Weed management of all priority weeds will be undertaken within and at the edges of the construction area.</li> </ul>	Construction subcontractor	During construction – throughout

Potential Impact	Mitigation	Responsibility	Timing/Duration
Fragmentation of retained BGW	<ul style="list-style-type: none"> <li>▪ All works, including ancillary facilities and laydown areas will be retained within the approved disturbance footprint.</li> <li>▪ Area of retained BGW will be protected during construction through fencing of exclusion areas and sign-posting these areas as no-go zones.</li> <li>▪ This will be maintained and checked daily throughout construction.</li> </ul>	Construction subcontractor	During construction – daily
Dust impacts to retained BGW	<ul style="list-style-type: none"> <li>▪ Dust mitigation measures will be implemented, including use of water carts to control dust and minimise dust impacts to retained BGW.</li> </ul>	Construction subcontractor	During construction – throughout

In order to facilitate the implementation of the above mitigations, the RRJV EMP has also been prepared and is presented in **Appendix D**. It is not possible to produce a comprehensive CEMP at this stage of the Project as the construction subcontracts have not yet been tendered and the CEMP will be developed, implemented by and the responsibility of the construction subcontractor(s).

### 3.6.3 Specific and measurable environmental outcomes to be achieved for BGW. (S2.1.13)

No measurable environmental outcomes have been developed for BGW at this stage given the detailed CEMP and associated sub-plans have yet to be developed. As indicated above, these Plans will be the responsibility of the successful construction subcontractor once appointed.

The RRJV EMP has been developed in support of this PIDR submission and will provide the governance for the subcontractor developed CEMP(s). The RRJV EMP will be updated (if required) to address any approval conditions set forth by DCCEEW as part of the EPBC Act referral, including any environmental outcomes to be achieved for the BGW. The RRJV EMP is provided (see **Appendix D**) as the governing EMP as part of this PIDR and will be provided as part of tender documentation for the construction subcontractor to ensure that any EPBC Act (and broader Project) approval conditions are contractually captured in the construction subcontract.

The successful construction subcontractors will be required to produce their own CEMP that is specific to their scope of works, while working within the conditions of the overarching RRJV EMP provided to them by the RRJV as part of their contracted works. The sub-plan relating to vegetation rehabilitation will include monitoring measures as well as environmental outcomes for the land plots to be used for rehabilitation and will address the specific measurable environmental outcomes for BGW (s2.1.13).

### 3.7 Offsets (S2.1.14 – 2.1.18)

Defence proposes to offset the residual impacts to BGW through establishing an in-perpetuity conservation area within the Kapooka Military Area Estate Base Plan. The Project will identify an area or areas of BGW community to be protected, clearly delineated, and rehabilitated (where deemed necessary), in accordance with the current Conservation Advice (DCCEEW 2023) and as per the annual vegetation monitoring outcomes for the EPBC Box-Gum Woodland vegetation communities that has been undertaken by EcoLogical (now EcoPlanning) for Defence since 2010 (EcoPlanning 2022). Ongoing monitoring and management of this nature will also be in keeping with the principles of net positive through active ongoing recovery and rehabilitation. Defence will ensure the area(s) conserved are consistent with, and meet the expectations of, the [EPBC Act environmental offsets policy - DCCEEW](#).

The size and specific location of the area(s) is yet to be confirmed. However, suitable sites have been identified and are located within the existing Weapons Range's 'Range Danger Area Safety Trace' in the large tract of

existing native vegetation to the west and north-west of the area outside of the Project's construction zone (see **Figure 3-5**). This area was originally mapped as BGW TEC in 2010 (**Figure 3-6**), and has been since monitored regularly by EcoLogical (now Ecoplanning) to assess the condition of the TEC relative to its exposure to environmental and anthropogenic conditions (**Figure 3-7**). This area is well suited for protection of the EPBC listed BGW as a means to demonstrating the Project's commitment to the Grassy Box Gum Woodland National Recovery Plan objectives of "no net" loss, by maintaining and improving where necessary the condition of existing critically endangered BGW. This area incorporates the Range Danger Area which adjoins the weapons range, "where firearm shooting takes place within which there may be a danger to persons or property arising from firearm shooting." The Range Danger Area is a large tract of land that limits and controls access (both vehicular and pedestrian) and prohibits any development due to the extreme safety concerns. However, land management activities are routinely conducted within the Range Danger Area when the ranges are not in use.

Once the final size and location of the area(s) has been confirmed, the Project will undertake a formal Defence process known as a Site Selection Board. This process is mandatory for the setting aside of areas on the estate for a given development, infrastructure project, range, facility, or in this case, conservation zone. The process will ensure that the proposed conservation area is unilaterally agreed to across Defence stakeholders, becomes formally recognised on the Estate Base Plan, and will not ever be earmarked for future use or development. Defence's Site Selection Board process involves comprehensive cross Defence review, assessment and agreement to the proposed siting. The site will then be endorsed by Defence Estate Planning Branch. A Site Selection Board Approval Minute will be issued to formalise the protection of the area against future use, in perpetuity.

The conservation area will be clearly demarcated, and will be monitored, and where necessary rehabilitated, by the Project under the direction of the Project Environment Manager, in accordance with the current Conservation Advice (DCCEEW 2023). Once the area is identified, and formally recognised on the Defence Estate Base Plan (following Site Selection Board processes), Defence will develop a formal Environmental Offsets Management Plan for the area.



**Figure 3-5: Proposed location of restorative activities for low condition BGW community**

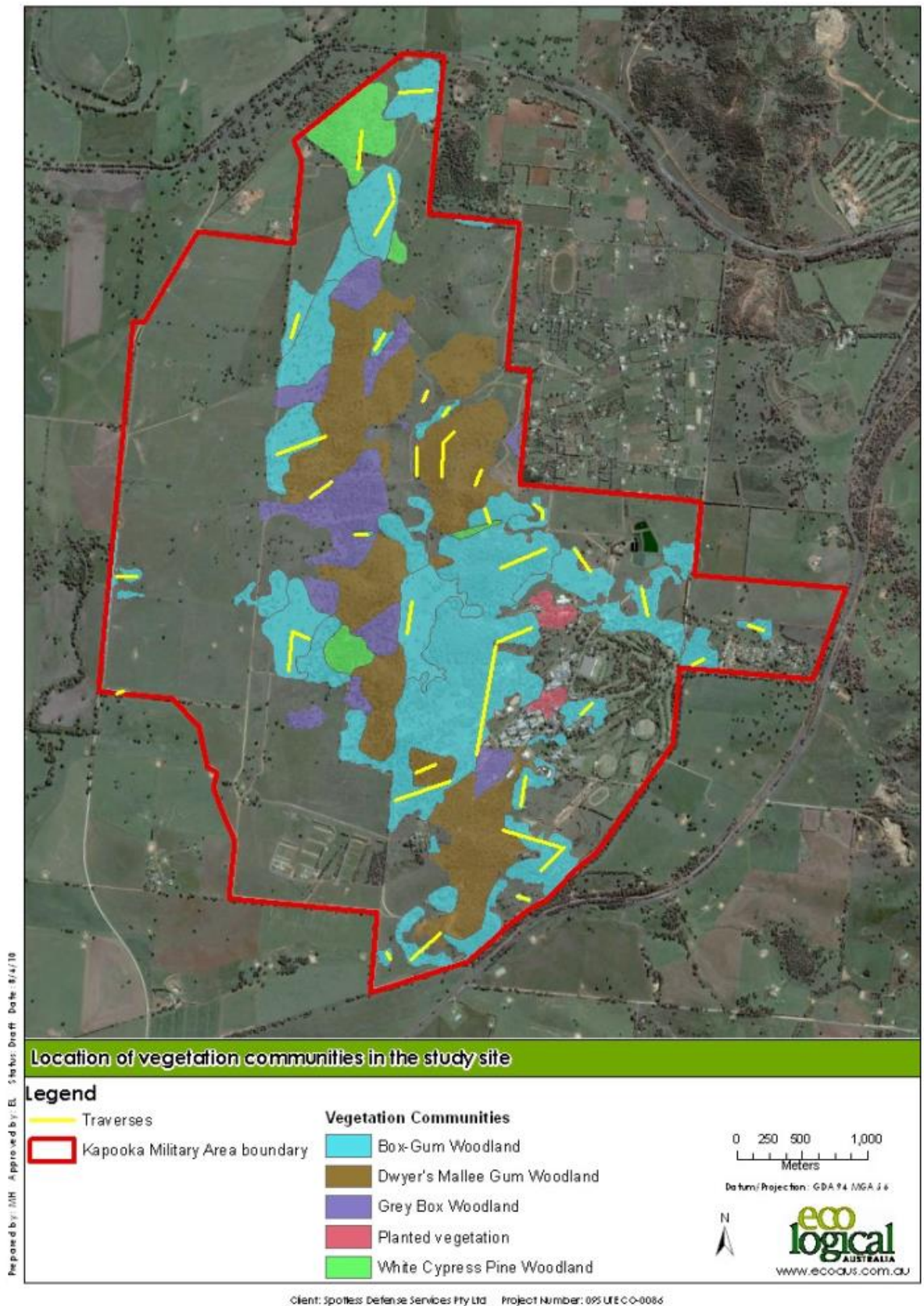


Figure 3-6: Field verified BGW woodland showing vegetation transects (as cited in EcoLogical 2010)



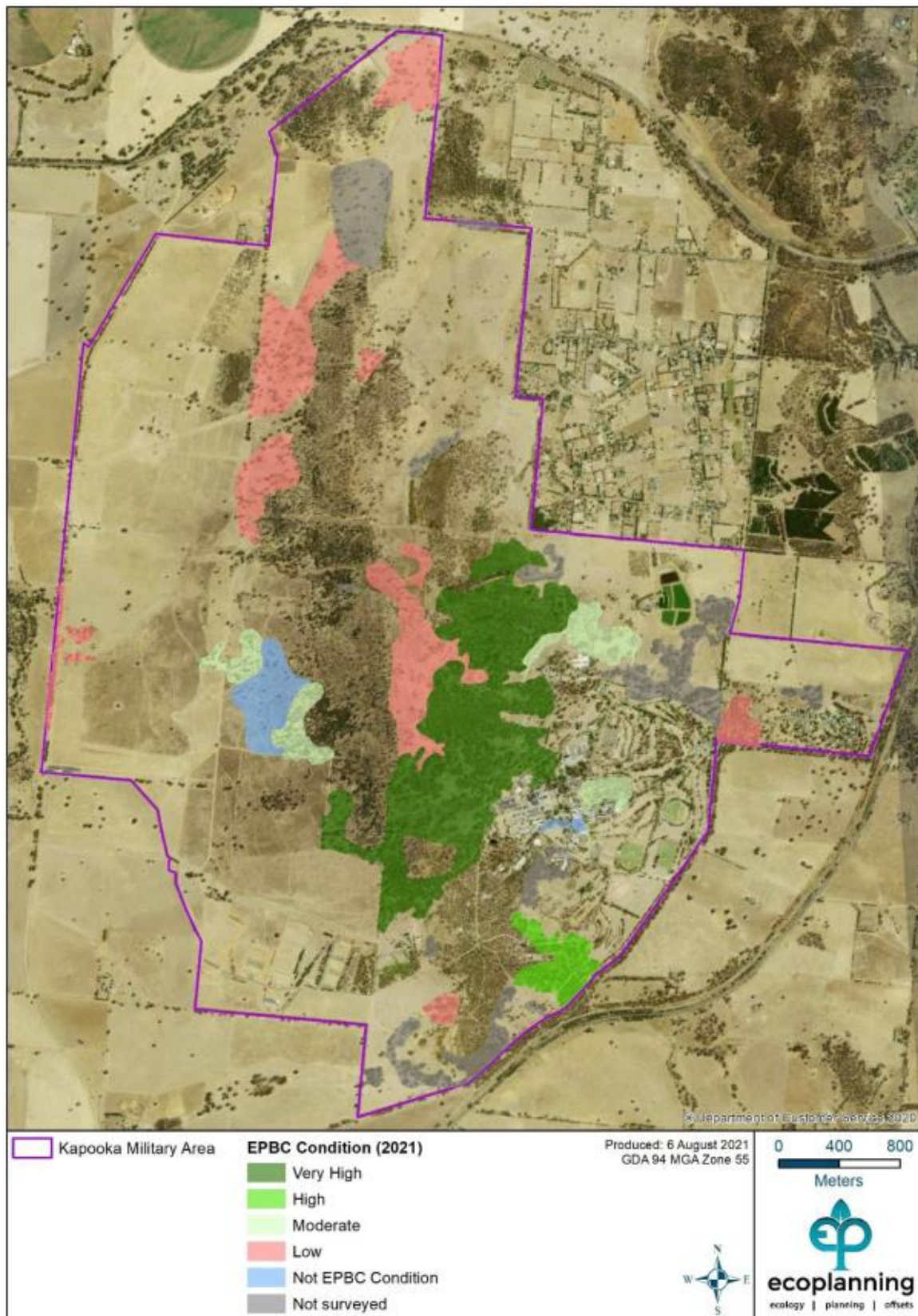


Figure 3-7: Vegetation condition of BGW TEC as mapped by Ecoplanning in 2021, including the general area proposed for conservation in-perpetuity by the Project

Protection of the identified area (s) in-perpetuity will be undertaken in line with the Defence Landscape Management Manual which seeks to improve connectivity and condition in accordance with the Australian Native Vegetation Framework. Further, a Nominated Site for Perpetuity Management Sub Plan, will be provided in the RRJV EMP, to clearly specify BGW management conditions for the Project, which may include (but not be limited to):

- Weed control – Woody weeds, annual and perennial weed species control program.
- Conduct mosaic ecological burns are required to aid the regeneration of the understory species comprising the BGW TEC.
- Engage with Traditional Owners to support the BGW restoration program utilising traditional land management techniques.

## 4. Controlling provision: Commonwealth action (s28)

### 4.1 Controlling chemical contaminants on BBK

Defence uses a comprehensive environmental impact assessment process to understand and manage the impacts of its activities on the environment and to ensure compliance with the EPBC Act. In accordance with the EPBC Act, and Defence's governing policies such as the Defence Environment and Heritage Manual and the Defence Contamination Management Manual, every project is required to consider:

*"...the nature and extent of contamination and if the presence, disturbance, removal or remediation of existing contamination is likely to have a significant impact on EPBC protected matters"*

The self-assessment undertaken in support of the proposed action has determined through desktop, site-based investigation and in application of *Significant Impact Guidelines 1.2*<sup>8</sup> (DSEWPC, 2013), that the proposed action is unlikely to have a significant impact on the receiving environment, including on people and communities. The remainder of this section presents the basis for Defence estate management of contamination, existing understanding as to the nature and extent of contamination hazards on BBK, supplementary technical assessment of ground conditions to be encountered in the proposed action construction footprint, and proposed avoidance, mitigation, and management measures to demonstrate that the *unlikely to have a significant impact* self-assessment determination is appropriate.

The management of contamination hazards on the Defence estate is governed by a specific hierarchy of legislation, guidance, and plans, notably:

#### Legislative Instrument

- National Environment Protection Council (1999) National Environment Protection (Assessment of Site Contamination) Measure, Schedule B2: Guideline on Site Characterisation (as amended in May 2013) (ASC NEPM, 2013) National Environment Protection (Assessment of Site Contamination) Measure 1999. (<https://www.nepc.gov.au/nepms/assessment-site-contamination>).

#### National Guidance and Standards

- Heads of EPAs Australia and New Zealand (HEPA) PFAS National Environmental Management Plan Version 2.0 (2020) (PFAS NEMP) <https://www.dcceew.gov.au/sites/default/files/documents/pfas-nemp-2.pdf>

#### Defence Policy and Plans

- Defence Contamination Management Manual (DCMM) (March 2018, amended June 2021), Annex C – Planning to Minimise and Manage Stockpiling. (<https://www.defence.gov.au/business-industry/industry-governance/industry-regulations/defence-contamination-management-manual>)
- Defence PFAS Construction and Maintenance Framework, Guidance for managing the risks of PFAS contamination for works on the Defence estate (Version 3.0, 2021) (<https://www.defence.gov.au/business-industry/industry-governance/industry-regulations/defence-pfas-construction-and-maintenance-framework>)
- Defence Pollution Prevention Management Manual (PPMM) (January 2023) (<https://www.defence.gov.au/business-industry/industry-governance/industry-regulations/pollution-prevention-management-manual>)

The management of contaminated land and groundwater is predominantly managed by two groups within Defence:

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<sup>8</sup> <https://www.dcceew.gov.au/environment/epbc/publications/significant-impact-guidelines-12-actions-or-impacting-upon-commonwealth-land-and-actions>

- **Directorate of Contamination Assessment, Remediation and Management (DCARM).**
- **PFAS Investigation and Management Branch (PFASIM).**

DCARM manage multiple contamination programs, including the Regional Contamination Investigation Program (RCIP<sup>9</sup>) which undertakes a 'whole of property' investigation, definition of nature and extent and risk appraisal of contamination hazards (generally excluding PFAS) on the Defence estate.

PFASIM undertakes the investigation and management of PFAS contamination hazards, as well as supporting impacted communities. This includes the development of PMAP and Ongoing Monitoring Programs for priority sites.

#### 4.1.1 Proposed action footprint: characterisation of potential contamination Hazards (s3.1.2 – 3.1.4)

##### Historical Uses and Activities

The PMAP for BBK was established in June 2021; key underlying documents were Jacobs (2019) *Detailed Site Investigation* and Jacobs (2021) *Human Health and Ecological Risk Assessment*:

- Defence (2021). *Blamey Barracks Kapooka: PFAS Management Area Plan*, Final Version, June 2021

In preparing the PMAP in 2021, Defence PFASIM had undertaken a comprehensive investigation of PFAS contamination at the Base and surrounds. PFAS contamination on and in the vicinity of BBK has been attributed to the historic use of AFFF for minor training purposes, incident control and beneficial re-use of wastewater at the following locations:

- **Current Fire Station** (inside the footprint of the proposed action).
- **Former Fire Training Areas** (outside the footprint of the proposed action).
- **Irrigated areas (golf course) using treated wastewater effluent from the wastewater treatment plant** (outside the footprint of the proposed action).

Groundwater has been ruled out as a major transport pathway for PFAS from BBK. Shallow monitoring wells have intersected perched water lenses (fed by localised rainwater infiltration from the ground surface) and chemical analysis from these wells near the wastewater treatment plant to the north and Kapooka Creek to the east of BBK have reported concentrations PFAS above laboratory limit of reporting (LOR). These locations are outside the footprint of the proposed action.

No complete exposure pathways have been identified to date in relation to deeper regional groundwater in the Jacobs (2021) HHERA. As such, groundwater is generally not considered further from PMAP implementation in terms of Base-wide management of PFAS impacts.

Therefore, the primary location of interest that the proposed action will require consideration of during construction activities is the current Fire Station and surrounding grassed areas, which is situated within the vicinity of the Q Store and Recruit Welfare Facility. An excerpt from the PMAP is below.

Table 4-1 PMAP description of BBK current fire station

Item	Description
Setting	Testing and cleaning of AFFF firefighting equipment has historically occurred on the grassed areas either side of the driveway in front of the Fire Station. Historically, AFFF products were stored in a

<sup>9</sup> <https://www.defence.gov.au/about/locations-property/regional-contamination-investigation-program#:~:text=The%20Defence%20Regional%20Contamination%20Investigation,were%20acceptable%20at%20the%20time.>

Item	Description
	purpose-built room behind the fire station. Small quantities were also stored in a Hazardous Materials (HAZMAT) trailer in the carpark behind the fire station.
Contaminant Nature	Soil at 1.0 m BGL: 3.75 mg/kg (sum of PFOS + PFHxS) and 0.027 mg/kg (PFOA) in BH003. Above both the NEMP ecological direct exposure criteria and human health public open space exposure criteria of 1 mg/kg for PFOS, below the same criteria for PFOA.
Contaminant Extent	Estimated source in soils up to 2.0 mBGL in depth and within 50 m to the east of the current Fire Station.

#### 4.1.1.1 Proposed Action Contamination Site Assessments

After review of existing Base-wide understanding of ground conditions in the vicinity of the proposed action, the following assessments were undertaken to increase understanding regarding known potential source areas and reduce uncertainty regarding latent (unknown) potential hazards which may be interacted with during construction activities.

- EMM Consulting Pty Ltd (2023b). *Pre-construction Contamination Assessment Report*, January 2023.
  - September 2022: collection of 15 surface soil samples and 8 boreholes.
  - October 2022: collection of 32 surface soil samples and 42 boreholes.
- EMM Consulting Pty Ltd (2023d). *Preliminary PFAS Risk Assessment*, December 2023.
- EMM Consulting Pty Ltd (2023e). *Contamination Management Strategy*, December 2023.

As an initial step, the following site assessment criteria (SAC, from EMM 2023b) framework was adopted to screen the 2022-2023 supplementary data obtained within the construction footprint of the proposed action. From the review of existing environmental investigations at the Base, generally PFAS is considered the primary contaminant of potential concern (CoPC) considered in the management of earthworks and materials in land forming for the proposed action.

Table 4-2 PFAS Site Assessment Criteria Framework

Guideline	Level Adopted	CoPC
ASC NEPM	HIL A, C and D HSL A-B, HSL C, HSL D	Metals, PAHs, phenols, OCPs, PCBs TRH, BTEX
CRC CARE	Intrusive Maintenance Worker 0 to 2.0 m BGL	THR, BTEX, naphthalene
ASC NEPM	EIL urban residential / public open space, and commercial / industrial ESL urban residential / public open space, and commercial / industrial	Arsenic, naphthalene TRH, BTEX, B(a)P.
PFAS NEMP	HIL A, C and D Ecological indirect exposure	PFOS and PFOA

#### Beneficial Reuse

As the assessment was designed to consider the chemical character of materials to be interacted with, and to inform construction environmental controls to not release or mobilise contamination, the principles of the NEMP *Reuse of Soil* was applied to underpin the contamination characterisation assessment.

The key principle of reuse under NEMP is that the levels of PFAS must be sufficiently low that they will not pose an increased or unacceptable risk to any receptor or to the environmental values of waters. The characterisation conclusions summarised in this PIDR aims to meet this principle by considering a lines of evidence approach and applying the NEMP decision tree:

- **Soil analysis.** Comparing to total concentrations to adopted SAC and assessing leaching potential where SAC are exceeded.
- **Qualitative assessment of risk and additional management measures per work area.** Consideration of the permeability of surfaces from the source to destination site (sealed vs unsealed, pavements and concrete), magnitude of urban development in the vicinity, the ecological setting and its sensitivity to change, surface waterways and stormwater system flow, and hydraulic connectivity from the ground surface to regional aquifers.

NEMP states that, if the source site is hydrogeologically appropriate, on-site encapsulation may acceptably manage on- and off-Base risks to direct and indirect beneficial uses and environmental values of soils, surface water, groundwater, and biota.

The decision tree for reuse of soil is presented below, and the key decision questions -- A) are there any SAC exceedances, B) does the destination support sensitive receptors, C) do soil leachate concentrations exceed health-based guideline vales, and D) do soil leachate concentrations exceed corresponding concentrations in local groundwater / surface water receptors -- are considered against the lines of evidence and presented in **Section 4.1.2.2 Analytical Results**.

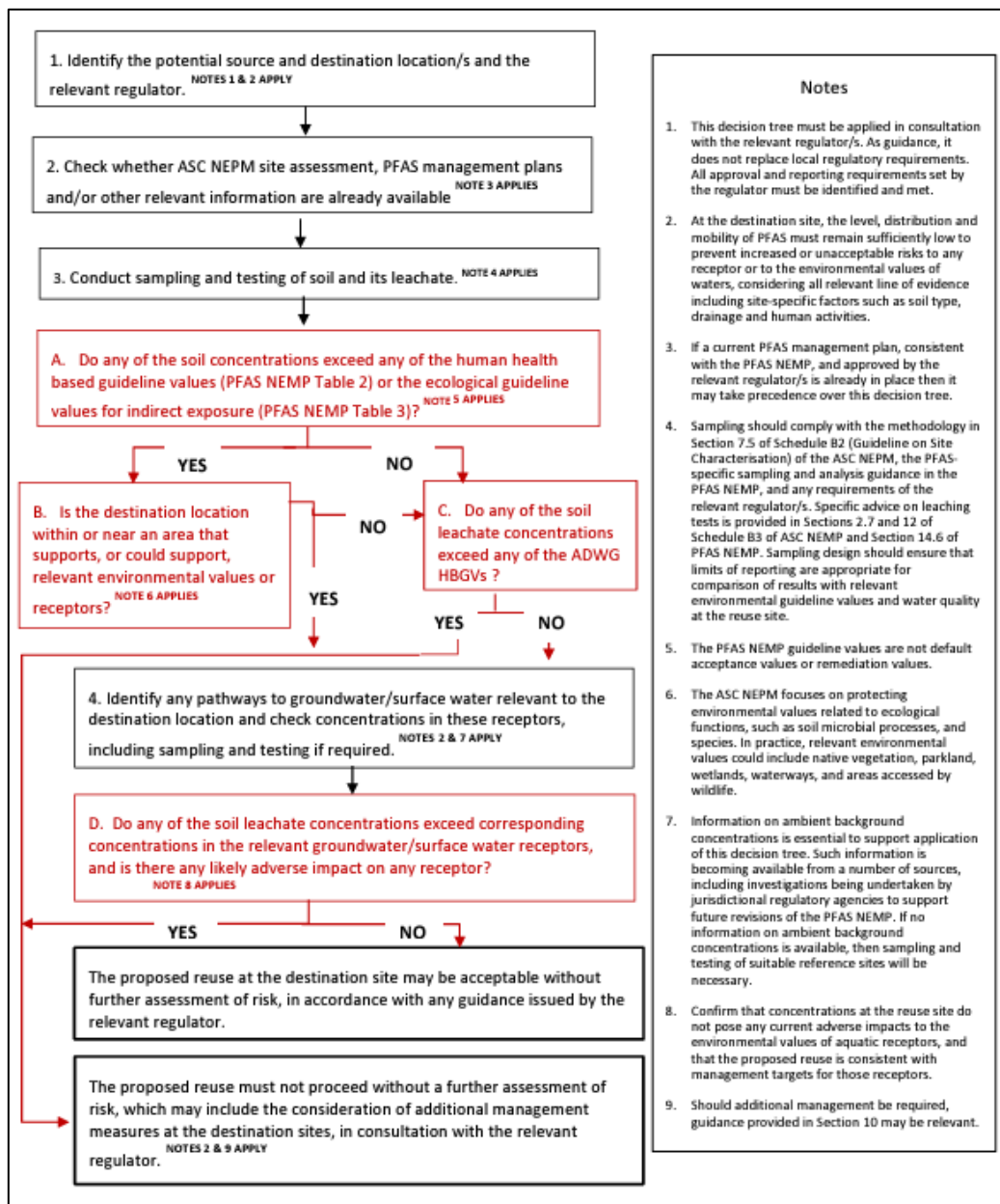


Figure 4-1: NEMP decision tree for reuse of soil

In adhering to decision question (A), where soil concentrations exceed guidelines values (in particular, indirect ecological criteria, being the lowest and most conservative, 0.01 mg/kg), leachate analysis from the soil has been assessed against drinking water quality guidance values (Department of Health, 2019) for sum of PFOS + PFHxS and PFOA (see Figure 4-2). These values align with the landfill acceptance criteria for unlined landfills and are therefore considered protective of long-term emplacement of material in the proposed action.

The health based guidance values for use in site investigations in Australia are:

Health based guidance value	Total PFOS+PFHxS	Total PFOS+PFHxS	PFOA	PFOA
	ng	µg	ng	µg
Tolerable daily intake (ng or µg /kg bw/day)	20	0.02	160	0.16
Drinking water quality guideline value (ng or µg /L)	70	0.07	560	0.56
Recreational water quality guideline value (ng or µg /L)	2,000	2.0	10,000	10.0

Note: bw = body weight, ng = nanograms, µg = micrograms

Figure 4-2: Department of Health, health-based guidance values in Australia. *Selection of drinking water quality<sup>10</sup> is considered the most appropriate to the uses of water in the catchment of BBK for the proposed action*

After consideration of the NEMP decision tree, the material in each work area has been categorised under the Defence *Construction and Maintenance Framework* (CMF) to steer earthworks planning and controls during the proposed action. Under the CMF, excavated soil from construction projects is categorised into four categories based on analytical results and understanding of the source and destination characteristics.

Table 4-3 CMF soil categories

Category	Guideline
Category 4 <sup>1</sup>	Excavated soils with PFOS+PFHxS concentrations less than 0.01 mg/kg
Category 3 <sup>2</sup>	Excavated soils with PFOS+PFHxS concentrations less than 1 mg/kg but greater than 0.01 mg/kg
Category 2 <sup>3</sup>	Excavated soils with PFOS+PFHxS concentrations less than 20 mg/kg but greater than 1 mg/kg
Category 1	Excavated soils with PFOS+PFHxS concentrations of 20 mg/kg or more

PFAS NEMP alignment with CMF Categories

- <sup>1</sup> Protective of interim soil – ecological indirect exposure for all land uses
- <sup>2</sup> Protective of Human health - direct soil contact for public open space
- <sup>3</sup> Protective of Human health - direct soil contact for industrial land use

#### 4.1.1.2 Analytical Results

The following presents a summary of the supplementary sampling works and assessment against Data Quality Objectives of EMM (2023b) *Pre-Construction Contamination Report* (presented in **Appendix D**), which had the aim of:

- Refining the understanding and assessment of contamination risks regarding building siting location.
- Providing initial materials classification of soils where management actions of potential contamination may be required.

The investigation consisted of collection and analysis of 191 soil samples for CoPC. Findings of the assessment included:

- Soil contaminant concentrations were reported below human health SAC in all samples analysed across the proposed action.
- Exceedances of ecological SAC (direct ecological exposure scenario) were reported from soils in the vicinity of:

<sup>10</sup> During preparation of the PMAP (Defence, 2021), properties in the vicinity of Base, and BBK itself, are connected to potable town water supply. **Groundwater** uses included commercial agriculture, watering gardens, home-grown produce, non-potable domestic purposes. **Surface water** (private dams along Kapooka Creek) was reported as being used for recreational purposes as well as for watering home-grown produce, livestock and gardens. As watering for home-grown produce was identified, the drinking water quality guideline value has been selected as a conservative measure in the first instance.



- **Recruit Welfare Facility**, BH38\_0.5, reported 1.4 mg/kg sum of PFOS + PFHxS, above the 1.0 mg/kg guideline value.
- Exceedances of ecological SAC (indirect ecological exposure scenario) were reported from soils in the vicinity of:
  - **Medical Training Facilities**, BH28\_0.5 reported 0.39 mg/kg sum of PFOS + PFHxS, above the 0.01 mg/kg guideline value.
  - **Recruit Welfare Facility**, BH36, BH37, BH38, BH39, BH40, SS20 and SS22, reported concentrations between 0.011 to 1.0 mg/kg sum of PFOS+PFHxS, above the 0.01 mg/kg guideline value.
  - **Weapons training area (EO storage)**, BH41\_2.5 reported 0.049 mg/kg sum of PFOS+PFHxS, above the above the 0.01 mg/kg guideline value.
  - **Q store warehouse**, BH54 and BH55 reported 0.12 to 0.83 mg/kg sum of PFOS+PFHxS, above the above the 0.01 mg/kg guideline value.
  - **Fitness training facility and gym**, BH58 and BH59 reported concentrations between 0.012 to 0.023 mg/kg sum of PFOS+PFHxS, above the above the 0.01 mg/kg guideline value.
- The following areas were analysed for leaching potential, due to exceedances of certain SAC to further inform risk management strategies during construction of the proposed action:
  - **Medical Training Facilities**, BH28\_0.5 reported 0.1 ug/L sum of PFOS+PFHxS leaching potential, above the 0.07 ug/L guideline value.
  - **Recruit Welfare Facility**, SS20 and SS23 reported 0.13 to 0.19 ug/L sum of PFOS+PFHxS leaching potential, above the 0.07 ug/L guideline value.
  - **Recruit Welfare Facility**, BH37, BH38, BH39 reported 10.0 to 57.0 ug/L sum of PFOS+PFHxS leaching potential, above the 0.07 ug/L guideline value.
  - **Q store warehouse**, BH54 reported 4.7 to 85.0 ug/L sum of PFOS+PFHxS leaching potential, above the 0.07 ug/L guideline value.
  - **Fitness training facility and gym**, BH58 and BH59 reported 0.08 to 0.67 ug/L sum of PFOS+PFHxS leaching potential, above the 0.07 ug/L guideline value.
- Groundwater was not encountered during drilling in September to October 2022 works, up to a maximum borehole depth of 6.0 m BGL (the greatest depth of bulk excavation required by the design).

Per the NEMP decision tree, boundaries of material exceeding ecological SAC and leaching guideline values in work areas listed above have been defined and presented on **Figure 4-3** and **4-4** below. In these areas, qualitative consideration of risk profile for environmental impact avoidance and additional management measures for environmental impact mitigation and will be incorporated into the RRJV EMP and subsequent construction plans.

To present the additional considerations and measures, **Table 4-4** further expands on the detail presented in **Table 2-1** Cut:fill Bulk Earthworks Detail above, summarising soil and leaching concentrations, Defence CMF category, environmental context in each work area (environmental features, land use history, presence of any vulnerable ecological values), then stipulates the additional management measures to be adhered to during construction activities of the proposed action.

Table 4-4. Materials characterisation and management measures

Area	Net cut:fill (m <sup>3</sup> )	Soil conc. Leach. conc.	CMF Category	Environmental Context	Additional Management Measures
<b>Cantonment</b>					
<b>Medical training</b>	794 cut	>Eco indirect >ADWG	Cat 3	TEC nearby the construction zone, up topographic gradient, but requires some clearance. Drainage line down topographic gradient.	<b>Surplus cannot be used</b> as fill in work areas <Cat 3, preferentially to be used in land forming in the Medical Training work area specifically under sealed surfaces (roads, pavement, engineered concrete slab) and not in vicinity of drainage lines or stormwater systems. If not practicable, material should be disposed of off-Base as waste under NSW EPA Waste Regulation.
<b>Northern Ring Road</b>	-22,531 fill	<Eco indirect	Cat 4	TEC nearby the construction zone, up topographic gradient, but requires some clearance. No existing stormwater system.	<b>No surplus material.</b> Current ground surface acceptable to receive suitable fill from comparable work areas, or appropriate off-Base sources. Erosion and sediment control per RRJV EMP to be adhered to.
<b>LIA West</b>	126 cut	<Eco indirect	Cat 4	Intensively developed area, sealed surfaces, and stormwater system. Minimal remnant vegetation in vicinity.	<b>Surplus can be used</b> as fill in other Cat 4 work areas, no appreciable mass loading or increase to risk profile anticipated. Materials tracking registers per RRJV EMP to be adhered to.
<b>Road between LIAs</b>	509 cut	<Eco indirect	Cat 4	Intensively developed area, sealed surfaces, and stormwater system. Minimal remnant vegetation in vicinity.	<b>Surplus can be used</b> as fill in other Cat 4 work areas, no appreciable mass loading or increase to risk profile anticipated. Materials tracking registers per RRJV EMP to be adhered to.
<b>HQ</b>	1,688 cut	<Eco indirect	Cat 4	Intensively developed area, sealed surfaces, and stormwater system. Minimal remnant vegetation in vicinity.	<b>Surplus can be used</b> as fill in other Cat 4 work areas, no appreciable mass loading or increase to risk profile anticipated. Materials tracking registers per RRJV EMP to be adhered to.

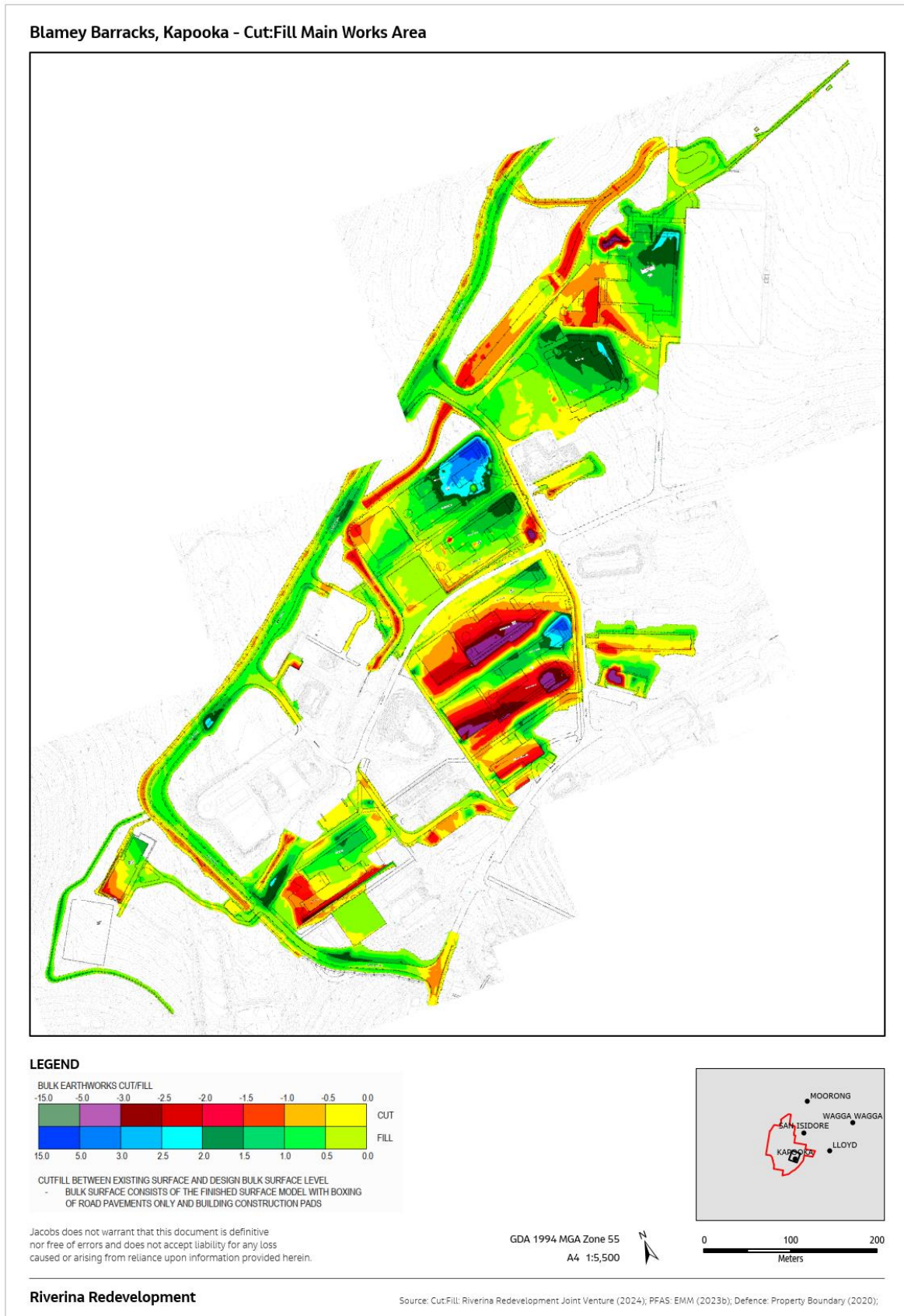
Area	Net cut:fill (m <sup>3</sup> )	Soil conc. Leach. conc.	CMF Category	Environmental Context	Additional Management Measures
LIA carparks	-610 fill	<Eco indirect	Cat 4	Minor developed area with unsealed grassed surfaces, and stormwater system. Some remnant vegetation in vicinity.	<b>No surplus material.</b> Current ground surface acceptable to receive suitable fill from comparable work areas, or appropriate off-Base sources. Erosion and sediment control per RRJV EMP to be adhered to.
LIA Alpha & Bravo Company	14,327 cut	<Eco indirect	Cat 4	Intensively developed area, sealed surfaces, and stormwater system. Minimal remnant vegetation in vicinity.	<b>Surplus can be used</b> as fill in other Cat 4 work areas – most notably LIA C&D - no appreciable mass loading or increase to risk profile anticipated. Materials tracking registers per RRJV EMP to be adhered to.
LIA Charlie & Delta Company	-19,846 fill	<Eco indirect	Cat 4	Intensively developed area, sealed surfaces, and stormwater system. Minimal remnant vegetation in vicinity.	<b>No surplus material.</b> Current ground surface acceptable to receive suitable fill from comparable work areas – most notably LIA A&B - or appropriate off-Base sources. Erosion and sediment control per RRJV EMP to be adhered to.
Q store warehouse	-9,961 fill	>Eco indirect >ADWG	Cat 3	Intensively developed area with sealed and unsealed grassed surfaces, with stormwater system. Minimal remnant vegetation in vicinity.	<b>No surplus material.</b> Prior to importation of fill, current ground surface to be used in land forming in the work area specifically under sealed surfaces (roads, pavement, engineered concrete slab) and not in vicinity of drainage lines or stormwater systems. If not practicable, material should be disposed of off-Base as waste under NSW EPA Waste Regulation. <b>Category 2 area (current fire station precinct)</b> to be segregated and managed as an integrated response with PMAP implementation project (under contaminated sites protocols and roles).
Multi-Function & nearby roads	-3,517 fill	>Eco indirect >ADWG	Cat 3, Cat 2	Intensively developed area with sealed and unsealed grassed surfaces, with stormwater system. Minimal remnant vegetation in vicinity.	<b>No surplus material.</b> Prior to importation of fill, current ground surface to be used in land forming in the work area specifically under sealed surfaces (roads, pavement, engineered concrete slab) and not in vicinity of drainage lines or stormwater systems. If not practicable, material should be disposed of off-Base as waste under NSW EPA Waste Regulation.

Area	Net cut:fill (m <sup>3</sup> )	Soil conc. Leach. conc.	CMF Category	Environmental Context	Additional Management Measures
					<b>Category 2 area (current fire station precinct)</b> aligned with the same work zone as Q store warehouse, to be segregated and managed as an integrated response with PMAP implementation project (under contaminated sites protocols and roles).
<b>WTTS</b>	-459 fill	<Eco indirect	Cat 4	Minor developed area with unsealed grassed surfaces, and stormwater system. Some remnant vegetation in vicinity.	<b>No surplus material.</b> Current ground surface acceptable to receive suitable fill from comparable work areas, or appropriate off-Base sources. Erosion and sediment control per RRJV EMP to be adhered to.
<b>Contractors Precinct</b>	-1,927 fill	<Eco indirect	Cat 4	Minor developed area with unsealed grassed surfaces, and drainage lines down topographic gradient. Some remnant vegetation in vicinity.	<b>No surplus material.</b> Current ground surface acceptable to receive suitable fill from comparable work areas, or appropriate off-Base sources. Erosion and sediment control per RRJV EMP to be adhered to.
<b>Land Management Compound</b>	-4,339 fill	<b>Data gap in assessment,</b> however up topographic gradient of known PMAP source zones		Minor developed area with unsealed grassed surfaces, and drainage lines down topographic gradient. Some remnant vegetation in vicinity.	<b>No surplus material.</b> Current ground surface may be acceptable to receive suitable fill from comparable work areas, or appropriate off-Base sources. Sampling and assessment to be conducted prior to earthworks.
<b>Heritage Walk</b>	-1,422 fill	<Eco indirect	Cat 4	Remnant vegetation near the construction zone requires some clearance. Unsealed grassed surfaces. No existing stormwater system.	<b>No surplus material.</b> Current ground surface acceptable to receive suitable fill from comparable work areas, or appropriate off-Base sources. Erosion and sediment control per RRJV EMP to be adhered to.
<b>Fitness Training Facility &amp; Gym</b>	-1,154 fill	>Eco indirect >ADWG	Cat 3	Remnant vegetation near the construction zone requires some clearance. Unsealed grassed surfaces. No existing stormwater system.	<b>No surplus material.</b> Prior to importation of fill, current ground surface to be used in land forming in the work area specifically under sealed surfaces (roads, pavement, engineered concrete slab) and not in vicinity of drainage lines or stormwater systems. If not practicable, material should be disposed of off-Base as waste under NSW EPA Waste Regulation.

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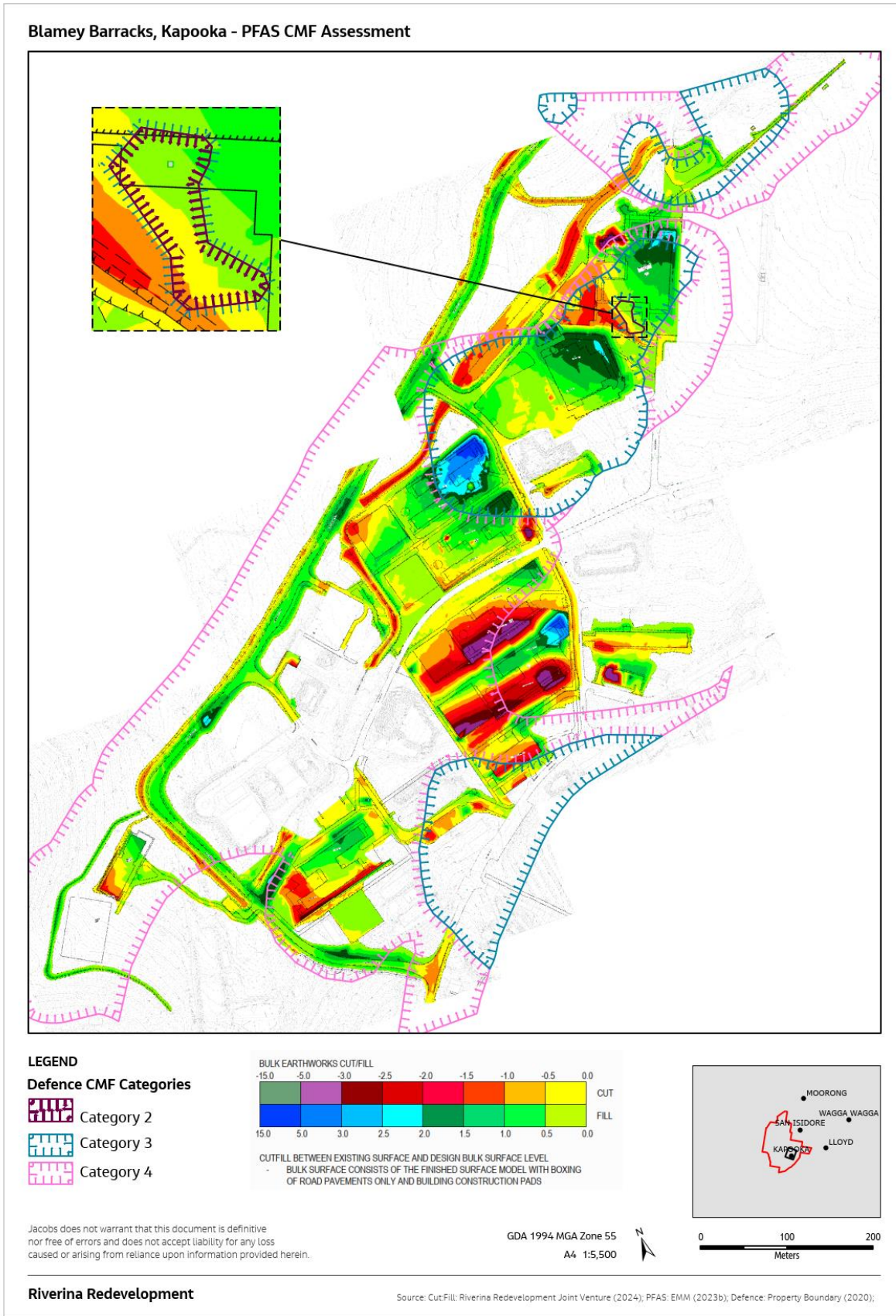
Area	Net cut:fill (m <sup>3</sup> )	Soil conc. Leach. conc.	CMF Category	Environmental Context	Additional Management Measures
Miscellaneous (Kapooka Drive & Park Drive)	-612 fill	N/A	N/A	-	-
Weapons Training Area					
Range Road	-2,133 fill	<Eco indirect	Cat 4	Remnant vegetation near the construction zone requires some clearance. Unsealed grassed surfaces. No existing stormwater system.	<b>No surplus material.</b> Current ground surface acceptable to receive suitable fill from comparable work areas, or appropriate off-Base sources. Erosion and sediment control per RRJV EMP to be adhered to.
EO Ranges	1,842 cut	<Eco indirect	Cat 4	Remnant vegetation near the construction zone requires some clearance. Unsealed grassed surfaces. No existing stormwater system.	<b>Surplus can be used</b> as fill in other Cat 4 work areas – most notably the range road - no appreciable mass loading or increase to risk profile anticipated. Materials tracking registers per RRJV EMP to be adhered to.

Figure 4-3: Cut:fill Earthworks



\\AUSYD0V501\GIS\Defence\IS389900\_Riverina\_PMCA\Geospatial\Apps\ArcPro\Figures\Enviro\IS389900\_Riverina\_Redevelopment\_Enviro\_Figures\_Blamey.aprx Produced: 7/3/2024 Author: DATOV

Figure 4-4: Cut:fill Earthworks with CMF Boundary Overlay



**Requirement for further assessment**

EMM (2023b) identified discrete areas where soil data were not in sufficient density or are not able to be generated until demolition of existing structures occurs during the proposed action. These included:

- **Land management compound.** Due to the timing of design process and the staging of EMM September to October 2022 investigations, soil samples were not obtained in this area. Review of the environmental context of the area did not identify sensitive or vulnerable ecological values, nor significant potential for contamination sources. Assessment of soils will be conducted to inform construction plans and management measures for the source and destination of material used in the work area.
- **Utilities corridors.** Generally, sub-surface utilities trenches and associated features do not generate large volumes of surplus materials, and excavations are conducted under non-destructive digging protocols for protection of assets. During these works, Erosion and sediment controls and materials tracking, including off-Base waste disposal, will adhere to the RRJV EMP and construction plans.
- **Stormwater detention basin.** Due to the timing of design process of hydrology modelling and the staging of EMM September to October 2022 investigations, an incomplete dataset was generated for this area. As the area is intrinsically linked to the water retention and water quality, it is considered to a sensitive ecological value, and requires sufficiently protective assessment of soils to inform construction plans and management measures for the source and destination of material used in the work area.
- **Current Fire Station precinct.** Detailed, high -resolution assessment of the extent of PFAS impacts in the vicinity of the current Fire Station (to be constructed as the Q store warehouse and Multi-Function Centre in the proposed action) is to be completed as an integrated response between the proposed action and PFASIM's PMAP implementation at BBK. Management of this known source zone will be controlled by the contaminated site legislation and guidance process, including the oversight of a Contaminated Site Auditor.

For these areas, supplementary sampling and analysis will be assessed per the NEMP decision tree and Defence CMF workflows in **Table 4-5**, as well as utilising the PFAS calculator tool in the RRJV EMP to consider contaminant mass load in the source and sensitivity of the destination.

PFAS Calculator Tool			
Sum PFHxS + PFOS			
<b>Source material:</b>			
spoil volume	m3		volume of soil excavated, area x depth
bulk density	kg/m3		specific to soil type, e.g. clay loam = 1500
soil weight	kg	0	spoil volume x bulk density
Sum PFHxS + PFOS concentration	mg/kg		calculated 95% upper confidence limit (UCL), based on recent testing
PFHxS + PFOS mass in spoil	mg	0	UCL Sum PFHxS + PFOS concentration x soil weight
PFHxS + PFOS mass in spoil	kg	0	convert mg/kg to kg
<b>Soil at reuse location:</b>			
depth of existing PFAS contamination	m		based on recent soil testing
footprint of existing PFAS contamination within reuse area	m2		estimate of reuse area with existing PFAS contamination, based on recent testing
volume of PFAS contamination	m3	0	depth x area of footprint
bulk density	kg/m3		specific to soil type, e.g. clay loam = 1500
soil weight	kg	0	spoil volume x bulk density
Sum PFHxS + PFOS concentration	mg/kg		calculated 95% upper confidence limit (UCL), based on recent testing
PFHxS + PFOS mass in reuse area	mg	0	UCL Sum PFHxS + PFOS concentration x soil weight
PFHxS + PFOS mass in reuse area	kg	0	convert mg/kg to kg
<b>Comparison:</b>			
combined mass of PFHxS + PFOS after reuse	kg	0	PFHxS + PFOS mass in source material + existing PFHxS + PFOS mass at reuse location
percentage change in mass of PFHxS + PFOS	%	#DIV/0!	PFHxS + PFOS mass in spoil compared to PFHxS + PFOS mass at reuse location

**Figure 4-5: EMM RRJV PFAS Calculator Tool**



## 4.1.2 Contamination hazard avoidance, mitigation and management

### 4.1.2.1 Avoidance measures

A key first step in managing environmental values under the *Significant Impact Guidelines 1.2* (DSEWPC, 2013), is the avoidance altogether of interacting with ground hazards and creating release or transport mechanisms during construction works. Accordingly, the assessment of risk presented in this section meets the requirements of DSEWPC (2013) and NEMP's guidance on beneficial reuse. The interaction and movement of contaminant mass is limited as far as reasonably practicable, fulfilling an elimination level of control, and the source zone requiring additional management, the current Fire Station, will be coordinated as an integrated response per the published PMAP for BBK.

### 4.1.2.2 Mitigation and management measures: construction management plan and sub-plans

The second step in managing environmental values under the *Significant Impact Guidelines* is, where it is not practicable to avoid interaction with ground hazards altogether, to adopt a robust level of construction environmental control. These measures generally fulfill the engineering and administrative level of controls and are governed by construction plan documentation.

The Contamination Management Strategy (EMM, 2023e) and RRJV EMP are key governance documents (presented in **Appendix D**). The RRJV EMP will be provided as part of construction subcontract tender documentation for the construction subcontractor to ensure that any EPBC Act (and broader Project) approval conditions are contractually captured in the construction subcontracts.

The RRJV EMP incorporates high level sub-plans to mitigate the risk from interaction with potential ground hazards, which will be developed further on a task-basis in construction plans. Per DCCEE's RFI document, the RRJV EMP has been updated to include:

- Materials management plans:
  - Stockpile management plans.
  - Movement of PFAS impacted soil to areas without PFAS (i.e. 'clean' areas).
  - Management of temporary stockpiles under best practices.
- Imported fill protocols.
- Temporary segregation and off-Base disposal protocols of solid and liquid wastes.
- Dewatering plans and management of construction water (to keep separate from clean water).
- Diversion and management of clean surface water.
- Unexpected finds (UxF) protocol.
  - Unexpected finds - interaction with higher-than-expected PFAS impacted soil/groundwater.
  - Military materiel.
  - Other contaminants and ground hazards.
- Remediation action plans (RAPs) where PMAP integrated response is required.
- Stakeholder communication and consultation.
- Preparation and administration of an Environmental Clearance Certificate (ECC) under DEPAC approvals.

In addition to these, the RRJV EMP has also provided guidance for the following specific environmental management sub-plans, which will be incorporated into the task-based construction plans:

- Flora and fauna identification and protection.
- Noise and vibration management – baseline, working hours, abatement protocols.
- Dust and air quality – sensitive receptors, potential hazards, abatement protocols.
- Cultural heritage identification and protection.
- Hazardous substances.
- Groundwater and surface water surveillance monitoring plans\*.

\*The RRJV has committed to preparing detailed environmental monitoring plans for groundwater and surface water, as nominated by DCCEEW, and has included preliminary details within the attached RRJV EMP (**Appendix D**), which will be aligned and integrate with the PMAP (Defence, 2021) ongoing monitoring program currently occurring at BBK.

## 4.2 Impacts to heritage values

### 4.2.1 Characterisation of heritage values (s 3.2.1)

While BBK has no statutory or non-statutory heritage listings, it has been assessed as meeting the Commonwealth heritage criteria for built and intangible historic values. These heritage values are detailed and managed through a Heritage Management Plan (HMP) (Umwelt 2022).

#### **Built heritage**

The HMP identifies BBK as containing buildings that date from all phases of development, which include Royal Australian Engineers training during World War II (WWII), migrant hostel by the Department of Immigration and as a dedicated military training area from the 1950s, including the Blamey Barracks development era from the 1960s onwards.

The Blamey Barracks are an intact and representative example of Government design and construction from the 1960s. There are 38 buildings with heritage values from the Blamey era.

The elements contributing to the values are contained within three historic areas of the base, namely, the accommodation and administration sub-precinct, the store and warehouses sub-precinct and the social sub-precinct.

#### **Intangible heritage**

While the HMP places emphasis on the buildings, particularly those relating to the Blamey era of development, the historical functions of the base, which continue to present day and the social significance are identified by Base personnel as being of greater importance than the buildings. BBK is historically significant as the 'Home of the Soldier' and has been for over 70 years. The physical fabric is the means to the end, it is a tool or a teacher, but is not important in and of itself. It is instead the function, the form and the social connections that are of heritage value.

BBK is socially significant for the 'deep social and cultural connections that exist between BBK and Australian Army personnel [which] are unparalleled by other military training areas in Australia' (Umwelt 2022, p.65).

#### **Indigenous heritage**

More than 20 Indigenous heritage sites are documented across BBK. None of these sites will be impacted by the proposed action.

BBK has been assessed as containing Indigenous sites that suggest the place is part of an Indigenous tradition. Site inspections, targeting previously undisturbed or minimally disturbed areas within the Project footprint, were undertaken on two separate occasions in 2023 with Indigenous stakeholders.

During the first site inspection, the Indigenous stakeholders identified a culturally modified tree in the north-west section of the Cantonment Precinct, adjacent to an existing track. The proposed action has been re-designed to avoid an impact to this tree. At the second site inspection, an additional potential culturally modified tree was identified in the vicinity of the proposed ring road. Further assessment is underway to determine if the scarring on this tree is cultural, however, the proposed action can be managed to avoid any impact to this tree.

In consultation with the Indigenous stakeholders, the archaeologist identified two areas of archaeological potential, but no new archaeological sites were identified.

### **Natural heritage**

A natural heritage values assessment was undertaken as part of the HMP (Umwelt 2022). Underpinning the assessment of ecological, and therefore the natural heritage values of BBK, are the attributes of each of the important natural values. The attributes considered in this assessment included: biodiversity values (species and ecosystem richness and diversity, presence of rare or endangered species/communities), geodiversity (rare or intact examples of geomorphological processes, exemplary fossil records), ecosystem (where there is a diversity of intact ecosystems including but not limited to threatened ecological communities) and scientific value (where there has been long term monitoring and/or scientific studies of threatened species or communities).

This assessment concluded that the natural values of BBK are partially intact and have a low to moderate level of natural integrity based on the remaining woodland remnants. At a landscape scale, BBK shares similar geodiversity and biodiversity to the broader region, particularly along the north-south ridgeline. Although biodiversity conservation has high value, given the deteriorating condition of Box-Gum Woodland, there are other grassy woodland patches in the region that represent better natural integrity. These changes in condition and integrity are not a natural phenomenon but are a result of past and current human modification.

As a place, BBK does not meet the CHL criteria for natural heritage values, as the natural values are currently represented in an altered state with comparable features in the local region, subregion and bioregion.

Within the local region, these values are generally of greater ecological significance elsewhere because of their being in larger contiguous patches with greater connectivity and ecological function.

## **4.2.2 Impact assessment (s3.2.2)**

### **Built heritage**

There is likely to be a significant impact on historic heritage values at BBK. While the Base has no statutory or non-statutory heritage listings, it has been identified in the HMP (Umwelt 2022) as meeting the Commonwealth Heritage List criteria for historic values. These values do not meet National Heritage List or World Heritage List criteria and therefore are not MNES. The significant impact has therefore been determined against Whole of Environment matters, as opposed to MNES. A Heritage Impact Assessment (HIA) was prepared and considered historic heritage values. (EMM 2023f).

As part of the proposed action, demolition of 31 of the 38 Blamey era buildings (with heritage value) is proposed. Assessment against DCCEEW's Significant Impact Guidelines 1.2<sup>11</sup> (DCCEEW, 2013) has determined this demolition to be a significant impact under 'whole of environment', as removal would adversely impact the rarity (criterion b), representative (criterion d) and aesthetic (criterion e) heritage values, which are all or in part embodied in the Blamey Barracks era building fabric. During the design of the Project, two Blamey era buildings originally proposed for demolition (Sergeants and Officers Messes) have been identified for

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<sup>11</sup> <https://www.dcceew.gov.au/environment/epbc/publications/significant-impact-guidelines-12-actions-or-impacting-upon-commonwealth-land-and-actions>

retention, based on feedback from Base stakeholders. No other alternatives for this action have been identified.

### Intangible heritage

Although the action will remove fabric of a heritage place, the Base personnel, DEHPD and DEPAC have indicated that much of the heritage value of BBK is vested in the historically significant intangible heritage values of the site as the 'Home of the Soldier' for Army for over 70 years. BBK is also of great social significance for the 'deep social and cultural connections that exist between BBK and Australian Army personnel [which] are unparalleled by other military training areas in Australia' (Umwelt 2022). These important values will be retained and significantly enhanced with the proposed development, which facilitates continuation of use of BBK as the 'Home of the Soldier'. In addition, given the requirements of housing and training recruits, the proposed replacement buildings will reference the Blamey era buildings in form and design as well as in maintenance of existing function.

### Indigenous heritage

The HIA was prepared and considered Indigenous heritage values (EMM 2023f). Surveys with Indigenous stakeholders identified one culturally modified tree, one potentially culturally modified tree (subject to further assessment), and two areas of Indigenous archaeological potential. Both the trees will be avoided during the action and the impacts to the areas of archaeological potential will not be significant (management measures have been agreed with the Indigenous stakeholders for these areas).

This impact is not considered significant when assessed against the Significant Impact Guidelines 1.2 criteria (DCCEEW 2013).

Management measures have been developed in active consultation with the Indigenous stakeholders, including monitoring during ground disturbance in areas of archaeological potential, and protective fencing around Indigenous sites, will be implemented.

## 4.2.3 Avoidance, mitigation and management (s3.2.3)

The Project proposes the following avoidance, mitigation and management measures. These include the new measures proposed by the CHS Team at DCCEEW (bolded and italicised below for clarity).

- Full professional, archival recording of the current site with a focus on those buildings to be demolished ***considering their internal and external layout and function.***
- Preparation of an Oral History report that:
  - collects audio and/or video testimonies of graduates and staff. The participants should be chosen from the various decades of use – from the 1960s through to the present.
  - photographs associated with the occupation of the LIA (an overlap with the archival recording)
  - a report that summarises the main themes from the participants memories
  - is recorded in a format that can be ***publicly accessible*** (if appropriate under Defence security requirements) ***either onsite or through an online archive.***
- Prepare an Interpretation Plan, which is to include consideration of:
  - the existing content in the Interpretation Strategy (*Appendix J* of the HMP), in particular, consultation with the Army History Unit on the implementation of any heritage interpretation.
  - integration of interpretive material regarding the 1960s Blamey Barracks era into the:
    - Kapooka Heritage Trail, a pathway between the visitor carpark to the ***proposed Multi-Function Centre and Parade Ground.***
    - proposed recruit LIA precinct

- proposed multi-function centre.
- main Parade Ground
- former Post Office.
- making content from the archival recording and oral history available online and onsite.
- consider reuse of materials, particularly the red bricks in landscaping.
- measures to ensure the architectural style and materiality can be understood as an interpretive measure.
- Development and completion of the Kapooka Heritage Trail from the visitor carpark to the proposed Multi-Function Centre and Parade Ground.
- Protection of the gun emplacements in the accommodation and administration sub-precincts and adjacent to the main parade ground during construction. If the gun emplacements need to be moved, appropriate management measures are to be developed to protect and manage the move.
- The design of new buildings will comply with Policies 48 to 52 of the HMP (Umwelt 2022) to the extent possible, in order to consider how the architectural style and materiality of new buildings can be understood as an interpretative measure of the former buildings, such as:
  - large-scale buildings, arranged in a symmetrical 'disciplined' layout.
  - rectilinear forms, preferably rectangular footprints, rather than winged.
  - limited roof overhangs, placing the visual emphasis on the tall, smooth vertical faces of the buildings.
  - buildings are visible in the round and set in grassed areas.
  - warm, rich tones akin to red brick.
  - vertical architectural expressions of the window fenestration with no dominant horizontal expression, resulting in a solid, anchored building.
  - Consideration to be given as to whether the fibre cement sheeting proposed for the LIA development can be textured, or the size of the sheeting reduced to minimise the visual impact of large flat sheeting.
  - LIA signage should be built in red brick as per concept design.
- Retain and seek to adaptively re-use the remaining Blamey Barracks (1960s) era rectangular buildings as representations of this era at Kapooka. Buildings to be retained include the Officers and Sergeants Messes, where their function/use will remain extant and Buildings 11 and 13 (existing accommodation buildings). The Base management will continue to work on identifying adaptive re-use options, and these are likely to be retained as existing visitor or overflow accommodation.
- In relation to the proposed adaptive reuse of the Edmondson Soldier's Club:
  - replacement of original/early doors which will be impacted are to be further detailed in consultation with the heritage consultant.
  - the original early walls proposed for removal are to be interpreted in the building fabric through the retention of nubs in the wall and accompanied by onsite interpretation.
  - the principles in the *Defence Technical Guide: Adaptive Reuse* (Department of Defence 2022) should be considered and integrated into the detailed design.
- In relation to the proposed demolition of parade shelters:
  - the Project will consult with the individuals and/or families of the individuals that the parade shelters are named in honour of, and

- develop specific mitigation measures based on the feedback received during consultation, which may include naming of sections of the new seating area after the individuals.
- In relation to Indigenous heritage:
  - All areas known to have Indigenous heritage values must be fenced during construction to prevent inadvertent damage.
  - As proposed during consultation with Indigenous stakeholders during the site inspections, an Indigenous stakeholder is to be engaged to undertake active monitoring during initial ground disturbance activities in the two areas shown as holding low and low to moderate archaeological potential.
- Policies 58, 59 and 60 in the HMP (Umwelt 2022) should be adhered to in the event of unforeseen discoveries.
- Following the completion of Project, the HMP should be reviewed and updated by Defence in accordance with Section 341X of the EPBC Act and *Working Together: Managing Commonwealth Heritage Places*<sup>12</sup>(Department of the Environment and Energy 2019: p.21).

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<sup>12</sup> <https://www.dcceew.gov.au/parks-heritage/heritage/publications/working-together-managing-commonwealth-heritage-places>

## 5. Ecologically sustainable development

### 5.1 How the proposed action meets the principles of ecologically sustainable development (s4.1)

The National Strategy for Ecologically Sustainable Development<sup>13</sup> (ESD) (Commonwealth of Australia 1992), endorsed by all Australian jurisdictions, defines the goal of ESD as: 'development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends'.

The following ESD principles are outlined in *Section 3A* of the EPBC Act:

- a) Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations (the 'integration principle').
- b) If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation (the 'precautionary principle').
- c) The principle of inter-generational equity – that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations (the 'intergenerational principle').
- d) The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making (the 'biodiversity principle').
- e) Improved valuation, pricing and incentive mechanisms should be promoted (the 'valuation principle').

In determining the ESD responses for the BBK Project, the Defence Smart Infrastructure Handbook was used to guide the proposed approaches to energy efficiency/ greenhouse gas emission reduction, potable water use reduction and improving indoor environmental quality. The Defence Smart Infrastructure Handbook sets performance benchmarks for various environmental parameters including:

- Climate Adaptation
- Energy Efficiency (passive design, building fabric, heating and cooling systems, lighting, appliances, metering, renewables, air tightness testing)
- Water Use (appliances, metering, water sources, water sensitive urban design)
- Waste Management (operations and construction waste management)
- Materials
- Internal Environment Quality (outside air, daylighting, avoidance of toxic materials)
- Pollution Prevention
- Transport

These benchmarks have informed the design, construction, and commissioning commitments for the proposed new Defence facilities and infrastructure.

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<sup>13</sup> <https://documents.parliament.qld.gov.au/TableOffice/TabledPapers/2016/5516T2036.pdf>

In consultation with key stakeholders, the following additional project-specific guiding principles have been established as key motivators and drivers of sustainability in addition to the standard resources, references and guides issued by Defence:

- Desire to elevate experience of recruits/cadets and assist with retention. Highlights importance of internal environment quality and amenity.
- Establish a legacy stemming from the large investment that continues to benefit local communities and economies.
- Strong "circular economy" approach to promote local demand for recycled content.
- Electrification of assets, including EV charger and Solar Photovoltaic (PV).
- Adopt ESD best practice from other sustainability rating tools such as Green Star, NABERS Energy & Water.

ESD requirements were identified from the initial brief and have been discussed and workshopped through each design phase in alignment with the above principles. The above process has culminated in the creation of a detailed and stand-alone sustainability specification for BBK outlining specific initiatives. The Project has also identified and quantified, where possible, sustainability outcomes against the Smart Infrastructure Handbook requirements.

Further details on how the BBK Project has addressed the ESD principles and the project-specific principles outlined above is provided in the following sections.

### **5.1.1 The integration principle**

Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations (the 'integration principle').

The climate of the BBK region has been taken into context as currently experienced and also as forecast under future RCP8.5<sup>14</sup> for 2040 and 2080 scenarios. While climate science is accepted as not giving absolutes or guaranteed outcomes, this conservative RCP8.5 scenario was selected and assessed over the life cycle of the infrastructure despite the uncertainties associated with this approach. Key risks have been identified by stakeholders and mitigated through relevant design interventions.

### **5.1.2 The precautionary principle**

If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation (the 'precautionary principle').

The Project seeks to identify, assess, and avoid, mitigate or manage any potential for serious or irreversible environmental damage. The robust ecological assessment undertaken provides the relevant information related to potential for impacts on flora and fauna. The contamination assessment undertaken so far, and the proposed management plans for different potential contaminants, combined with the CEMP, provide confidence that the Project is assessing, and will continue to assess the potential for contamination of land and groundwater resulting from the action or its operation.

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<sup>14</sup> Representative Concentration Pathway (RCP) is a greenhouse concentration trajectory used in climate modelling. RCP8.5 is generally taken as the worst case climate change scenario.



### **5.1.3 The intergenerational principle**

The principle of inter-generational equity – that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations (the ‘intergenerational principle’).

Care has been taken to minimise the resource consumption of the proposed infrastructure, buildings and services to be delivered under this Project, recognising the finite nature of many resources crucial to future generations’ ability to thrive but also integral to construction of infrastructure and built form. Waste will be diverted from landfill, consumption of fossil fuels has been minimised through selection of all-electric equipment for all new services and a focus on energy efficiency reduces the consumption of electricity and gas throughout the life of the buildings. Similarly, the ongoing health of future users has been safeguarded through elimination of toxic materials and ensuring access to quality views, sufficient daylight and fresh air.

### **5.1.4 The biodiversity principle**

The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making (the ‘biodiversity principle’).

This principle is assured by the thorough nature of the current and future environmental assessments for the Project. In particular, the avoidance of harm to TECs throughout the siting and the evolution of the design process, has been critical to the minimisation of harm to ecological values.

Construction works will avoid, mitigate and manage potential environmental impact through comprehensive EMPs, with key issues such as dust and noise suppression and waterway pollution addressed. Landscape design has prioritised native plant selections to increase the ecological value of proposed works.

### **5.1.5 The valuation principle**

Improved valuation, pricing and incentive mechanisms should be promoted (the ‘valuation principle’).

Careful consideration of cost and value has been a central and driving principle of the Project. Upfront costs have been balanced against ongoing savings via Whole of Life costing assessments, which were undertaken at 30% and 50% design phases. These considered air conditioning for the LIA, hot water systems, roof-mounted solar PV power generation and rainwater harvesting and re-use. These assessments allowed the full life cycle of costs to be documented and understood, including the use of natural resources and assets and the ultimate disposal of any waste.

Costs have also been coordinated with the Quantity Surveyor as well as through extensive workshops with relevant stakeholders to identify value beyond the simple economics of each proposed initiative in order to provide a more holistic assessment of valuation and pricing.

## **6. Economic and social matters**

### **6.1 Consultation activities**

#### **6.1.1 Details of any public consultation activities undertaken, and the outcomes**

Defence has developed a community consultation and communications strategy that recognises the importance of providing residents from the regional communities of Riverina, Murray and Hume (as well as other interested stakeholders) an opportunity to provide input into, or raise concerns relating to, the proposed works. These include:

- Open forum community information sessions (Wagga Wagga and Wodonga).
- Stormwater flooding information session targeting San Isidore residents, in conjunction with Wagga Wagga City Council.
- Letter drops, brochures and newspaper marketing to advertise information sessions and to summarise Program and Project information.
- Letters to key organisations (such as Local, State and Federal Members) to create Program awareness. Private briefings occurred with these stakeholders.
- Targeted consultation activities with local residents who are already known to the Base(s).

#### **6.1.2 Details of any consultation with Indigenous stakeholders**

Defence has consulted the following Indigenous stakeholder groups during the planning phase:

- Wagga Aboriginal Land Council
- Albury Wodonga Aboriginal Land Council
- Murray Riverina Alliance
- National Indigenous Australians Agency
- Aboriginal Employment Working Group
- Albury Wodonga Military Area Defence Cultural Working Group
- Wiradjuri Elders and members
- Duduroa Dhargal members
- Duduroa Elders
- Mawang Gaway Elders Advisory Group
- Wodonga TAFE Koori Liaison
- Albury TAFE Aboriginal Coordinator
- Wagga TAFE Aboriginal Coordinator
- Charles Sturt University, First Nations Success.

Defence has also coordinated site inspections with Indigenous leaders to identify the presence of Indigenous heritage artefacts and to seek feedback on the "Designing With Country" concepts.

## **6.2 Economic and social monitoring program**

No monitoring programs are proposed to monitor changes to economic and social characteristics potentially affected by the proposed action as the operation of the action does not materially change from Defence's current use of BBK (training of ADF soldiers).

## **6.3 Economic costs and benefits**

The RRP expenditure will support the Australian economy, in the construction and professional services sectors in the Riverina, Murray and Hume regional development areas and surrounding regions. The complete RRP – which includes the BBK Redevelopment Project, the RBW Redevelopment Project and the AWMA Redevelopment Project – is estimated to contribute a capital investment of approximately \$1.7b to the Riverina, Murray and Hume regional development areas and surrounding regions. Due to the influx of workers required to complete the RRP, there is a secondary economic benefit to local businesses in the regions.

## **6.4 Community employment and wider benefits**

### **6.4.1 Employment opportunities expected to be generated by the Project at each phase of the proposed action.**

The RRP will generate multiple employment opportunities across each phase of the proposed action. The RRP will directly engage/employ a diverse range of consultants, contractors, and construction workers over the approximate nine-year construction program. Additionally, the RRP is expected to generate major opportunities for education, up-skilling and job training, allowing individuals to improve their technical skills and knowledge increasing their employability on future projects. The Managing Contractor has signed Memorandums of Understanding with Charles Sturt University and TAFE Colleges in Albury, Wodonga and Wagga to increase the number of courses related to construction.

### **6.4.2 Benefits to the local and wider community as a result of the proposed action.**

The duration of the RRP will provide additional career pathways to local residents in the Riverina, Murray and Hume regional development areas and surrounding regions. Students currently in high school will have opportunities to further their careers locally, either through university education resulting in formal qualifications allowing them to enter the workforce pre- and post-graduation, trades apprenticeships that lead to employment with local businesses, or initial entry-level employment opportunities once construction has been completed, to service the ongoing operations on the Base.

Defence, through their Managing Contractor, is heavily reliant on local businesses embracing opportunities to supply construction workforce expertise and materials to mitigate market risks to successful cost-effective delivery. Defence, through the Managing Contractor, has, since 2021, actively promoted opportunities for small to medium local enterprises through its Regional Development Team and approach to construction trade and building packages. The same team has had carriage of developing opportunities for Indigenous business involvement in accordance with the Indigenous Procurement Policy and forms an important part of generating the required capacity for the works. The Managing Contractor's Regional Development Team approach their response to mandatory compliance with the Government's Local Industry Capability and Indigenous Procurement participation policies. The Managing Contractor has provided detailed commitments that will become contract deliverables in delivery and shall be required to report on their performance against them. While the policy does not mandate local suppliers, there are opportunities to engage local industry on the supply chain side where this is cost effective.

## 7. Environmental history of the person proposing to take the action

### 7.1 Person proposing to take the action

Person proposing to take the action organisation details	
ABN/can	68706814312
Organisation name	Department of Defence
Organisation address	Brindabella Business Park, 2 Brindabella Cct, Canberra Airport, ACT, 2609.
Person proposing to take the action contact	
Name	Dan Palmer
Job title	LTCOL
Phone	+61 0403 757 632
Email	daniel.palmer2@defence.gov.au
Address	26 Brindabella Circuit, Canberra Airport, Australian Capital Territory 2609

### 7.2 Defence's environmental policy and planning framework

Defence mandates the implementation of standard procedures, policies and doctrines (Standard Operating Procedures - SOPs), across all Defence project sites and operations. Key documents include, but are not limited to:

- Defence Environmental Policy 2016 (**Appendix F**)
- Defence Environmental Strategy 2016-2036 (<https://www.defence.gov.au/about/strategic-planning/defence-environmental-strategy-2016-2036>).
- The Defence Environment and Heritage Manual (2019) (<https://www.defence.gov.au/business-industry/industry-governance/industry-regulations/environment-and-heritage-manual>).
- The Defence Landscape Management Manual ([https://www.defence.gov.au/sites/default/files/2023-06/landscape\\_management\\_manual.pdf](https://www.defence.gov.au/sites/default/files/2023-06/landscape_management_manual.pdf)).

#### 7.2.1 Defence Environmental Policy

The Secretary for Defence and the Chief of the Defence Force have endorsed the Defence Environmental Policy (2016) which demonstrates Defence's commitment to environmental management. The policy supports Defence's Environmental Vision, which states "Defence would be a leader in sustainable environmental management to support the Australian Defence Force's capability to defend Australia and its national interests".

The Defence Environmental Vision is underpinned by four pillars:

- **Compliance:** Defence complies with its legislative and regulatory obligations regardless of where it operates and complies with the spirit and intent of state and territory environmental management legislation where it does not conflict with Commonwealth legislation.
- **Efficiency:** Defence applies efficient and innovative environmental resource management in the delivery of Defence capability and environmental outcomes.
- **Trust:** Defence conducts its activities in an environmentally responsible manner that enhances its reputation and fosters the confidence of the community, industry and regulators.
- **Accountability:** Defence takes ownership of, and responsibility for, environmental outcomes when performing its activities.

The Defence Environmental Policy defines goals and commitments under five strategic aims:

- **Strategic aim 1** - Defence would deliver a sustainable estate across Defence maritime, land and aerospace areas, activities and operations.
- **Strategic aim 2** - Defence would understand and manage its environmental impacts.
- **Strategic aim 3** - Defence would minimise future pollution risks and manage existing contamination risks.
- **Strategic aim 4** - Defence would improve the efficiency of its resources consumption and strengthen resource security.
- **Strategic aim 5** - Defence would recognise and manage the Defence estate heritage values.

## 7.2.2 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 is focused on five strategic environment related aims.

## 7.2.3 Defence Environment and Heritage Manual

Defence uses a comprehensive Environmental Impact Assessment (EIA) process to understand and manage the impacts of its activities and projects on environment and heritage values. The specific requirements of the EIA process for each activity or project varies depending upon the degree of predicted, actual and perceived environmental risk. Where it is identified that some activity, work or new equipment may pose a real risk of potentially significant environmental impacts, Defence requires that assessments are undertaken in accordance with requirements of the EPBC Act.

Regardless of the process used, environmental issues identified are then managed to mitigate the potential for adverse impacts to occur. Of particular relevance in this document is Chapter 3 (Heritage management) and Chapter 5 (Native Species and Ecological Communities).

## 7.2.4 Defence Landscape Management Manual

The Defence Landscape Management Manual provides policy implementation direction and minimum requirements for undertaking certain land management activities in line with Defence's legislative obligations and stewardship goals. The Defence Landscape Management Manual applies to all Defence personnel, contractors, consultants or outsourced service providers (through the terms of their contract) undertaking work on behalf of Defence across all Defence properties. The Defence Landscape Management Manual provides specific instructions and reference to guidance materials to support the implementation of the Defence Environment and Heritage Manual, specifically in relation to domestic biosecurity, native species and

ecological communities, soil management and bushfire management. Of particular relevance in this document is Chapter 5 (Threatened Species and Ecological Communities) and Chapter 7 (Native Vegetation).

### 7.2.5 Other Defence policies and guidelines

- Defence Estate Heritage Strategy (<https://www.defence.gov.au/about/strategic-planning/defence-estate-heritage-strategy>)
- Defence PFAS Construction and Maintenance Framework (<https://www.defence.gov.au/business-industry/industry-governance/industry-regulations/defence-pfas-construction-and-maintenance-framework>)
- Defence Contamination Management Manual (<https://www.defence.gov.au/business-industry/industry-governance/industry-regulations/defence-contamination-management-manual>)
  - Annex B – Investigations, Remediation and Management
  - Annex C – Planning to Minimise and Manage Stockpiling
  - Annex J – Infrastructure Demolition
  - Annex K – Management of PFAS Contamination
- Defence Security & Estate Group Asbestos Management Plan (AMP) ([Defence Estate Asbestos Management Plan | Defence](#))
- Defence Pollution Prevention Manual (<https://www.defence.gov.au/business-industry/industry-governance/industry-regulations/pollution-prevention-management-manual>)
- Defence Building Works Manual Edition 1 Amendment 4 (2020) (<https://www.defence.gov.au/business-industry/industry-governance/industry-regulations/building-works-manual>)
- Defence Environmental Management System (*internal Defence document, not for publication*).
- Guidance on the Preparation of an Environmental Report (V3) (August 2020) (*internal Defence document, not for publication*).

## 7.3 Defence's history on environmental matters

As trusted custodians and stewards of over three million hectares of Commonwealth land embracing five World Heritage Areas, Defence has an excellent history of responsible environmental management. Defence is the largest Commonwealth landholder and one of the largest overall landholders in Australia. It is geographically dispersed and complex, comprising a wide variety of facilities of differing ages, uses and condition. The Defence estate consists of around 700 owned and leased properties, comprises 25,000 buildings and 6,000 other structural assets, as well as some 150,000 items of fixed plant and equipment. Defence is committed to maintaining the trust of the Australian community and environmental regulators by ensuring the estate is managed for the long-term sustainable environment and heritage protection across it, whilst also supporting Australian Defence Force capability to defend Australia and its national interests. This commitment was reaffirmed by the Defence Secretary and the Chief of Defence Force on the release of the Defence Environmental Policy 2016 and Strategy2016-2036.

Defence has a long history of environmental compliance with the EPBC Act. Defence has submitted 50 Part 7 referrals for consideration under the EPBC Act since the Act commenced in 2000. Thirty-three of these referrals were made during the first five years of operation of the Act when limited information was available to guide proponents on whether potential environmental impacts were likely to trigger assessment and approval under the EPBC Act.

Since the publication of the EPBC Act Significant Impact Guidelines 1.1 and Significant Impact Guidelines 1.2 in 2006, Defence has made 16 referrals, with four in the past five years.

Defence is currently managing the compliance for nine active EPBC Act approvals that were determined controlled actions. Defence has recorded one formal non-compliance with EPBC Act approval conditions for the Defence Training Facilities at Greenbank Training Area (EPBC 2011/5896), which has been resolved.

Defence has a proven track record of successfully protecting and competently managing the very broad range of MNES and whole of environment that occur across its vast estate.

Referrals by Defence since 2010 include:

- 2023/09649 – *Blamey Barracks Kapooka Redevelopment Project (this Referral)*.
- 2023/9496 – Greenvale Training Area Initial Works
- 2023/9595 – Greenvale Training Area Main Works
- 2019/8514 – Point Cook Road, Point Cook/Victoria/Demolition of structures at RAAF Williams - Point Cook
- 2014/7324 – RAAF Base Williamstown/NSW/Removal of heritage buildings from RAAF Base, Williamstown, NSW
- 2014/7123 – RAAF Base Amberley, Sthrn Amberley Road, Amberley/QLD/Removal of heritage buildings at RAAF Base
- 2012/6462 – Holsworthy/NSW/Moorebank Units Relocation Project, Holsworthy Training Area, NSW
- 2012/6430 – Fleet Base East, Garden Island/NSW/Garden Island Hammerhead Crane Proposed Removal, NSW
- 2012/6376 – Port Phillip Bay/VIC/Point Wilson Explosives Area Waterside Infrastructure Remediation
- 2011/6039 – Department of Defence/Commonwealth/Gallipoli Barracks, Enoggera/QLD/Demolition of four buildings
- 2011/5896 – Greenbank 20 km SSW of Brisbane & 17 km E of Ipswich/Queensland/Defence Training Facilities at the Greenbank Training Area
- 2010/5747 – RAAF Base Tindal, Williamstown and Salt Ash Air Weapons Range/New South Wales/Flying operations of the F-35 Joint Strike Fighter
- 2010/5316 – South of the Eyre Highway/SA/Expansion of the Cultana Training Area
- 2008/4410 – RAAF Base Amberley, Southern Amberley Rd, west of Ipswich/QLD/Australian Super Hornet Flying Operations at RAAF Base Amberley
- 2008/4251 – Williams Road RAAF Williams Point Cook/VIC/Removal

## **8. Outcomes based conditions (s7)**

The Project does not wish to pursue outcomes-based conditions.



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## **Appendix A. DCCEEW letter documenting request for further information for Preliminary Documentation**



EPBC ref: 2023/09649

Lieutenant Colonel Daniel Palmer  
Project Director  
Riverina Redevelopment Program  
West and South Directorate  
Capital Facilities and Infrastructure Branch  
Security and Estate Group  
Department of Defence

**Further information required for preliminary documentation Blamey Barracks Kapooka Redevelopment Project**

Dear Lt Col Palmer

I am writing to you about your proposal to redevelop defence barracks, including upgrades to existing facilities, construction of new facilities and ancillary infrastructure, involving vegetation clearing and earthworks at Blamey Barracks, Kapooka military base near Wagga Wagga, NSW.

On 21 December 2023, a delegate of the Minister for the Environment and Water decided that the proposed action is a controlled action and that it will be assessed by preliminary documentation. Further information was required to assess the relevant impacts of the proposed action.

I now request, under s95A(2) of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), further information as outlined in the attached.

Details on the assessment process for the project and the responsibilities of the proponent are set out in the [EPBC Act — Environment Assessment process](#) fact sheet. Further information on the [referral and assessment process](#) can be found on the department's website.

If you have any questions about the referral process or this decision, please contact the project manager, Rebecca Reid, by email to [rebecca.reid@dcceew.gov.au](mailto:rebecca.reid@dcceew.gov.au) and quote the EPBC reference number shown at the beginning of this letter.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'M. Paull'.

Martin Paull  
Director, Southern NSW Assessments  
Environment Assessments NSW and ACT  
19 January 2024



## Preliminary documentation requirements

Preliminary documentation includes the information about the action and its relevant impacts already outlined in the referral. It also includes additional information identified by the Minister as being necessary to adequately assess the acceptability of the proposed action.

This document sets out the general and specified information required by the Minister under section 95A of the EPBC Act for the assessment of the impacts of your proposed action ('the preliminary documentation').

Importantly, **the preliminary documentation MUST be able to be read as a stand-alone document** and must include summaries of all relevant information, without the need to search for supplementary reports. While some of this information may be similar or the same as what was provided in the referral, it must be presented in the preliminary documentation so that the Minister and members of the public may gain a clear understanding of the proposed action without referring to other documents.

See **Appendix A** for content, format and style requirements.

**It is important that you read this document carefully and make sure that you understand the requirements.** If you have not followed the guidance in this document, additional information may continue to be requested until determined adequate for assessment. Please contact the project manager, Rebecca Reid, at [rebecca.reid@dcceew.gov.au](mailto:rebecca.reid@dcceew.gov.au) as early as possible if you have any questions or concerns.

### 1 Description of the proposed action

The preliminary documentation must provide a detailed description of the proposed action.

Information required	
1.1	A summary of all components of the action.
1.2	Descriptions of the preconstruction, construction, and operational phases of the proposed action.
1.3	The anticipated timing and duration (start and completion dates) of each component or phase.
1.4	Descriptions of any proposed clearing, earthworks and construction activities or other elements proposed to be taken within the construction footprint. This is particularly relevant for the department's assessment of potential chemical mobilisation.

1.5	An up-to-date area of direct impact in hectares, including the weapons range area. The department notes that there was a discrepancy between the area of impact quoted in the referral, and the area of impact calculated from spatial file provided to the department.
1.6	Quantification of the amount of native vegetation that will be impacted. Please also quantify the area of vegetation that will be impacted in the weapons range area (noting that the department is aware that this vegetation is not likely to constitute a TEC, as per the referral documentation). A quantified area of vegetation to be cleared for the new weapons range was not included in the referral.
1.7	A map clearly delineating the construction/clearing footprint boundary, and any wider boundaries where relevant, including the finalised weapons range area plan. Please include a key with proposed building names if specific buildings are referred to within the text.
1.8	A description of how the action relates to any other action that is being or will be taken in the Kapooka area. Please include short discussion of the Riverina Redevelopment Program, including anticipated impacts from the other project components.

## **2 Controlling provision: Listed threatened species and communities (s18 & 18A)**

The department considered the species and communities identified using the Protected Matters Search Tool (PMST) during the referral stage. The department determined that the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community was the only protected matter under this controlling provision likely to be significantly impacted. **You may wish to include a statement to this effect** in the preliminary documentation so that the public and the Minister have a clear understanding for the focus on this threatened ecological community.

### **2.1 White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland**

#### *Background and justification for referral decision*

The referral states that the proposed action will require clearing of 1.39 ha of **White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland** ecological community (BGW; critically endangered), and that indirect impacts may also affect 1.17 ha of retained areas of BGW.

The department has completed an assessment against the [EPBC Act Policy Statement – Significant Impact Guidelines 1.1 – Matters of National Environmental Significance](#) and considers that the proposed action is likely to have a significant impact on the critically endangered **White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland** ecological community (BGW), as there is a real chance or possibility that it will reduce the extent of the TEC, fragment the TEC, and adversely affect habitat critical to the survival of the TEC:

- While the department acknowledges that the area of BGW to be cleared exists in a modified condition, this does not lessen the significance of the clearing of 1.39 ha, as most remaining patches of BGW exist in a modified or highly modified condition. The [Conservation Advice for](#)

[the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland](#) (BGW Conservation Advice) notes that at the time of listing in 2006, the community had already suffered an estimated 92% reduction of its original extent, with the remaining extent being highly fragmented, occurring in small, isolated patches within a cleared environment, or within a landscape of other disturbed woodlands. While the referral notes that there are large areas of BWG within the Blamey Barracks Kapooka (BBK) area, the referral does not state that these areas are protected.

- The department considers it is probable the condition of the areas of BGW that will be fragmented (i.e., become isolated on the southern side of the proposed ring road) will decline in condition, being more susceptible to weed ingress, trampling, and removal of woody debris, to the extent that they may no longer meet the diagnostic criteria and condition thresholds of EBPC Act listed BGW. This would result in the loss of more than 1.39 ha of BGW.
- The [National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland](#) (BGW Recovery Plan) states that given the currently highly fragmented and degraded state of this ecological community, all areas of BGW which meet the minimum condition criteria should be considered critical to the survival of this ecological community.

The department requests the preliminary documentation contain the following in relation to BGW.

*Characterisation of BGW within and surrounding proposed action area*

<b>Information required</b>	
2.1.1	A description of the BGW within and adjacent the proposed action area, and a description of how the vegetation meets the Commonwealth BGW listing criteria as per the BGW Conservation Advice and BGW Recovery Plan.
2.1.2	Provide detail on the surveys undertaken to characterise BGW for the proposed action, including: <ul style="list-style-type: none"> <li>• Survey timing and effort</li> <li>• Methodology (e.g., in accordance with the NSW Biodiversity Assessment Method, or other recognised survey method)</li> <li>• Number of vegetation plots undertaken</li> </ul>
2.1.3	Identification of the condition class(es) of the patch(es) of BGW within and adjacent the proposed action area, as per section 2.3 (p.18) of the BGW Conservation Advice. If multiple condition classes are present, provide detail (and maps, see below). The BGW Conservation Advice provides information on why condition classes are relevant for environmental management decision-making, and describes condition of patches that can have high ecological value.
2.1.4	Provide detailed <b>mapping</b> of BGW, including: <ul style="list-style-type: none"> <li>• Detailed mapping undertaken for the proposed action, including an overlay of the project disturbance footprint (as provided in the referral);</li> </ul>

	<ul style="list-style-type: none"> <li>• Delineation of different condition classes of BGW (if multiple present);</li> <li>• Delineation of the areas to be indirectly impacted;</li> <li>• Location of vegetation plots undertaken;</li> <li>• Other BGW mapping previously undertaken by the Department of Defence for the Blamey Barracks Kapooka area.</li> </ul>
2.1.5	Attach all relevant ecological surveys referenced in the referral and preliminary documentation as supporting documents, including <b>vegetation plot survey data</b> .

*Impact assessment*

As discussed above, the referral states that the proposed action will require clearing of 1.39 ha of BGW, and that indirect impacts may also affect 1.17 ha of retained areas of BGW.

<b>Information required</b>	
2.1.6	Quantification of the area of BWG to be: <ul style="list-style-type: none"> <li>• Directly impacted.</li> <li>• Indirectly impacted. Please include information about how the area of BGW to be indirectly impacted was quantified (i.e., how the 1.17 ha figure of indirect impacts was calculated – is it the area that will be fragmented, or a buffer of X meters from the proposed action area, etc.).</li> </ul>
2.1.7	An assessment of the likely impacts associated with project specific impacts i.e., vegetation clearance, construction, operation, and maintenance. Focus should be on threats known to impact BGW, as listed in the BGW Recovery Plan and BGW Conservation Advice.
2.1.8	An assessment of the impacts of habitat fragmentation in the proposed action area and surrounding areas.
2.1.9	An assessment of the likely duration of impacts to BGW as a result of the proposed action, and whether impacts are likely to be repeated, for example as part of maintenance for asset protection zones.
2.1.10	A discussion of whether any impacts are likely to be unknown, unpredictable or irreversible.



2.1.11	Justification, with supporting evidence, how the proposed action will not be inconsistent with: <ul style="list-style-type: none"><li>• Australia’s obligations under the Biodiversity Convention, the Convention on Conservation of Nature in the South Pacific (Apia Convention), and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); and</li><li>• <a href="#">National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland</a></li><li>• <a href="#">Threat abatement plan for disease in natural ecosystems caused by <i>Phytophthora cinnamomi</i></a><sup>1</sup></li></ul>
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*Avoidance, mitigation & management*

Avoidance and mitigation measures are the primary methods of eliminating and reducing significant impacts on MNES. Where possible and practicable, it is best to avoid impacts. If impacts cannot be avoided, then they should be minimised or mitigated as much as possible. Avoidance and mitigation measures must be investigated thoroughly as a part of the assessment and be supported by evidence to demonstrate likely success.

Management commitments by the person proposing to take the action must be clearly distinguished from recommendations or statements of best practice made by the document author or other technical expert.

The SPRAT Database, and associated statutory documents, may provide relevant mitigation measures for listed threatened species and ecological communities and listed migratory species.

The department acknowledges that the referral describes how the avoid, minimise, mitigate hierarchy has been applied to the proposed action, resulting in a reduction in direct impacts to 16 ha of TECs, down to the 2.56 ha of direct/indirect impacts in the current proposed action, which is a positive outcome.

The department notes the referral includes details of the proposed mitigation and management measures to be implemented during the construction, operation and maintenance stages of the

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<sup>1</sup> Note there are two other Threat Abatement Plans for BGW:

- [Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads;](#) and
- [Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs](#)

However the department does not consider that these threat abatement plans are likely to be relevant for BGW in this instance.

proposed action. The referral also states that the following relevant management plans will be developed prior to the commencement of the proposed action:

- Construction Environmental Management Plan
- Biodiversity Management Plan

<b>Information required</b>	
2.1.12	Provide an overview of implemented avoidance measures, and proposed mitigation and management measures, and provide detail on how proposed mitigation and management measures align with those in the BGW Recovery Plan and BGW Conservation Advice.
2.1.13	Provide details of specific and measurable environmental outcomes to be achieved for BGW. All commitments must be drafted using committal language (e.g. 'will' and 'must') when describing the proposed measures.
2.1.14	Provide details of any avoidance and mitigation measures that will be addressed in either the Construction Environmental Management Plan or the Biodiversity Management Plan.

*Offsets*

Significant residual impacts are - impacts to a threatened species or community that remain after any avoidance and mitigation measures have been considered. Environmental offsets are measures that compensate for the residual significant impacts of an action on the environment. Offsets provide environmental benefits to counterbalance the impacts that remain after consideration of avoidance and mitigation measures. It is important to consider environmental offsets early in the assessment process. Correspondence with the department regarding offsetting is highly encouraged.

Significant residual impacts must be offset in accordance with the department's *EPBC Act Environmental Offsets Policy 2012*<sup>2</sup> and Offsets assessment guide (OAG)<sup>3</sup>, or other endorsed offset framework (for example, the NSW Biodiversity Offset Scheme).

While offsets do not need to be secured before the decision on whether to approve the proposed action, should the proposed action be approved, conditions of an approval are likely to require that offsets are secured, and management measures are in place, before commencement of the proposed action.

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<sup>2</sup> Department of Sustainability, Environment, Water, Population and Communities (2012). Environment Protection and Biodiversity Conservation Act 1999 *Environmental Offsets Policy*. Commonwealth of Australia, Canberra. [Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy \(dceew.gov.au\)](http://dceew.gov.au).

<sup>3</sup> The Offsets assessment guide is a tool developed for users in the department to assess the suitability of offset proposals, but is also available to proponents to assist with planning and estimating future offset requirements. [Offsets assessment guide - DCCEEW](#)

EPBC Act Environmental Offsets

If offsets are to be secured in accordance with the EPBC Act Environmental Offsets Policy, the preliminary documentation must demonstrate that the proposed Offset Strategy meets the criteria outlined below.

<b>Information required</b>	
The offset strategy detailed in the preliminary documentation must:	
2.1.14	Meet the principles specified in the EPBC Act Environmental Offsets Policy.
2.1.15	Directly contribute to the ongoing viability of the relevant protected matters to deliver an overall conservation outcome that improves or maintains the viability of the protected matter in the region, as compared to what is likely to have occurred under the status quo, i.e., if neither the action nor the offset had taken place.
2.1.16	Compensate for the impacts over the entire duration of the proposed action (should impacts be in perpetuity, the offsets must also be delivered in perpetuity).
2.1.17	The preliminary documentation must also provide and clearly justify the scores entered into the Offset assessment guide.
2.1.18	You may wish to consider the offset goals for BGW on page 36 of the BGW Conservation Advice.

Other endorsed offset frameworks

If using an endorsed framework, the report detailing the outcomes (including credit report) prepared in accordance with the state requirements must be submitted with the preliminary documentation.

The NSW Biodiversity Assessment Method (BAM) and Biodiversity Offset Scheme (BOS) have been endorsed by the Commonwealth. This means that offsetting outcomes achieved through the BAM will be accepted for the purposes of the EPBC Act, provided that they are 'like-for-like' in relation to listed threatened species and communities as defined for the purposes of the EPBC Act. Payment into the Biodiversity Conservation Fund is also considered acceptable. If you are proposing offsets developed using the BAM, you should append all relevant BAM documentation to your preliminary documentation; this would generally include a Biodiversity Development Assessment Report (BDAR).

### **3 Controlling provision: Commonwealth action (s28)**

#### **3.1 Impacts on the environment from chemical contaminants**

*Background and justification for referral decision*

The Southern NSW Assessments Section requested specialist advice from the Environmental Contamination Advice and Standards Section (ECASS) of the department to assist in forming a referral recommendation. ECASS’s review focused on the identification of contamination, the potential for mobilisation of contamination, determination of any contamination-related impacts, and how potential impacts associated with contamination will be managed during the construction stage of the project.

ECASS considered that there were information gaps in the referral documentation and additional documents provided, such that impacts on the environment and sufficiency of mitigation and management measures could not be fully assessed, including detail on the full scope of works, characterisation of contamination, and management plan content and detail.

ECASS advised that further information outlined below should be provided to adequately assess the significance of impacts to the environment from chemical contaminants.

*Characterisation of works*

The department requires a more comprehensive characterisation of the scope of works, outlined below.

<b>Information required</b>	
3.1.1	<p>The site should be adequately characterised to provide the foundation for appropriate assessment of health and environmental risks associated with the contamination, and to provide the basis for the development of appropriate remediation and/or management strategies, if not already characterised. Provide sufficient information regarding the proposed works so that the potential to encounter, remobilise, and/or redistribute contamination can be independently assessed, including but not limited to:</p> <ul style="list-style-type: none"> <li>• final design information</li> <li>• the location of proposed works</li> <li>• depths of excavations</li> <li>• whether any dewatering will be necessary</li> <li>• management of surface waters and construction waters</li> <li>• information about cut and fill activities (for example, locations of sources and destinations, quantities of materials, contamination status of material)</li> <li>• imported fill (volumes, sources, suitability for importation)</li> <li>• waste disposal</li> <li>• timeframes.</li> </ul>

*Impact assessment*

<b>Information required</b>	
3.1.2	<p>The site should be assessed in accordance with Commonwealth-endorsed guidelines including:</p> <ul style="list-style-type: none"> <li>• National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM)</li> <li>• PFAS NEMP 2.0 (HEPA 2020)</li> <li>• National Water Quality Management Strategy.</li> </ul>
3.1.3	<p>Further investigations will be required to address recommendations made in the Pre-construction Contamination Assessment report, and may require the assessment of other potentially impacted environmental compartments such as groundwater, sediments, and biota.</p>

3.1.4	Preparation of human health and environment risk assessments (HHERA) may also be required for issues such as residual contamination and the reuse of contaminated materials.
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*Avoidance, mitigation & management*

<b>Information required</b>	
3.1.5	<p>Prepare detailed management plans specific to the proposed action, including but not limited to:</p> <ul style="list-style-type: none"> <li>• construction environmental management plans (CEMP)</li> <li>• unexpected finds (UxF) protocol</li> <li>• remediation action plans (RAPs)</li> <li>• stockpile management plans</li> <li>• beneficial re-use (BRU) plans</li> <li>• imported fill assessment</li> <li>• off-site disposal of soil and/or groundwater</li> <li>• dewatering plans</li> <li>• management of surface water and construction waters</li> <li>• materials management plans</li> <li>• design versus as-built monitoring plans</li> <li>• dust control plans, and contingency plans, in addition to environmental risk assessments (ERAs) and contaminant management plans (CMPs) for the ongoing management of any residual contamination.</li> </ul>
3.1.6	<p>Provide detailed environmental monitoring plans specific to the proposed development, including but not limited to:</p> <ul style="list-style-type: none"> <li>• groundwater monitoring plans</li> <li>• surface water monitoring plans</li> <li>• asbestos air monitoring plans.</li> </ul>

**3.2 Impacts to heritage values**

*Background and justification for referral decision*

The Southern NSW Assessments Section requested specialist advice from the Cultural Heritage Section (CHS) of the department to assist in forming a referral recommendation. CHS reviewed all material in relation to potential impacts on the heritage values of the environment on Commonwealth Land, based on the heritage values identified in the referral.

CHS found that the proposed action to demolish 31 buildings will likely have an adverse impact on some of the historic heritage values that have been identified at this place. However, CHS considered that the overall heritage significance of Blamey Barracks Kapooka (BBK) can be maintained through the mitigation measures in the referral which ensure that the level of impact on the heritage values is minimised where possible.

The department concluded that it is critical to the historic and social value of the place that the training facility remains at BBK to maintain the function of the barracks, ensure sympathetic design

principles in the new buildings, and be interpreted appropriately to reflect BBK’s evolution and history. As such, the option of demolishing accommodation buildings to build more appropriate facilities, rather than moving the training facility to another location, is preferable.

The department therefore requests that the preliminary documentation contain a summary of the proposed action as it relates to heritage impacts, and the proposed mitigation measures.

*Characterisation of heritage values*

<b>Information required</b>	
3.2.1	<p>Provide a summary of the heritage values within and surrounding the proposed action area, including:</p> <ul style="list-style-type: none"> <li>• Built heritage</li> <li>• Intangible heritage</li> <li>• Indigenous heritage</li> <li>• Natural heritage</li> </ul>

*Impact assessment*

<b>Information required</b>	
3.2.2	<p>Provide a summary of the impacts to heritage values within and surrounding the proposed action area, including:</p> <ul style="list-style-type: none"> <li>• Built heritage</li> <li>• Intangible heritage</li> <li>• Indigenous heritage</li> <li>• Natural heritage</li> </ul>

*Management and mitigation measures*

CHS outlined a number of mitigation measures, which are a combination of mitigation measures proposed in the Heritage Impact Assessment, and recommendations from CHS.

<b>Information required</b>	
3.2.3	<p>The preliminary documentation should detail proposed mitigation measures, and how they align with the mitigation measures recommended by CHS below.</p> <p><b>Measures recommended by CHS:</b></p> <ul style="list-style-type: none"> <li>• Conduct full, professional, archival recording of the current site with particular emphasis on the buildings to be demolished considering their internal and external layout and function.</li> <li>• Retain and seek to adaptively re-use the remaining Blamey Barracks (1960s) era rectangular buildings as representations of this era at Kapooka.</li> <li>• The Heritage Interpretation Strategy found at Appendix J in the HMP should be considered, particularly consultation with the Australian Army History Unit on the implementation of any heritage interpretation.</li> <li>• Conduct an oral history project that includes:</li> </ul>

	<ul style="list-style-type: none"> <li>○ Audio and/or video interviews with graduates and staff from Kapooka. The participants should range across the decades of operation from the 1960s to the present.</li> <li>○ A report that summarises the main themes from the participants memories.</li> <li>○ The report and recordings should be made publicly accessible either on site or through an online archive.</li> <li>● Development and completion of the Kapooka Heritage Trail from the visitor carpark to the proposed Multi-Function Centre and Parade Ground</li> <li>● Interpretation of Kapooka’s history and heritage to be displayed through photographs, objects or signage in the following areas:             <ul style="list-style-type: none"> <li>○ Kapooka Heritage Trail</li> <li>○ Proposed recruit live in accommodation precinct</li> <li>○ Proposed multi-function centre</li> <li>○ Main Parade Ground</li> <li>○ Former Post Office.</li> </ul> </li> <li>● Consider how the architectural style and materiality of new buildings can be understood as an interpretative measure of the former buildings.</li> <li>● Consider reuse of materials, particularly the red bricks from the demolished buildings in landscaping.</li> <li>● The gun emplacements should be protected during construction. If the gun emplacements need to be moved, appropriate management measures are to be developed to protect and manage the move.</li> <li>● The new buildings to follow the following design principles:             <ul style="list-style-type: none"> <li>○ Large-scale buildings, arranged in a symmetrical ‘disciplined’ layout.</li> <li>○ Rectilinear forms, with an emphasis on rectangular footprints rather than winged.</li> <li>○ Buildings are visible in the round and set in grassed areas.</li> <li>○ Vertical architectural expressions of the window fenestration with no dominant horizontal expression, resulting in a solid, anchored building.</li> <li>○ Consideration should be given to whether the Fibre Cement Sheets that are proposed for the LIA redevelopment can be textured, or the size of the sheeting reduced to minimise the visual impact of large flat sheeting.</li> <li>○ LIA signage should be built in red brick as per concept designs.</li> </ul> </li> <li>● Regarding the proposed demolition of parade shelters:             <ul style="list-style-type: none"> <li>○ Consult with the individuals and/or families that the parade shelters are named in honour of.</li> <li>○ Based on this feedback, consider where naming could be used in new development.</li> </ul> </li> <li>● Regarding Indigenous heritage:             <ul style="list-style-type: none"> <li>○ All areas known to have Indigenous Heritage values must be fenced during construction to avoid inadvertent damage.</li> <li>○ Consultation is required with the Traditional Owners to determine the level of engagement they would like to have in actively monitoring the initial ground</li> </ul> </li> </ul>
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	<p>disturbance activities in the areas shown as holding low and low to moderate archaeological potential sites.</p> <ul style="list-style-type: none"> <li>• Policies 58,59 and 60 in the HMP should be adhered to in the event of unforeseen discoveries during construction.</li> </ul>
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## 4 Ecologically sustainable development

Information required	
4.1	<p>A description of how the proposed action meets the principles of <b>ecologically sustainable development</b> (as defined in section 3A of the EPBC Act), as follows:</p> <ul style="list-style-type: none"> <li>• decision making processes should effectively integrate both long term and short term economic, environmental, social and equitable considerations;</li> <li>• if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;</li> <li>• the principle of inter generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;</li> <li>• the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making;</li> <li>• improved valuation, pricing and incentive mechanisms should be promoted.</li> </ul>

## 5 Economic and social matters

The preliminary documentation must address the economic and social impacts (both positive and negative) of the proposed action. Consideration of economic and social matters may include the points listed below.

Information required	
5.1	Details of any public consultation activities undertaken, and the outcomes.
5.2	Details of any consultation with indigenous stakeholders.
5.3	Any monitoring programs to monitor ongoing changes to economic and social characteristics potentially affected by the proposed action.
5.4	Projected economic costs and benefits of the project, including the basis for their estimation through cost/benefit analysis or similar studies.
5.5	Employment opportunities expected to be generated by the project at each phase of the proposed action.
5.6	Benefits to the local and wider community as a result of the proposed action.

## 6 Environmental history of the person proposing to take the action



<b>Information required</b>	
The preliminary documentation must include details of any past or present proceedings under a Commonwealth, State or Territory law, for the protection of the environment, or the conservation and sustainable use of natural resources, against:	
6.1	the person proposing to take the action;
6.2	If the person proposing to take the action is a corporation—details of the corporation’s environmental policy and planning framework.
6.3	if the person is a corporation that is a subsidiary of another body or company (the parent body)—the history in relation to environmental matters of the parent body and its executive officers.

## 7 Outcomes-based conditions

Outcomes-based conditions can provide approval holders with greater flexibility and autonomy while still holding them accountable for achieving sound environmental outcomes. The department promotes the use of outcomes-based conditions where possible, in accordance with its Outcomes-based Conditions Policy 2016<sup>4</sup>.

However, outcomes-based conditions are generally only appropriate where the person proposing to take the action has a good environmental record and the baseline condition of a site is well understood and documented.

Please advise the assessment officer if you would like to pursue this approach. The table below provides a checklist for the information required if taking this approach.

<b>Information required</b>	
7.1	Thoroughly document the baseline condition of the relevant impacted matter(s).
7.2	Identify conservation objectives (outcomes) for the relevant impacted matters, preferably with reference to any applicable conservation advices, recovery plans and threat abatement plans.
7.3	Outline how performance against specified objectives will be measured and reported.

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<sup>4</sup> See Outcomes-based conditions policy and guidance: [Outcomes-based conditions policy and guidance - DCCEEW](#)



## APPENDIX A General content, format and style

The purpose of the preliminary documentation is to enable interested stakeholders and the Minister to understand the environmental consequences of the proposed development on protected matters, including matters of national environmental significance (MNES).

A1. Content requirements	
A1.1	Be a stand-alone document containing sufficient information to avoid the need to search out previous or supplementary reports.
A1.2	Enable interested stakeholders and the Minister to easily understand the consequences of the project on matters of national environmental significance (MNES).
A1.3	Be written so that any conclusions reached can be independently assessed. Include all key claims, findings, proposals and undertakings in the main document.
A1.4	Refer to all relevant standards, policies and other guidance material published by the department. Any instances where published guidance is not followed must be justified. Where no Commonwealth standards exist, state government and industry standards may be useful.
A1.5	Include the names, roles and qualifications (where relevant) of all persons involved in preparing the preliminary documentation.
A1.6	Include a copy of this request for information and a cross-reference table indicating where the information fulfilling this request is included in the preliminary documentation (e.g. Section 4.2.2 and Appendix A, Chapter 2.1).
A1.7	The preliminary documentation must state the following for all information provided: The source and date of the information; How the reliability of the information was tested; The uncertainties (if any) in the information; The guidelines, plans, and/or policies considered.
A2. Format and style requirements	
A2.1	Be in a suitable format to be published in hardcopy (A4 or A3 size, with maps and diagrams in A4 or A3 size and in colour) and published in electronic format (e.g. MSWord or PDF) on the internet.
A2.2	Include detailed technical information, studies or investigations necessary to support the information in the stand-alone document as appendices.
A2.3	Be objective, clear, succinct, avoid technical jargon and, where appropriate, be supported by maps, plans, diagrams, data or other descriptive detail.

A2.4	Reference all sources using the Harvard standard of referencing. Ensure that other supporting documents (e.g. academic studies, regulatory standards) are publicly accessible, with electronic links provided where possible.
A2.5	Redact the contact details of departmental officers.
A2.6	Not contain any commercial in confidence markings. If the preliminary documentation contains sensitive information, please discuss this with the assessment officer.
A3. Ecological data provision	
A3.1	The preliminary documentation must include an appendix of occurrence records (both sightings and evidence of presence) for all listed threatened and migratory species identified during field surveys for the proposed action. This data may be used by the department to update the relevant species distribution models that underpin the publicly available Protected Matters Search Tool (PMST).
A3.2	The species occurrence records must be provided in accordance with the department's <a href="#">Guidelines for biological survey and mapped data (2018)</a> using the species observation data template provided with this request for additional information. Sensitive ecological data must be identified and treated in accordance with the department's <a href="#">Sensitive Ecological Data – Access and Management Policy V1.0 (2016)</a> or subsequent revision.

## **APPENDIX B Assessing patches of an ecological community**

A patch is a discrete and mostly continuous area of an ecological community (or species habitat). It can include small-scale variations, gaps and disturbances, such as tracks, paths or breaks (including exposed soil, leaf litter, cryptogams and watercourses/ drainage lines), or localised changes in vegetation that do not significantly alter the overall functionality of the ecological community. Permanent man-made structures, such as roads and buildings, are typically excluded from a patch.

The Key Diagnostic Characteristics for each community are the primary definition of what the ecological community is (how to identify it). National listing focuses legal protection on the remaining patches of an ecological community that are most functional, relatively natural and in relatively good condition. Patches/occurrences that do not meet minimum condition thresholds (for example, very degraded or modified) can be excluded from national protection.

A condition class describes a range of conditions that are thought to be of similar ecological value; i.e. a range of conditions that meet or exceed a particular condition threshold. A condition class may also contain different condition categories and thresholds, where different variables are used to indicate the same condition class. Patches that do not meet minimum condition thresholds may still be considered critical, as a buffer, to protect patches that do meet minimum condition thresholds. The importance of such patches requires assessment on a case-by-case basis.

## Appendix B. Cross Reference table of information required by DCCEEW

In accordance with DCCEEW RFI **Appendix A**, the following table is supplied relating to cross referencing of information required by DCCEEW with its location in this PIDR.

RFI Reference number	RFI description	Location in PIDR (Section)
<b>1</b>	<b>Description of the Proposed Action</b>	<b>Section 2</b>
<b>1.1</b>	A summary of all components of the action.	2.1
<b>1.2</b>	Descriptions of the preconstruction, construction, and operational phases of the proposed action.	2.3.1, 2.3.2, and 2.3.3
<b>1.3</b>	The anticipated timing and duration (start and completion dates) of each component or phase.	2.4
<b>1.4</b>	Descriptions of any proposed clearing, earthworks and construction activities or other elements proposed to be taken within the construction footprint. This is particularly relevant for the department's assessment of potential chemical mobilisation.	2.3 and 2.3.2 Figures 2-2 and 2-3
<b>1.5</b>	An up-to-date area of direct impact in hectares, including the weapons range area. The department notes that there was a discrepancy between the area of impact quoted in the referral, and the area of impact calculated from spatial file provided to the department.	2.3.2 Figure 2-5
<b>1.6</b>	Quantification of the amount of native vegetation that will be impacted. Please also quantify the area of vegetation that will be impacted in the weapons range area (noting that the department is aware that this vegetation is not likely to constitute a TEC, as per the referral documentation). A quantified area of vegetation to be cleared for the new weapons range was not included in the referral.	2.3.2.1, 3.5.1 Figures 2-4 and 2-5

RFI Reference number	RFI description	Location in PIDR (Section)
1.7	A map clearly delineating the construction/clearing footprint boundary, and any wider boundaries where relevant, including the finalised weapons range area plan. Please include a key with proposed building names if specific buildings are referred to within the text.	Figures 2-2 and 2-3 and 2-4
1.8	A description of how the action relates to any other action that is being or will be taken in the Kapooka area. Please include short discussion of the Riverina Redevelopment Program, including anticipated impacts from the other project components.	2.5
2	<b>Controlling provision: Listed threatened species and communities (s18 &amp; 18A)</b>	<b>Section 3</b>
2.1	"White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (BGW)"	Section 3
2.1.1	A description of the BGW within and adjacent the proposed action area, and a description of how the vegetation meets the Commonwealth BGW listing criteria as per the BGW Conservation Advice and BGW Recovery Plan.	3.2 and 3.2.1
2.1.2	Provide detail on the surveys undertaken to characterise BGW for the proposed action, including: <ul style="list-style-type: none"> <li>▪ Survey timing and effort</li> <li>▪ Methodology (e.g., in accordance with the NSW Biodiversity Assessment Method, or other recognised survey method)</li> <li>▪ Number of vegetation plots undertaken</li> </ul>	3.3
2.1.3	Identification of the condition class(es) of the patch(es) of BGW within and adjacent the proposed action area, as per section 2.3 (p.18) of the BGW Conservation Advice. If multiple condition classes are present, provide detail (and maps, see below). The BGW Conservation Advice provides information on why condition classes are relevant for environmental management decision-making, and describes condition of patches that can have high ecological value.	3.4

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RFI Reference number	RFI description	Location in PIDR (Section)
2.1.4	<p>Provide detailed mapping of BGW, including:</p> <ul style="list-style-type: none"> <li>▪ Detailed mapping undertaken for the proposed action, including an overlay of the project disturbance footprint (as provided in the referral);</li> <li>▪ Delineation of different condition classes of BGW (if multiple present);</li> <li>▪ Delineation of the areas to be indirectly impacted;</li> <li>▪ Location of vegetation plots undertaken;</li> <li>▪ Other BGW mapping previously undertaken by the Department of Defence for the Blamey Barracks Kapooka area.</li> </ul>	<p>Figure 3-1 Figure 3-2 Figure 3-3</p>
2.1.5	<p>Attach all relevant ecological surveys referenced in the referral and preliminary documentation as supporting documents, including vegetation plot survey data.</p>	<p>Biodiversity Assessment Report (<b>Appendix E</b> to the PIDR) (provided in <i>Appendix C of the Biodiversity Assessment Report</i>).</p>
2.1.6	<p>Quantification of the area of BWG to be:</p> <ul style="list-style-type: none"> <li>▪ Directly impacted.</li> <li>▪ Indirectly impacted. Please include information about how the area of BGW to be indirectly impacted was quantified (i.e., how the 1.17 ha figure of indirect impacts was calculated – is it the area that will be fragmented, or a buffer of X meters from the proposed action area, etc.).</li> </ul>	<p>3.5 and 3.5.3</p>
2.1.7	<p>An assessment of the likely impacts associated with project specific impacts i.e., vegetation clearance, construction, operation, and maintenance. Focus should be on threats known to impact BGW, as listed in the BGW Recovery Plan and BGW Conservation Advice.</p>	<p>3.5.2</p>
2.1.8	<p>An assessment of the impacts of habitat fragmentation in the proposed action area and surrounding areas.</p>	<p>3.5.3</p>

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RFI Reference number	RFI description	Location in PIDR (Section)
2.1.9	An assessment of the likely duration of impacts to BGW as a result of the proposed action, and whether impacts are likely to be repeated, for example as part of maintenance for asset protection zones.	3.5.4
2.1.10	A discussion of whether any impacts are likely to be unknown, unpredictable or irreversible.	3.5.5
2.1.11	Justification, with supporting evidence, how the proposed action will not be inconsistent with: <ul style="list-style-type: none"> <li>▪ Australia’s obligations under the Biodiversity Convention, the Convention on Conservation of Nature in the South Pacific (Apia Convention), and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); and</li> <li>▪ National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland</li> <li>▪ Threat abatement plan for disease in natural ecosystems caused by <i>Phytophthora cinnamomi</i>.</li> </ul>	3.5.6
2.1.12	Provide an overview of implemented avoidance measures, and proposed mitigation and management measures, and provide detail on how proposed mitigation and management measures align with those in the BGW Recovery Plan and BGW Conservation Advice.	3.6.1 and 3.6.2
2.1.13	Provide details of specific and measurable environmental outcomes to be achieved for BGW. All commitments must be drafted using committal language (e.g. 'will' and 'must') when describing the proposed measures	3.6.3
2.1.14	Provide details of any avoidance and mitigation measures that will be addressed in either the Construction Environmental Management Plan or the Biodiversity Management Plan.	3.6.3
2.1.14	Meet the principles specified in the EPBC Act Environmental Offsets Policy.	3.7.1



RFI Reference number	RFI description	Location in PIDR (Section)
2.1.15	Directly contribute to the ongoing viability of the relevant protected matters to deliver an overall conservation outcome that improves or maintains the viability of the protected matter in the region, as compared to what is likely to have occurred under the status quo, i.e., if neither the action nor the offset had taken place.	3.7.1
2.1.16	Compensate for the impacts over the entire duration of the proposed action (should impacts be in perpetuity, the offsets must also be delivered in perpetuity).	3.7.1
2.1.17	The preliminary documentation must also provide and clearly justify scores entered into the Offset assessment guide.	3.7.1
2.1.18	You may wish to consider the offset goals for BGW on page 36 of the BGW Conservation Advice.	3.7.2
3	<b>Controlling provision: Commonwealth action (s28)</b>	<b>Section 4</b>
3.1	Impacts on the environment from chemical contaminants	Section 4.1

RFI Reference number	RFI description	Location in PIDR (Section)
3.1.1	<p>The site should be adequately characterised to provide the foundation for appropriate assessment of health and environmental risks associated with the contamination, and to provide the basis for the development of appropriate remediation and/or management strategies, if not already characterised. Provide sufficient information regarding the proposed works so that the potential to encounter, remobilise, and/or redistribute contamination can be independently assessed, including but not limited to:</p> <ul style="list-style-type: none"> <li>▪ final design information</li> <li>▪ the location of proposed works</li> <li>▪ depths of excavations</li> <li>▪ whether any dewatering will be necessary</li> <li>▪ management of surface waters and construction waters</li> <li>▪ information about cut and fill activities (for example, locations of sources and destinations, quantities of materials, contamination status of material)</li> <li>▪ imported fill (volumes, sources, suitability for importation)</li> <li>▪ waste disposal</li> <li>▪ timeframes.</li> </ul>	4.1.1 4.1.2
3.1.2	<p>The site should be assessed in accordance with Commonwealth-endorsed guidelines including:</p> <ul style="list-style-type: none"> <li>▪ National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM)</li> <li>▪ PFAS NEMP 2.0 (HEPA 2020)</li> <li>▪ National Water Quality Management Strategy.</li> </ul>	4.1.3

RFI Reference number	RFI description	Location in PIDR (Section)
3.1.3	Further investigations will be required to address recommendations made in the Pre-construction Contamination Assessment report, and may require the assessment of other potentially impacted environmental compartments such as groundwater, sediments, and biota.	4.1
3.1.4	Preparation of human health and environment risk assessments (HHERA) may also be required for issues such as residual contamination and the reuse of contaminated materials.	4.1
3.1.5	<p>Prepare detailed management plans specific to the proposed action, including but not limited to:</p> <ul style="list-style-type: none"> <li>▪ construction environmental management plans (CEMP)</li> <li>▪ unexpected finds (UxF) protocol</li> <li>▪ remediation action plans (RAPs)</li> <li>▪ stockpile management plans</li> <li>▪ beneficial re-use (BRU) plans</li> <li>▪ imported fill assessment</li> <li>▪ off-site disposal of soil and/or groundwater dewatering plans</li> <li>▪ management of surface water and construction waters</li> <li>▪ materials management plans</li> <li>▪ design versus as-built monitoring plans</li> <li>▪ dust control plans, and contingency plans, in addition to environmental risk assessments (ERAs) and contaminant management plans (CMPs) for the ongoing management of any residual contamination.</li> </ul>	4.1 <b>Appendix D</b>

RFI Reference number	RFI description	Location in PIDR (Section)
3.1.6	Provide detailed environmental monitoring plans specific to the proposed development, including but not limited to: <ul style="list-style-type: none"> <li>▪ groundwater monitoring plans</li> <li>▪ surface water monitoring plans</li> <li>▪ asbestos air monitoring plans.</li> </ul>	<b>Appendix D</b>  Included in the Soil and Water Sub Plan and Hazardous Substances Sub-Plan.
3.2	<b>Impacts to heritage values</b>	<b>Section 4.2</b>
3.2.1	Provide a summary of the heritage values within and surrounding the proposed action area, including: <ul style="list-style-type: none"> <li>▪ Built heritage</li> <li>▪ Intangible heritage</li> <li>▪ Indigenous heritage</li> <li>▪ Natural heritage</li> </ul>	4.2.1
3.2.2	Provide a summary of the impacts to heritage values within and surrounding the proposed action area, including: <ul style="list-style-type: none"> <li>▪ Built heritage</li> <li>▪ Intangible heritage</li> <li>▪ Indigenous heritage</li> <li>▪ Natural heritage</li> </ul>	4.2.2

<p><b>3.2.3</b></p>	<p>The preliminary documentation should detail proposed mitigation measures, and how they align with the mitigation measures recommended by CHS below.</p> <ul style="list-style-type: none"> <li>▪ Conduct full, professional, archival recording of the current site with particular emphasis on the buildings to be demolished considering their internal and external layout and function.</li> <li>▪ Retain and seek to adaptively re-use the remaining Blamey Barracks (1960s) era rectangular buildings as representations of this era at Kapooka.</li> <li>▪ The Heritage Interpretation Strategy found at Appendix J in the HMP should be considered, particularly consultation with the Australian Army History Unit on the implementation of any heritage interpretation.</li> <li>▪ Conduct an oral history project that includes: <ul style="list-style-type: none"> <li>- Audio and/or video interviews with graduates and staff from Kapooka. The participants should range across the decades of operation from the 1960s to the present.</li> <li>- A report that summarises the main themes from the participants memories.</li> <li>- The report and recordings should be made publicly accessible either on site or through an online archive.</li> </ul> </li> <li>▪ Development and completion of the Kapooka Heritage Trail from the visitor carpark to the proposed Multi-Function Centre and Parade Ground</li> <li>▪ Interpretation of Kapooka's history and heritage to be displayed through photographs, objects or signage in the following areas: <ul style="list-style-type: none"> <li>- Kapooka Heritage Trail</li> <li>- Proposed recruit live in accommodation precinct</li> <li>- Proposed multi-function centre</li> <li>- Main Parade Ground</li> <li>- Former Post Office.</li> </ul> </li> <li>▪ Consider how the architectural style and materiality of new buildings can be understood as an interpretative measure of the former buildings.</li> </ul>	<p>4.2.3</p>
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RFI Reference number	RFI description	Location in PIDR (Section)
	<ul style="list-style-type: none"> <li>▪ Consider reuse of materials, particularly the red bricks from the demolished buildings in landscaping.</li> <li>▪ The gun emplacements should be protected during construction. If the gun emplacements need to be moved, appropriate management measures are to be developed to protect and manage the move.</li> <li>▪ The new buildings to follow the following design principles:               <ul style="list-style-type: none"> <li>- Large-scale buildings, arranged in a symmetrical ‘disciplined’ layout.</li> <li>- Rectilinear forms, with an emphasis on rectangular footprints rather than winged.</li> <li>- Buildings are visible in the round and set in grassed areas.</li> <li>- Vertical architectural expressions of the window fenestration with no dominant horizontal expression, resulting in a solid, anchored building.</li> <li>- Consideration should be given to whether the Fibre Cement Sheets that are proposed for the LIA redevelopment can be textured, or the size of the sheeting reduced to minimise the visual impact of large flat sheeting.</li> <li>- LIA signage should be built in red brick as per concept designs.</li> </ul> </li> <li>▪ Regarding the proposed demolition of parade shelters:               <ul style="list-style-type: none"> <li>- Consult with the individuals and/or families that the parade shelters are named in honour of.</li> <li>- Based on this feedback, consider where naming could be used in new development.</li> </ul> </li> <li>▪ Regarding Indigenous heritage:               <ul style="list-style-type: none"> <li>- All areas known to have Indigenous Heritage values must be fenced during construction to avoid inadvertent damage.</li> <li>- Consultation is required with the Traditional Owners to determine the level of engagement they would like to have in actively monitoring the initial ground disturbance activities in the areas shown as holding low and low to moderate archaeological potential sites.</li> </ul> </li> <li>▪ Policies 58,59 and 60 in the HMP should be adhered to in the event of unforeseen discoveries during construction.</li> </ul>	

RFI Reference number	RFI description	Location in PIDR (Section)
<b>4</b>	<b>Ecologically sustainable development</b>	<b>Section 5</b>
4.1	<p>A description of how the proposed action meets the principles of ecologically sustainable development (as defined in section 3A of the EPBC Act), as follows:</p> <ul style="list-style-type: none"> <li>▪ decision making processes should effectively integrate both long term and short term economic, environmental, social and equitable considerations;</li> <li>▪ if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;</li> <li>▪ the principle of inter generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;</li> <li>▪ the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making;</li> <li>▪ improved valuation, pricing and incentive mechanisms should be promoted.</li> </ul>	5.1
<b>5</b>	<b>Economic and social matters</b>	<b>Section 6</b>
5.1	Details of any public consultation activities undertaken, and the outcomes.	6.1.1
5.2	Details of any consultation with indigenous stakeholders.	6.1.2
5.3	Any monitoring programs to monitor ongoing changes to economic and social characteristics potentially affected by the proposed action	6.2

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RFI Reference number	RFI description	Location in PIDR (Section)
5.4	Projected economic costs and benefits of the project, including the basis for their estimation through cost/benefit analysis or similar studies.	6.3
5.5	Employment opportunities expected to be generated by the project at each phase of the proposed action.	6.4.1
5.6	Benefits to the local and wider community as a result of the proposed action.	6.4.2
6	<p><b>Environmental history of the person proposing to take the action:</b></p> <p><b>The preliminary documentation must include details of any past or present proceedings under a Commonwealth, State or Territory law, for the protection of the environment, or the conservation and sustainable use of natural resources, against:</b></p>	Section 7
6.1	<ul style="list-style-type: none"> <li>▪ the person proposing to take the action;</li> </ul>	7.1
6.2	<ul style="list-style-type: none"> <li>▪ If the person proposing to take the action is a corporation—details of the corporation’s environmental policy and planning framework.</li> </ul>	7.2
6.3	<ul style="list-style-type: none"> <li>▪ if the person is a corporation that is a subsidiary of another body or company (the parent body)—the history in relation to environmental matters of the parent body and its executive officers.</li> </ul>	7.3
7	Outcomes-based conditions	Section 8



## Appendix C. Relevance of information utilised

In accordance with DCCEEW RFI **Appendix A**, Section A1.7 the following table is supplied relating to information utilised in this report.

Report	Source and date of information	How the reliability of information was tested	Uncertainties of information	Guidelines, plans, policies relevant to information
Biodiversity Assessment Report	EMM Consulting August 2023	Technical reviews undertaken by consultant organisation.  Review of documents by the RRJV and PMCA.	As per limitations stated in the Biodiversity Assessment Report. <ul style="list-style-type: none"> <li>▪ Biodiversity surveys provide only a sample of the species present at the site.</li> <li>▪ Timing of follow-on surveys in different seasons.</li> <li>▪ Limited targeted fauna surveys taken.</li> <li>▪ Planted non-indigenous and exotic species not recorded.</li> </ul>	Environment Protection and Biodiversity Conservation Act 1999  Biodiversity Conservation Act 2016  NSW Biodiversity Assessment Method (BAM) (DPIE, 2020)  Matters of National Environmental Significance: Significant impact guidelines 1.1 (DoE, 2013)  National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland. (DECCW 2010).  Commonwealth Listing Advice on White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Grassland. (DoEH, 2006)

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<p>Pre-construction Contamination Assessment (PCA) Report</p>	<p>EMM Consulting January 2023</p>	<p>Technical reviews undertaken by consultant organisation.  Review of documents by the RRJV and PMCA.</p>	<p>As per limitations stated in the Pre-construction Contamination Assessment:</p> <ul style="list-style-type: none"> <li>Subsurface environment at any site may present substantial uncertainty.</li> </ul>	<p>Defence Contamination Management Manual Defence PFAS Construction and Maintenance Framework  National Environment Protection (Assessment of Contamination) Measure (ASC NEPM, 1999 as amended 2013)  <i>National Environmental Protection Council Act (1994)</i>  <i>National Environmental Protection Measures (Implementation) Act 1998</i>  ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water  Heads of EPAs Australia and New Zealand (HEPA), 2020, PFAS National Environmental Management Plan (NEMP v2.0), January 2020  Guidelines for the NSW Site Auditor Scheme (3<sup>rd</sup> edition, 2017)  NSW EPA Waste Classification Guidelines (2014). National Health and Medical Research Council &amp; Agriculture and Resource Management Council of Australia and New Zealand, Australian Drinking Water Guidelines, 2022.</p>
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Report	Source and date of information	How the reliability of information was tested	Uncertainties of information	Guidelines, plans, policies relevant to information
				<p>National Health and Medical Research Council, Guidelines for Managing Risks in Recreational Waters, 2008.</p> <p>AS4482.1:2005 Guide to the Investigation and Sampling of sites with Potentially Contaminated Soil. Part 1: Non-volatile and Semi-Volatile Compounds.</p> <p>AS4482.2:1999 Guide to the sampling and investigation of potentially contaminated soil. Part 2: Volatile substances.</p>
Contamination Validation Report	EMM Consulting December 2023	<p>Technical reviews undertaken by consultant organisation.</p> <p>Review of documents by the RRJV and PMCA.</p>	<p>None.</p> <p>This objective of this report is to identify the changes to the design at BBK between the 30% CDR and 50% SDR design stages, and to determine whether the changes have substantially changed the Pre-Construction Assessment completed at 50% SDR design stage.</p>	<p>None.</p> <p>This objective of this report is to identify the changes to the design at BBK between the 30% CDR and 50% SDR design stages, and to determine whether the changes have substantially changed the Pre-Construction Assessment completed at 50% SDR design stage.</p>

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<p>Contamination Management Strategy</p>	<p>EMM Consulting  December 2023</p>	<p>Technical reviews undertaken by consultant organisation.  Review of documents by the RRJV and PMCA.</p>	<p>As per limitations in the Contamination Management Strategy:</p> <ul style="list-style-type: none"> <li>• Subsurface environment at any site may present substantial uncertainty.</li> <li>• The Pre-Construction Assessment, which informs the Contamination Management Strategy, is based on documentation, information and data made available during the 5% MPFR and 30% CDR design stages, which informed the constraints analysis and the scope of site investigations.</li> <li>• Site investigations were undertaken during 30% CDR design stage and assessed scope items and proposed building footprints that were preferred at the time. As such, further investigations are required to address data gaps associated with changes in design.</li> </ul>	<p>National Environment Protection Council (1999) National Environment Protection (Assessment of Site Contamination) Measure, Schedule B2: Guideline on Site Characterisation (as amended) in May 2013) (ASC NEPM, 2013)</p> <p>Heads of EPAs Australia and New Zealand (HEPA) PFAS National Environmental Management Plan Version 2.0 (2020) (PFAS NEMP)</p> <p>NSW EPA (2022) Contaminated Land Guidelines: Sampling Design (Parts 1 and 2)</p> <p>NSW EPS 2014. Waste Classification Guidelines, Part 1: Classifying Waste. November 2014.</p> <p>Environment Protection Act 2017</p> <p>EPA Victoria, 2009, Industrial Waste Resource Guidelines: Soil Sampling, IWRG702, June 2009</p> <p>EPA Victoria, 2022. Groundwater Sampling Guidelines. EPA Victoria Publication 669.1</p> <p>Standards Australia AS/NZ 2005, Guide to the Sampling and Investigation of Potentially Contaminated Soil – Non-Volatile and Semi-Volatile Compounds, AS4482.1:2005, Standards Australia, Sydney</p> <p>Standards Australia AS/NZ 1999, Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil – Volatile</p>
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Report	Source and date of information	How the reliability of information was tested	Uncertainties of information	Guidelines, plans, policies relevant to information
				<p>Substances, AS4482.2:1999, Standards Australia, Sydney</p> <p>Department of Defence (2018) Defence Contamination Management Manual (as amended in June 2021)</p> <p>Defence PFAS Construction and Maintenance Framework (v3.0, August 2021)</p> <p>Defence Pollution Prevention Management Manual (June 2017)</p> <p>Defence Per- and Poly-fluoroalkyl Substances (PFAS) – Engineered Stockpile Facility Performance Specification (as appropriate) (v1.0, March 2018)</p>

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Report	Source and date of information	How the reliability of information was tested	Uncertainties of information	Guidelines, plans, policies relevant to information
Preliminary PFAS Risk Assessment	EMM Consulting  December 2023	Technical reviews undertaken by consultant organisation.  Review of documents by the RRJV and PMCA.	As per limitations stated in the Preliminary PFAS Risk Assessment: <ul style="list-style-type: none"> <li>• Subsurface environment at any site may present substantial uncertainty.</li> <li>• Risk assessment is based of documentation, information and data made available during the 5% MPFR, 30% CDR and 50% SDR design stages.</li> <li>• Site investigations were undertaken during 30% CDR design stage and assessed scope items and proposed building footprints that were preferred at the time. As such, further investigations are required to addressed data gaps associated with changes in design.</li> </ul>	National Waste Policy 2018 and associated National Waste Hierarchy  Defence PFAS Construction and Maintenance Framework, Guidance for managing the risks of PFAS contamination for works on the Defence estate (Version 3.0, 2021)  Defence Contamination Management Manual (March 2018, amended June 2021), Annex C – Planning to Minimise and Manage Stockpiling  PFAS National Environmental Management Plan (Version 2.0, January 2020)

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Report	Source and date of information	How the reliability of information was tested	Uncertainties of information	Guidelines, plans, policies relevant to information
Heritage Management Plan	Umwelt Environmental & Social Consultants (2023)	Technical reviews undertaken by consultant organisation.  DEHP and stakeholder review and acceptance of HMP.	<p>As per limitations stated in the HMP.</p> <ul style="list-style-type: none"> <li>Detailed information regarding the buildings of Defence bases is not generally readily accessible, predominately due to security concerns and gaps in the available data and is therefore limited to the data provided at the time of the HMP development.</li> <li>The internal inspection of component elements was only undertaken where external inspections suggested that this was warranted. As such, the majority of built components listed in this HMP were not subject to internal inspection</li> <li>The HMP relied upon a 1998 report ground truthing previously identified Indigenous archaeological sites, and was limited by the absence of the available mapping showing locations.</li> <li>Consultation with the Wagga Wagga Local Aboriginal Land Council was undertaken as part of the HMP however they were not able to provide a representative to attend the survey.</li> <li>The natural heritage field survey provides a limited view into the whole KMA and was generally focused on broad scale vegetation and landscape values using rapid assessments.</li> </ul>	<p><i>Environment Protection and Biodiversity Conservation Act 1999.</i></p> <p><i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i></p> <p><i>Native Title Act 1993</i></p> <p><i>Biodiversity Conservation Act 2016</i></p> <p>Defence Environmental Strategy 2016-2036 (2016)</p> <p>Defence Environment and Heritage Manual (2019)</p> <p>Defence Estate Heritage Strategy (2017)</p> <p>The Burra Charter: The Australian ICOMOS charter for places of cultural significance (ICOMOS (Australia))</p> <p>Ask First: A guide to respecting Indigenous heritage places and values (Australian Heritage Commission, 2002)</p> <p>Australian Natural Heritage Charter (Commonwealth of Australia, 2002)</p>

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Report	Source and date of information	How the reliability of information was tested	Uncertainties of information	Guidelines, plans, policies relevant to information
Heritage Impact Assessment	EMM Consulting July 2023	<p>Technical reviews undertaken by consultant organisation.</p> <p>Review of documents by the RRJV and PMCA.</p>	<p>Predictions regarding the probability of subsurface archaeological material occurring within the place are based on the HMP (Umwelt 2022), site survey and surface indications and environmental context. However, it is possible that materials may occur in areas without surface indications and in any environmental context.</p>	<p><i>EPBC Act</i></p> <p><i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i></p> <p><i>Native Title Act 1993</i></p> <p><i>National Parks and Wildlife Act 1974</i></p> <p><i>Aboriginal Land Rights Act 1983</i></p> <p>Defence Estate Heritage Strategy (2017)</p> <p>Defence Heritage Management Manual (2022)</p> <p>The Burra Charter: The Australian ICOMOS charter for places of cultural significance (ICOMOS (Australia))</p> <p>Ask First: A guide to respecting Indigenous heritage places and values (Australian Heritage Commission, 2002)</p> <p>Engage Early: Guidance for proponents on best practice Indigenous engagement for environmental assessments under the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia, 2016)</p>



## **Appendix D. RRJV Environmental Management Plan and Pre-Construction Contamination Report**



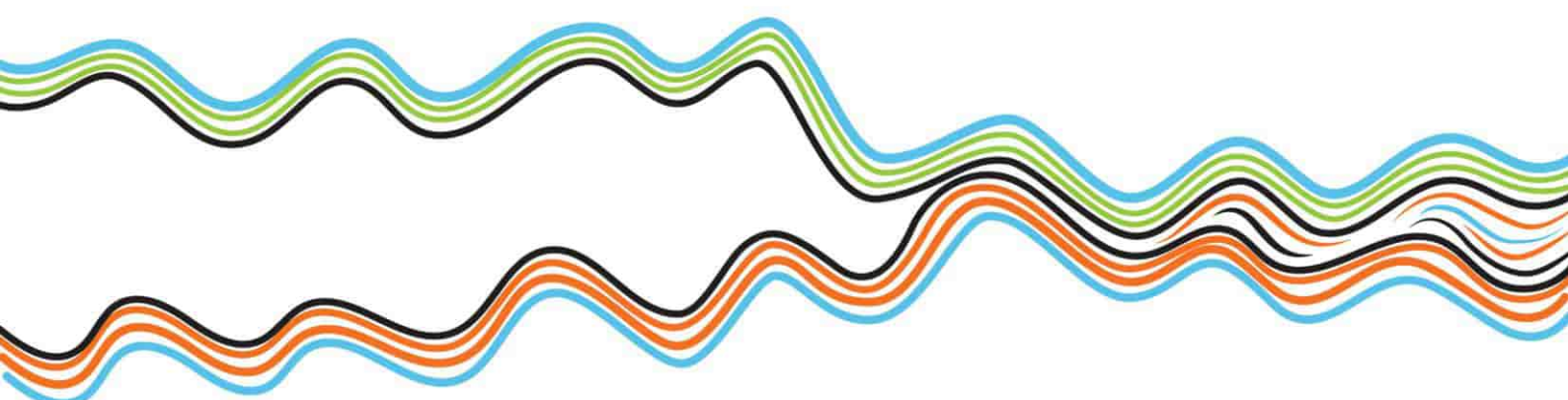
## Riverina Redevelopment Joint Venture

# Environmental Management Plan

Project Name: EST02036 Blamey Barracks Kapooka Redevelopment

Document number: RRP-BBK-GLO-RRJV-PRM-PLN-4000

Rev	Date	Prepared by	Reviewed by	Approved by
09	12/07/2024	F. Lean	E. Eveleigh	M. Quinn



# Document Control

The Contractor's Representative is responsible for ensuring that this plan is reviewed and approved. The Environmental Manager is responsible for updating this plan to reflect changes to environmental, legal and other requirements, as required. Any revisions or amendments must be approved by the Contractor's Representative before being distributed / implemented.

## Revision status

Rev	Date	Changes since last revision	Prepared by	Checked by	Approved by
00	11/05/2022	Initial issue for site access	C. Moser	M. Billings	J. Flood
01	30/05/2022	Updated for ESM & PMCA review comments	C. Moser	M. Billings	J. Flood
02	16/02/2024	Updated to include Delivery Phase	S. Mahon	K. Malvaso	M. Quinn
03	04/03/2024	Updated response to PMCA	S. Mahon	K. Malvaso	M. Quinn
04	18/03/2024	Updated to address PMCA review comments	S. Mahon	K. Malvaso	M. Quinn
05	21/03/2024	Updated to address PMCA review comments	S. Mahon	K. Malvaso	M. Quinn
06	23/04/2024	Added BGW Rehabilitation Sub Plan	S. Mahon	K. Malvaso	M. Quinn
07	02/04/2024	Added BGW Location Map Formatting	S. Mahon	K. Malvaso	M. Quinn
08	08/07/2024	Nominated site in perpetuity added	S. Mahon	E. Eveleigh	M. Quinn
09	12/07/2024	Correction of formatting back to Rev 07 style	F. Lean	E. Eveleigh	M. Quinn

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# A. Acronyms and Abbreviations

Term or Abbreviation	Definition
ACM	Asbestos Management Plan (Defence)
ADF	Australian Defence Force
AMP	Defence Asbestos Management Plan, version 5.2 (15 December 2023)
BEAP	Base Engineering Assessment Program
BBK	Blamey Barracks Kapooka
CAP	Construction Area Plan
CAPRA	Construction Area Plan Risk Assessment
CMS	CPB Management System
CPB	CPB Contractors Pty Ltd
CRAT	Contamination Risk Assessment Tool (Defence)
DEEP	Directorate of Estate Engineering Policy, Department of Defence
DEHPD	Directorate of Environment and Heritage Policy Development, Department of Defence
DCCEEW	Department of Climate Change, Energy, Environment & Water
DCM	Defence Contamination Manual
DEPAC	Directorate of Environmental Planning, Assessment and Compliance, Department of Defence
DERMS	Directorate of Environmental Resource Management and Sustainability, Department of Defence
EMP	Environmental Management Plan
EMS	Environmental Management System
EMOS	Estate Maintenance and Operations Services
EO	Explosive Ordinance
EPA	Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cth)
EH	Environmental Harm
EI	Environmental Incident
ER	Environmental Report
ESCP	Erosion and Sediment Control Plan
ESM	Defence Environment & Sustainability Manager
ESdat	Environmental Data Management Software
EWMS	Environmental Work Method Statement
Hazchem	Hazardous Chemicals
ITP	Inspection and Test Plans
KPI	Key Performance Indicator
LIA	Living In Accommodation
MCC	Managing Contractor Contract
NATA	National Association of Testing Authorities
NEMP	National Environmental Management Plan (PFAS)
NGER	National Greenhouse and Energy Reporting

Term or Abbreviation	Definition
PFAS	Per- and Poly-fluoro-alkyl substances
PNEMP	PFAS National Environmental Management Plan 2.0
RDC	Recruit Development Company
RRP	Riverina Redevelopment Program
RRJV	Riverina Redevelopment Joint Venture, a joint venture between CPB Contractors/Downer in the capacity as the Managing Contractor for the project
SEA	Significant Environmental Aspects
SEH	Significant Environmental Hazards
SEP	Site Environmental Plan(s)
SMP (BLUE BOOK)	Sediment Management protocols (Blue Book) NSW
SWMS	Safe Work Method Statement
TCCC	Tactical Combat Casualty Care
UFP	Unexpected Finds Protocol
URB	User Requirement Brief
VM	Value Management
WE	Work Element

## A.1 MC Contract Reference

This Environmental Management Plan (EMP) has been developed to satisfy the requirements of the contract; and support the project team in completing the requirements of the project. The table below addresses the relevant sections of the Contract that are addressed in the EMP.

MC Contract references	Environmental Plan References
<p>Clause 1.1 Glossary of terms, <b>Environmental Management Plan</b></p> <p>The plan prepared by the Contractor and finalised under clause 9.2, which must set out in adequate detail the procedures the Contractor will implement to manage the Contractor's Activities and the Works from an environmental perspective to:</p> <ul style="list-style-type: none"> <li>(a) ensure compliance with the Environmental Requirements and Statutory Requirements; and</li> <li>(b) maximise the achievement of the Environmental Objectives, the ESD Principles and the WOL Objectives.</li> </ul> <p>The Environmental Management Plan must address, at a minimum:</p> <ul style="list-style-type: none"> <li>(c) all Environmental Requirements;</li> <li>(d) without limiting paragraph (c), all Statutory Requirements;</li> <li>(e) all Environmental Objectives;</li> <li>(f) without limiting paragraph (e), all ESD Principles and WOL Objectives,</li> <li>(g) the roles and responsibilities of all Contractor and subcontractor personnel (including the Contractor's key people under clause 3.6(a)) regarding the Environment;</li> </ul>	<ul style="list-style-type: none"> <li>a) Section B2.2 Standards and Legislation</li> <li>b) Section 2.4 Purpose and 2.9 Environmental Contract Requirements, Section 7 ESD &amp; WOL, Appendix D</li> <li>c) Section B2.2.2 Legislation and Regulatory Requirements</li> <li>d) Section 2.4 Purpose of this plan</li> <li>e) Section 2.4 Purpose of this plan, 8 Elements and Expectations</li> <li>f) Section 2.4 Purpose of this plan</li> <li>g) Section 3.3 Key Project Roles and Responsibilities</li> </ul>



MC Contract references	Environmental Plan References
<ul style="list-style-type: none"> <li>(h) the procedure for consultation, cooperation and coordination of activities with the Contract Administrator, the Commonwealth and Other Contractors regarding the Environment during the Contractor's Activities and the Works;</li> <li>(i) the training and awareness programmes provided to Contractor and subcontractor personnel regarding the Environment;</li> <li>(j) the procedure for preparing (including tailoring) and finalising the Environmental Management Plan under clause 9.2;</li> <li>(k) the procedure for regularly identifying, controlling and monitoring possible and actual impacts on the Environment associated with the Contractor's Activities and the Works, including the procedures for recording, reporting, responding to and finalising: <ul style="list-style-type: none"> <li>(i) matters arising out of or in connection with such identification, control and monitoring; and</li> <li>(ii) complaints, incidents (including Environmental Incidents), near misses and other situations or accidents regarding the Environment during the Contractor's Activities and the Works;</li> </ul> </li> <li>(l) the procedure for regularly reviewing, updating and amending the Environmental Management Plan under clause 9.2 (including as a result of any complaint, incident (including Environmental Incidents), near misses and other situations or accidents on Commonwealth property or the Site during the Contractor's Activities and the Works);</li> <li>(m) the procedure for ensuring subcontractor compliance with the Environmental Management Plan;</li> <li>(n) the procedure for regularly auditing or other monitoring of Contractor and subcontractor compliance with the Environmental Management Plan, including the procedures for recording, reporting, responding to and finalising: <ul style="list-style-type: none"> <li>(i) matters arising out of or in connection with such audits or other monitoring; and</li> <li>(ii) complaints, incidents (including Environmental Incidents), near misses and other situations or accidents regarding the Environment during the Contractor's Activities and the Works;</li> </ul> </li> <li>(o) the additional matters specified in the Contract Particulars; and</li> <li>(p) any other matters required by: <ul style="list-style-type: none"> <li>(i) the Contract; or</li> <li>(ii) the Contract Administrator.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>h) Section 2.4 Purpose of this plan, 2.9 Environmental Aspects and Impacts Summary, Environmental Clearance Certificate (ECC)</li> <li>i) Section C8 Elements and Expectations, Element 7, Training and Competency</li> <li>j) Section C8 Elements and Expectations Element 10 Document and Record Management</li> <li>k) Section C8 Elements and Expectations Element 11 Auditing, Review and Improvements, Element 9 Incident Management</li>   <li>l) Section C8 Elements and Expectations Element 11 Auditing, Review and Improvements</li>   <li>m) Section C8 Elements and Expectations Element 11 Auditing, Review and Improvements, Element 8 Subcontractor Relationships</li> <li>n) Section C8 Elements and Expectations Element 11 Auditing, Review and Improvements</li>   <li>o) All sections</li>   <li>p) All sections</li> </ul>
<p>Clause 1.1 Glossary of terms, <b>Environmental Objectives</b> The Environmental Objectives are:</p> <ul style="list-style-type: none"> <li>(a) to encourage best practice environmental management through the planning, development, implementation and continuous improvement of environmental management procedures during the Contractor's Activities and the Works;</li> </ul>	<p>Section B 2.2.4 Environmental obligations and Targets and Throughout plan demonstrated in Sub plans</p> <p>Section C8 Elements and Expectations Element C11 Auditing, Review and Improvements</p>

MC Contract references	Environmental Plan References
<ul style="list-style-type: none"> <li>(b) to prevent and minimise adverse impacts on the Environment;</li> <li>(c) to recognise and protect any special environmental characteristics of the Site (including cultural heritage significance); and</li> <li>(d) the additional objectives specified in the Contract Particulars.</li> </ul>	
<p>Clause 1.1 Glossary of terms, <b>Environmental Requirements</b></p> <p>Includes the:</p> <ul style="list-style-type: none"> <li>(a) Environmental Clearance Certificate (ECC);</li> <li>(b) Defence Environmental Requirements; and</li> <li>(c) additional requirements specified in the Contract Particulars</li> </ul>	<p>Section 2.4 Purpose of this plan, 2.9 Environmental Aspects and Impacts Summary, Environmental Clearance Certificate (ECC)</p> <p>Section B2.2.3 EMP Environmental Management Obligations</p>
<p><b>Clause 8.26 The Environment</b></p> <p>The Contractor must:</p> <ul style="list-style-type: none"> <li>(a) ensure that in carrying out the Contractor's Activities: <ul style="list-style-type: none"> <li>(i) other than to the extent identified in writing by the Contract Administrator, it complies with all Statutory Requirements and other requirements of the Contract for the protection of the Environment;</li> <li>(ii) it does not cause or contribute to any Environmental Incident;</li> <li>(iii) without limiting subparagraph (ii), it does not cause or contribute to Contamination of the Site or any other land, air or water or cause or contribute to any Contamination emanating from the Site;</li> <li>(iv) it immediately notifies the Contract Administrator of: <ul style="list-style-type: none"> <li>A. any non-compliance with the requirements of clause 8.26;</li> <li>B. any breach of a Statutory Requirement for the protection of the Environment;</li> <li>C. any Environmental Incident; or</li> <li>D. the receipt of any notice, order or communication received from an authority for the protection of the Environment; and</li> </ul> </li> <li>(v) its Subcontractors comply with the requirements in clause 8.26; and</li> </ul> </li> <li>(b) clean up and restore the Environment, including any Contamination or Environmental Harm, arising out of or in connection with the Contractor's Activities or the Works, whether or not it has complied with all Statutory Requirements and other requirements of the Contract for the protection of the Environment.</li> </ul>	<p>Section B3.5 Potentially Significant Environmental Aspects and Impacts</p> <p>Section C1.9 Incident Management</p> <p>Section C Implementation C1.3 Legal and other requirements</p> <p>Section D.2 Contamination Subplan</p> <p>B2.2 Section 2.2.1 Legislation and Regulatory Requirements</p>
<p><b>Clause 8.27 Urgent Protection</b></p> <p>The Commonwealth may take any action necessary to protect the Works, other property, the Environment, or to prevent or minimise risks to the health and safety of persons, which the Contractor must take but does not take.</p> <p>The costs, expenses, losses, damages and liabilities suffered or incurred by the Commonwealth in taking such action will be a debt due from the Contractor to the Commonwealth.</p>	<p>B.3 Environmental Management system B.3.3 Ongoing Risk assessment</p>

MC Contract references	Environmental Plan References
<p><b>Clause 8.28 Valuable, Archaeological or Special Interest Items</b></p> <ul style="list-style-type: none"> <li>(a) Any valuable, archaeological or special interest items found on or in the Site will, as between the parties, be the property of the Commonwealth.</li> <li>(b) Where such an item is found on or in the Site, the Contractor must: <ul style="list-style-type: none"> <li>(vi) immediately give the Contract Administrator and the Commonwealth notice in writing;</li> <li>(vii) not disturb the item under any circumstances other than where such disturbance is necessary to comply with subparagraph (iii); and</li> <li>(viii) ensure that the item is protected until the nature of the item has been competently determined.</li> </ul> </li> <li>(c) The Contract Administrator must, within 14 days of receipt of a notice under paragraph (b)(i), instruct the Contractor as to the course it must adopt insofar as the Contractor's Activities are affected by the finding of the item.</li> <li>(d) The Contractor will be entitled to have the Contractor's Work Fee (Delivery) increased by the extra costs reasonably incurred by the Contractor after the giving of the notice under paragraph (b)(i) which arise directly from the finding of the item and the Contract Administrator's instruction under paragraph (c), as determined by the Contract Administrator in accordance with clause 11.3(a)(iii)B or C.</li> <li>(e) To the extent permitted by law, the Contractor will not be entitled to make (nor will the Commonwealth be liable upon) any Claim arising out of or in connection with the finding of the item or the Contract Administrator's instruction under paragraph (c), other than: <ul style="list-style-type: none"> <li>(i) under paragraph (d); or</li> <li>(ii) for Reimbursable Costs.</li> </ul> </li> </ul>	<p>Heritage Management Sub Plan D4 Section D.4.7 Unexpected Finds protocol</p>

# B. Overview

## B.1 Structure of this Plan

This Environmental Management Plan (EMP) outlines how we will achieve acceptable environmental outcomes on the Blamey Barracks Kapooka (BBK) redevelopment project by the application of the Environmental Management System (EMS) for Planning and Delivery Phase.

This Environmental Management Plan (EMP) has been prepared to satisfy the specific requirements under clause 9.2 of the MCC and to comply with the requirements of the *Environmental Management Plan Guidelines* published by the Department of Climate Change, Energy, the Environmental and Water (DCCEE) [Environmental Management Plan Guidelines - DCCEE](#). Where references to a Construction Environmental Management Plan (CEMP) exist in any other project related documentation, this shall mean this Environmental Management Plan (EMP).

This Environmental Management Plan (EMP) addresses both design and construction relation aspects of the project.

The works are being delivered by the Riverina Redevelopment Joint Venture (RRJV), a joint venture between CPB Contractors and Downer. The CPB Contractors Environmental Management System (EMS) will be adopted by the joint venture.

This EMP has the following structure:

Part A: Overview	This section outlines the: <ul style="list-style-type: none"><li>• Scope</li><li>• Environmental contract requirements</li><li>• Objectives and targets</li><li>• Environmental Management System (EMS) structure</li><li>• Summary of the potential Significant Environmental Aspects</li><li>• Approvals Delivery Strategy</li></ul>
Part B: Implementation Plan	This section outlines EMS Elements (systems and processes) as follows: <ul style="list-style-type: none"><li>• Requirements and Expectations</li><li>• How they will be met</li><li>• Responsibilities</li><li>• Associated deliverables / tools</li></ul>
Part C: Sub-plans	This section contains Sub-plans to manage Significant Environmental Aspects and other environmental aspects associated with the project
Part D: Appendices	This section includes the following policies and system tools: <ul style="list-style-type: none"><li>• Environmental Policy and ISO 14001 certification</li><li>• Environmental Roles and Responsibilities</li><li>• Monitoring, Inspections, Reporting, Review and Audit Schedule</li><li>• Site Environment Plan(s) as applicable.</li></ul>

## B.2 Overview

### B.2.1. Project Scope

The Riverina Redevelopment Program (RRP) involves an amalgamation of three individual redevelopment projects within the Riverina–Murray region, each similar in structure and scope, making them well-suited to deliver as a single large sustainment program. The projects included in the Riverina Redevelopment Program specifically include:

- EST02021 Albury Wodonga Military Area Redevelopment
- EST02025 RAAF Base Wagga Redevelopment
- EST02036 Blamey Barracks Kapooka Redevelopment (subject of this EMP)

Each project has a planning and delivery budget, reporting stream, delivery program and discrete works to be delivered under a single MCC-1 2021 model. The RRP will provide the facilities and infrastructure the Australian Defence Force (ADF) needs for the next 30 years, including the ability to meet increasing training and logistics demands. The Works will largely replace facilities and equipment at the end of their useful life. This will reduce maintenance costs, address deficiencies in operational reliabilities, improve personnel comfort, provide a safer work environment, and improve compliance with Defence standards.

**Table 1: Scope of Works (Work Elements)**

Work Element	Scope Item	Description	Comments
<b>STAGE 1 – Site Wide Infrastructure (and all other works)</b>			
WE1.1	S1	Electrical Infrastructure	URB scope adjusted by VM and limited to BEAP P1 to P3 items. Includes additional scope for EST0207 funded facilities.
WE1.2	S2	ICT Infrastructure	URB scope adjusted by VM and limited to BEAP P1 to P3 items. Includes additional scope for EST0207 funded facilities.
WE1.3	S3	Water Infrastructure (Potable, fire, irrigation)	URB scope adjusted by VM and limited to BEAP P1 to P3 items. Includes additional scope for EST0207 funded facilities.
WE1.4	S4	Gas Infrastructure	URB scope adjusted by VM and limited to BEAP P1 to P3 items. Includes additional scope for EST0207 funded facilities.
WE1.6	S6	Wastewater Infrastructure	URB scope adjusted by VM and limited to BEAP P1 to P3 items. Includes additional scope for EST0207 funded facilities.
WE1.7	S7	Stormwater Infrastructure	URB scope adjusted by VM and limited to BEAP P1 to P3 items. Includes additional scope for EST0207 funded facilities.

Work Element	Scope Item	Description	Comments
WE1.8	S8	Demolition (High Priority)	Demolition scope essential to facilitate the works.
WE1.9	S27	New Footpaths & Pedestrian Access	
WE1.10	S34	New Internal Roads, Car Parks and Parade Grounds	
<b>STAGE 2 – Enabling Works</b>			
WE2.1	S9	Recruit Welfare Facility (RWF) (Including Retail & Band Facility)	Integrates URB scope items S9 – New Multi-Function Centre, S30 – Retail Precinct, and S36 – Army Band Facility
WE2.2	S12	New EO Facility	
WE2.4	S21	New Contractor's Precinct	
WE2.5	S22	New Clothing & Q-Store	
WE2.6	S23	Expanded Chaplaincy and Well-Being Facilities	URB scope refined to exclude works to existing Chapel/Chaplin's facility and include adaptive re-use of Edmondson building (A0034) for multi-denominational space.
WE2.7	S26	New Land Management Compound	
<b>STAGE 3 – 1RTB Headquarters &amp; Training Facilities</b>			
WE3.1	S10	Upgrade Access to Existing Armoury	URB scope refined to exclude the adaptive re-use of Broughton Centre for 1RTB.
WE3.2	S35	New HQ Building	Integrates URB scope items S20 – Military Police Working Accommodation, S35 Co-locate HQ facilities, and S40 – SEG & Service Connect facility
<b>STAGE 4 – 1RTB Recruit Accommodation</b>			
WE4.1	S13	New LIA, Working & Training Facilities for RDC	
WE4.2	S14	New Recruit LIA, Working, Training for A, B, C, D Coy	URB scope amended to provide new facilities as existing facilities at end of life and unsuitable for refurbishment and expansion.
<b>STAGE 6 – 1RTB Training Support Company Facilities</b>			
WE6.1	S16	New Recruit Physical Training Facility	URB scope adjusted by VM to exclude upgrade works to existing gym (A0014) and provide a new co-located facility to expand capacity.
WE6.3	S24	Upgrades to Training Support Company Facilities	URB scope refined based on adaptive re-use of Edmondson building (A0034).

Work Element	Scope Item	Description	Comments
WE6.4	S28	New Medical Training and TCCC Facilities	
<b>STAGE 7 – Marksmanship Training Range (MTR) and Kapooka Training Area Works</b>			
WE7.1	S11	New Weapon Range	URB scope adjusted by VM to 300m range.
<b>STAGE 8 – Solar Panels</b>			
WE8.1	S42	Solar Panels	Provision of roof mounted solar panels to various facilities
<b>Unfunded Scope – “Below the Line”</b>			
WE7.5	S41	Refurbish Weapon Training Simulation System (WTSS)	Additional scope to support EST0207 – extension of existing WTSS facility.
WE1.8	S31	Demolition (Medium Priority)	Demolition of redundant facilities not essential to facilitate the works.

## B.2.2. EMP Scope

This EMP has been derived from the CPB Contractors ‘The Way We Operate’ framework. The framework aligns with AS/NZ ISO 9004:2011 Managing for the sustained success of an organisation – a quality management approach which has been specifically adapted for the Riverina Redevelopment Joint Venture.

As a key document, the EMP integrates environmental management requirements, client obligations and community expectations during delivery. It provides environmental management protocols for the design and construction of the Blamey Barracks Kapooka (BBK) redevelopment.

Specifically, the EMP:

- Identifies the environmental management obligations relevant to RRJV and lists all applicable environmental legislation, permits and approvals
- Identifies environmental hazards (aspects), potential impacts and risks associated with the works
- Identifies reasonable and feasible measures to reduce the environmental impact of the project.
- Assists in the prevention of unauthorised environmental impacts
- Fulfils the EMS requirements enabling CPB Contractors continued certification to ISO14001.

The Riverina Redevelopment Joint Venture will operate under the CPB Contractors Environmental Policy and ISO14001 certification contained in Appendix A.

The Contractor’s Representative, with input from the Environmental Manager is responsible for implementation of the Plan. Environmental Roles and Responsibilities are set out in Appendix C.

To address significant environmental hazards (SEHs) and other environmental hazards associated with the works Sub-Plans have been developed for individual environmental aspects.

Sub-Plans addressing SEH’s have been identified through the review and analysis of environmental reports, contractual documents, community and legal compliance requirements relating to the project (Element 3 of the EMP), risk assessment and professional experience.

Aspect specific sub-plans include.

- Soil and Water Management
- Stockpile Management

- Flora and Fauna Management
- Nominated Site In Perpetuity Management
- Noise Management
- Air Quality Management
- Vibration Management
- Energy Management.
- Heritage Management
- Contamination Management
- Energy Management
- Hazardous Substance Management
- Waste Management

Each of the Sub-Plan will be regularly reviewed as part of the EMP review process as the risks are reviewed.

### **B.2.3. Environmental Management Obligations**

This register lists the following environmental management obligations and how the obligations will be implemented:

- Applicable legislation
- Contract requirements
- Approval requirements
- Other associated obligations or commitments

The register will be reviewed regularly, and updates made as necessary. The Environmental Manager (or delegate) is responsible for updating this register.

This register is maintained in Aconex as document number RRP-BBK-GLO-RRJV-ENV-REG-0001.



## B.2.4. Objectives and Targets

The following environmental performance targets are applicable to the project:

**Table 2: Leading indicators**

Key Performance Indicator	Target	When	How measured	Accountability
Environmental training	100% of scheduled training completed on time	Prior to relevant activities	Based on environmental risks and the qualifications and experience of the workforce	Environmental Manager
Significant Environmental Aspect Management	Significant Environmental Aspect (SEA) Review	Each quarter	SEA Review Template	Environmental Manager
Environmental management review of Work Packs	100%	Prior to activity commencement / quarterly reviews	Work Pack sign-off/ Review register	Environmental Manager
Environmental Audits	100% of scheduled audits completed.	As per project obligations and (minimum 1 per annum)	Synergy / Monthly environmental dashboards	Environmental Manager
Completion of inspections	100%	Each month	Inspections of environmental controls to be identified, scheduled and conducted	Environmental Manager (or delegate)
Action Management	>80% of all env actions raised are completed on time. Calculated as actions closed on time/ actions due during period.	Each month	Synergy / Monthly env dashboards	Environmental Manager
Engagement	Subcontractor forums	1 per project / quarter	Synergy	Environmental Manager

**Table 3: Lagging Indicators**

Key Performance Indicator	Target	Time Frame	How measured	Accountability
Level 1 & 2 environmental incidents	Zero harm	Ongoing	Incident reporting	Construction Manager
Number of actions taken by regulators and/or client	Zero harm	At all times	Implementation of the EMP	Environmental Manager
Area of land cleared or disturbed without authorisation	Zero harm	At all times	Implementation of the Fauna and Fauna Sub-plan	Construction Manager
Number of unauthorised discharges	Zero harm	At all times	Implementation of Soil and Water Sub-plan	Construction Manager
Damage to heritage items or places without relevant approvals	Zero harm	At all times	Implementation of Heritage Sub-plan	Construction Manager
100% of all fuel use and greenhouse gas (GHG) emissions generated by the project is captured and entered into JDE (NGER reporting requirement).	All use / emissions entered into JDE System	Monthly	Implementation of Energy Sub-plan	Commercial Manager

Key Performance Indicator	Target	Time Frame	How measured	Accountability
% of waste reused or recycled	75% of waste generated [note waste types excluded from calculation will be defined]	12 months	Implementation of Waste Sub-plan	Environmental Manager

## B.2.5. Key Environmental Stakeholders

Key environmental management stakeholders have been identified and listed in Table 4, or refer to separate Community Management Plan.

Refer to Element 6.1 for further details, including the development of a comprehensive stakeholder analysis process to identify stakeholders and their interests relevant to environmental management of the project.

**Table 4: Environmental Stakeholders**

Stakeholder	Contact
Capital Facilities and Infrastructure (SEG-CFI)	LTCOL Dan Palmer
Army Headquarters (AHQ)	LTCOL Jonathan Pollard
Headquarters Forces Command	Adrian Murer
Joint Logistics Command (JCG)	LTCOL Andrew Weir
Estate Planning Branch – Region & Base	Dr Kathy Francki, Karen Reynolds
Director Service Delivery (SEG)	Elizabeth Patton
Base Manager (SEG) (BBK/RBW)	Wendy Frankham
Assistant Base Manager (BBK)	Kevin Armour
Estate Management and Planning	Wayne Clegget, Craig Orr
Directorate Estate Engineering Policy (DEEP)	Mark Sweetman
Department Climate Change Energy Environment and Water (DCCEEW)	Contact@DCCEEW.gov.au
Directorate of Environment and Heritage Policy Development (DEHPD)	Carmel McMahon, Claire Arthur
Directorate of Environmental Assessment and Compliance (DEPAC)	Berlinda Bowler, Kieran Shields
Regional Environmental and Sustainability Manager (RESM)	Rob Cameron, Joanne Hardy
Directorate of Environmental Resource Management and Sustainability (DERMS)	Lyn Harvey, Allan O'Connor
Directorate of PFAS Management (DPFAS)	Karin Hewitt, David Williamson
Directorate Contamination Assessment and Remediation Management (DCARM)	Richard Poli, Dr Khuong Vuong
Directorate of Estate and Land Management (DELM)	Brett Woodward
Australian Army History Unit	Tim Gellel
EMOS Operations and PSS	Wayne Walsh, Ben Renshaw and Tracey Reid
Wagga Wagga City Council	Warren Faulkner, Stephen McKay, Jason Creed
Fire & Rescue NSW	Andrew Wallace (Operations Manager – Defence Base Services - South East Aust)
Indigenous Stakeholders	Uncle Michael Lyons – Sandhills Artefacts, Luke Wighton – Yuulug Cultural Programs Wiradjuri Mawang Gaway Advisory Group

## B.3 Environmental Management System

### B.3.1. System Overview

#### B.3.1.1. Governance documentation

The Riverina Redevelopment Joint Venture will operate under the CPB Contractors Environmental Management System (EMS) which is based on the requirements of the CPB Management System (CMS).

The CMS is certified to conform to AS/NZS ISO 14001:2016 Environmental management systems – Requirements with guidance for use.

Evidence of certification is included in Appendix A.

The CMS has been developed and implemented to ensure a consistent approach to the project delivery and foster continual improvement.

As shown in Figure 1 the management system comprises the following components:

- Overarching Board Governance
- A Policy is a statement of commitment and lists the mandatory requirements for individuals of the organisation to comply with.
- Procedures and Work Instructions specify how to undertake and control specific activities. Where appropriate, project specific procedures are produced to include specific project details.
- Tools are preformatted documents such as forms and templates that are required to be completed as part of following a Procedure.
- Knowledge documents are reference material to provide context, additional information or guidance to a Policy or Procedure.
- Business Applications are the software tools used to support activities and Procedures.



**Figure 1: CPB Management System (CMS)**

#### B.3.1.2. Environmental Management Plan (EMP)

Each project team maintains a project specific EMP (this document) that describes the actions to comply with each Element and Expectation.

Implementation of the EMP demonstrates due diligence by nominating and monitoring the following:

- Contractual environmental requirements are being fulfilled
- The project is compliant with all relevant environmental legislation
- Environmental impacts are avoided where possible, or minimised.

### **B.3.2. Embedding environmental requirements in the design development process**

Workshops were held during design development with the design and construction teams to ensure that environmental and sustainability requirements were identified, considered and fully integrated into the design and construction methodology.

Technical studies include:

- Biodiversity Assessments
- Contamination Assessments, Preliminary Site Investigation (PSI), Detailed Site Investigation (DSI), Preliminary PFAS Risk Assessment
- Heritage Reports and Heritage Impact Assessment (HIA)
- Bushfire Attack Level Assessments
- Geotechnical Investigations

These studies inform the design development and the Environmental Manager who will provide input into requirements and environmental risk identification and design development at all phases.

Initiatives will be incorporated into the design where practicable. Any additional initiatives and compliance with environment and sustainability requirements will be documented within the Design Reports.

### **B.3.3. Ongoing environmental risk identification and management in construction**

Risk identification and management processes are a key focus in developing and implementing all EMS documentation. The objective of these processes is to confirm that the project is designed and constructed within acceptable limits of risk to personnel and the environment.

To assist in initial environmental risk identification, a review of potentially significant environmental aspects and impacts has been undertaken in Section B.3.5 to determine the specific environmental sub plans required.

Ongoing environmental risk and opportunities identification will be a key consideration during all risk assessments, including:

- Risk Register
- Construction Area Plan (CAP) risk assessments
- Work Packs, including Work Pack Risk Assessment
- Environmental Work Method Statements (EWMS) or Safe Work Method Statements (SWMSs), which address environmental risks (as applicable) Appendix I.
- Pre-start meetings.

We will prepare the risk assessment and planning documents detailed in

Table 6 to ensure the project is constructed safely, that we minimise environmental impacts and comply with all approval and contractual obligations. Our robust process will include a cross-functional review and sign-off at key stages.

**Table 6: Key construction planning documents**

Key planning document	Description
Construction Area Plan	The planning document for each construction area, CAPs will include overall construction approach and methodology, Construction Area Plan Risk Assessment (CAPRA), constructability reviews and associated Work Pack listing
Work Pack	<p>A Work Pack is a document containing all the information required to manage an activity. There will be multiple Work Packs referenced in each CAP. Each Work Pack will include a step-by-step breakdown of the activity to be undertaken, work method statement, sequencing, inspection and test plans (ITPs), SWMSs, relevant drawings, and environmental controls.</p> <p>Work Packs will be developed to provide an integrated approach to the management of safety, quality and environmental risks. During construction planning for each work area, work methods will be reviewed, the risks identified during the design phase will be re-assessed, and new risks identified and recorded in the Work Pack for communication to field staff. All controls necessary to ensure compliance will be included in the Work Packs, which will reference the relevant SEPs, procedures, checklists and forms. Work Packs may identify the need for amendment to an existing SEP or preparation of a new SEP.</p> <p>Work Packs will be approved by the Environmental Manager (or delegate) prior to commencement of works described in their scope. Relevance and adequacy of environmental controls identified in Work Packs will be reviewed and where required, updated.</p>
SWMS or EWMS	<p>A SWMS or EWMS description of methodology will be required to complete an activity. It will describe the prescriptive sequence of tasks to be undertaken. Depending on the activity's complexity or if the same activity is being repeated elsewhere, the work method statement may be a separate document included in the Work Pack.</p> <p>The development of EWMSs or SWMSs will be conducted and formally recorded for relevant activities prior to their commencement. They will include environmental hazards and their mitigation for that task. Its purpose will be to communicate task methodology in detail to the workplace personnel completing the task. Field staff will review and sign onto these documents, including the risk assessment and safe work systems, as part of a pre-start meeting.</p> <p>EWMS/ SWMS task-specific information will include work steps (in sequence) with work-step precautions, associated hazard(s) and hazard control(s), specific personal protective equipment, equipment available onsite, responsibilities, competencies and where applicable, permit conditions. The environmental context of a SWMS will be included to prompt consideration in the task steps, to address the positive actions of environmental care (i.e. dust control, erosion prevention, waste recycling, etc.) and address negative actions that may introduce an environmental impact (i.e. contamination, pollution, etc.).</p>
Pre-start meeting	<p>A pre-start meeting is a review of work progress and activities planned for the incoming shift focused on creating a positive environment, safety and quality culture and continually improving work habits, generating greater workforce involvement, and increasing accountability. It will:</p> <ul style="list-style-type: none"> <li>(a) Identify any changes to the work or environment, including impacts of nearby or interfacing work.</li> <li>(b) Include any environment or safety hazards reported and incidents reported on previous shifts.</li> </ul> <p>Site supervisors will conduct daily pre-start meetings with all work team members before starting work for each shift. These meetings will typically be conducted by a supervisor (or approved delegate) with individual work crews. Attendance at the pre-start meeting will be mandatory. Content of the pre-start meeting will be recorded, including any issues raised as well as attendance. Pre-start meetings will be held to ensure all workers are informed about hazards in their work area prior to start of the work. It will be used in conjunction with the SWMS document to ensure current on-site conditions (and hazards) are considered with those identified in the SWMS document, particularly looking for what conditions have changed (e.g. new workers, weather, changed materials, etc.) since the work was previously undertaken, i.e. the day or shift before.</p> <p>The pre-start meetings will contribute to implementing a safe work habit of checking the immediate surroundings and workplace conditions before starting, including considering potential environmental impacts.</p>
Site Environment Plans (SEPs)	SEPs are prepared for each individual worksite (usually each work element) and these specific documents include detailed plans illustrating key environmental controls, and tables documenting key requirements. These will inform and fully integrate with detailed construction planning.

The Environmental Manager (or delegate) will have approval authority for all environmental risk assessment types to ensure environmental risks and opportunities are adequately raised and addressed.

In addition, as set out in Section B.3.5, sub-plans will include a section that identifies key aspects and potential environmental impacts, which will also be used to inform development of specific management strategies to be applied across the project.

Identified environmental risks, controls and accountabilities will be communicated to all relevant personnel through preparation and communication of our environmental Sub Plans, CAPs, Work Packs, SWMSs/EWMSs, SEPs, toolbox meetings, and pre-start meetings.

### B.3.4. Continual Improvement

In addition to specifying the day-to-day environmental management of the project, the EMP details activities to be performed to deliver continual improvement in environmental performance.

The continual improvement process is achieved via the following steps:

- Undertaking comprehensive planning activities to assess environmental risks and design effective controls
- Identifying design and construction technique refinements to reduce risk and improve environmental management outcomes, as well as
- Implementing audit and review of both the EMP and Environmental Management System (EMS).

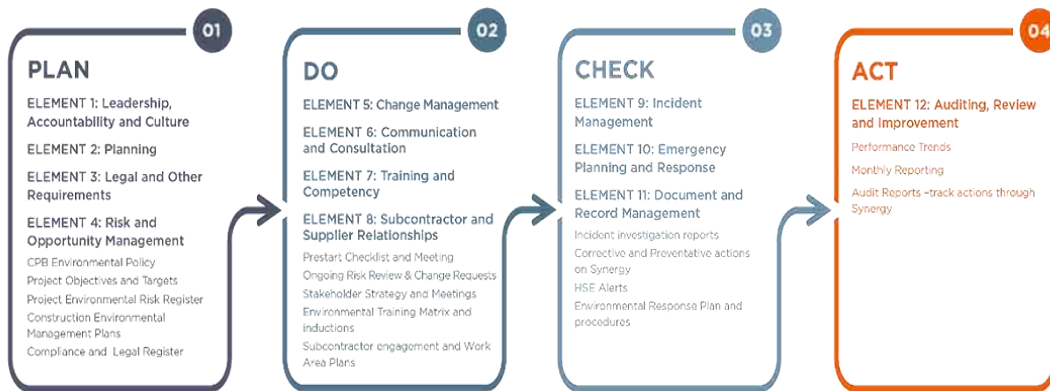


Figure 2: Continual improvement process

### B.3.5. Potentially Significant Environmental Aspects and Impacts

The term ‘hazard’ is used throughout this EMP and has the same meaning as ‘aspect’ for the purposes of implementing ISO14001 requirements.

Potentially Significant Environmental Aspects (SEAs) are identified as follows:

- Aspects documented as having a significant environmental impact within environmental assessment reports (including social/ stakeholder impacts), or contractual documents,
- Aspects that represent a significant environmental legal compliance risk.
- Aspects identified having adverse material impact or rated as either having a High, Very High or Extreme ‘Risk Level’ based on the Consequence and Likelihood criteria within the Risk Rating Matrix;
- The aspects that have or can have one or more significant beneficial impacts where defined as either having a High or Very High ‘Benefit Rating’ based on the Sustainability Impact Assessment Criteria within the Sustainability and Innovation Opportunity Register.

SEAs will attract a higher level of focus through design development and construction work planning detailed in Element 3 and 4 of Part B of this Plan.

Sub-plans are developed for:

- Significant Environmental Aspects
- Potential environmental impacts that require targeted management to avoid and minimise impacts,
- As required by Approvals or contractual obligations

Each of the Sub-plans listed below will be regularly reviewed during construction as the environmental aspects and impacts are reviewed.

**Table 7: Environmental Aspects, Impacts and corresponding Sub-plan/s**

Environmental Aspect (or hazard)	Significant Environmental Aspect (Yes/No)	Associated Potential Impacts	Environmental Sub-plans (Part C)
Clearing and grubbing	Yes	Injury/fatality of an endangered, vulnerable or threatened species	Flora and Fauna Sub-Plan Soil and Water Sub-Plan
Piling	Yes	Disturbance	Vibration Sub-plan Noise Sub-Plan
Demolition	Yes	Waste generation Air quality	Waste Sub-Plan Air Quality Sub-Plan
Management of asbestos or contaminated soil	Yes	<b>Waste generation</b> Air quality	Waste Sub-Plan Contamination Sub-Plan Hazardous Substances Sub-Plan
Bulk excavation	Yes	<b>Waste generation</b> Air quality Noise Water table impacts	Soil and Water Sub-Plan Contamination Sub-Plan Noise Sub-Plan
Stockpiling and hauling	Yes	<b>Waste generation</b> Air quality	Soil and Water Sub- Plan Air Quality Sub-Plan Stockpile Management Sub-Plan Contamination Sub Plan
Construction roads/ Buildings infrastructure- Civil	Yes	<b>Waste generation</b> Air quality Sediment	Hazardous Substances Sub-Plan Waste Sub-Plan Air Quality Sub-Plan
Surface water contamination - PFAS	Yes	Contamination Water Sediment	Stockpile Management Sub-Plan Contamination Sub Plan Soil and Water Sub-Plan

The above terminology is consistent with ISO 14001 definitions, see below:

**Environmental aspect:**

Element of an organisation’s (3.1.4) activities or products or services that interacts or can interact with the environment (3.2.1)

*Note 1: An environmental aspect can cause (an) environmental impact(s) (3.2.4). A significant environmental aspect is one that has or can have one or more significant environmental impact(s).*

*Note 2: Significant environmental aspects are determined by the organization applying one or more criteria.*

## Environmental impact:

Change to the environment (3.2.1), whether adverse or beneficial, wholly or partially resulting from an organization's (3.1.4) environmental aspects (3.2.2)

### B.3.6. Approvals Delivery Strategy

A staged approach to commencing design investigations and construction activities that considers potential environmental risks have been developed which considers approvals that the RRJV will obtain to allow the commencement of works. This strategy is set below.

**Table 8: Approvals delivery strategy**

Activity	Approval Authority (agency consultation)	Scope	Relevant document(s)	Target Submission	Target Approval
Design investigations (including contamination and geotechnical)	Department Defence ESM	Investigation to inform the design	Environmental Management Plan	30/05/2022	30/05/2022
Commencement of redevelopment works	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Commencement of construction activities	EPBC Act Referral	Nov 23	March 24
Commencement of redevelopment works	ESM	Commencement of construction	Environmental Clearance Certificate (ECC)	Min. 4 weeks prior	Min. 1 week prior
Demolition	Department Defence CFI	Demolition of buildings and infrastructure	Approval to Demolish/Dispose Defence Assets	Min. 4 weeks prior	Min. 1 week prior
Site establishment	PMCA	Approval for site establishment For each work element	Environmental Management Plan	Min. 4 weeks prior	Min. 1 week prior
Temporary Stockpiles	ESM/Base Mgt	Approval of temporary stockpiles for each work element	Site Environment Plan, ESCP	Min. 4 weeks prior	Min. 1 week prior
Out of hours works	SEG Base Mgt	Works outside of normal hours	Out of hours' notice	Min. 4 weeks prior	Min. 1 week prior
Offsite disposal of PFAS contaminated materials	EPA NSW	Offsite disposal to licenced waste facility	Waste Classification Report	Min. 8 weeks prior	Min. 1 week prior



# C. Implementation

## C.1 Elements and Expectations

The Environmental Management Plan is structured using a common set of Elements and Expectations:

Element	Key aspects for managing this function
Expectation	The high-level outcomes achieved as part of each Element

This two-level hierarchy provides a consistent structure that is applied across all Management Plans on the project. Those Elements are:

Element 1: Leadership, Accountability and Culture

Element 2: Planning

Element 3: Legal and Other Requirements

Element 4: Risk and Opportunity Management

Element 5: Change Management

Element 6: Communication and Consultation

Element 7: Training and Competency

Element 8: Subcontractor Relationships

Element 9: Incident Management

Element 10: Emergency Planning and Response

Element 11: Document and Record Management

Element 12: Auditing, Review and Improvement

## C.1.1. Element 1: Leadership, Accountability and Culture

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference
Environmental leadership and commitment are demonstrated through participation in environmental management	<p><b>Environment Policy</b></p> <p>The RRJV has adopted the CPB Contractors Environment Policy to lead the creation of a consultative and proactive culture that ensures environmental compliance as a driver of work behaviours.</p> <p>This will be communicated in inductions and prominently displayed at the Main Site Office.</p> <p>All personnel in leadership roles on the RRJV will participate in environmental management activities, including toolbox talks, and raising any environmental issues observed during inspections and incident reviews.</p>	<p><b>Contractor's Representative</b></p> <p>Environmental Manager</p> <p>Relevant functional managers</p>	<p>Environment policy displayed and communicated in site inductions</p>	<p><a href="#">Environment Policy</a></p>
Environmental accountabilities, roles and responsibilities for managers, staff, employees and subcontractors are clearly defined, documented and communicated	<p><b>Roles and Responsibilities</b></p> <p>Environmental responsibilities are included in all relevant Position Descriptions.</p> <p>Roles that carry specific environmental accountabilities (e.g. those that supervise or manage work with specific environmental risks) will contain more detailed environmental content.</p> <p>The environmental responsibilities contained in Position Descriptions are communicated to each person by their immediate Supervisor upon commencing in their role.</p>	<p><b>HR Manager</b></p> <p>Environmental Manager</p> <p>Line managers</p>	<p>Position Descriptions</p>	<p><a href="#">Prepare Position Descriptions</a></p>
Environmental leadership and commitment are demonstrated through measurable participation in environmental management	<p><b>Participation and Measurement</b></p> <p>All personnel in leadership roles on the RRJV participate in environmental management activities, including observations, incident reviews and HSE committee meetings.</p> <p>RRJV management will regularly review environmental performance against KPIs, raise corrective actions to maintain or improve environmental performance as necessary.</p> <p>Pertinent environmental matters shall be addressed at communication forums.</p>	<p><b>Contractor's Representative</b></p> <p>Line managers</p> <p>Functional managers</p> <p>Supervisory staff</p> <p>Environmental Manager</p>	<p>Measurement system output to include:</p> <p>Observation records,</p> <p>Incident reviews,</p> <p>HSE Committee meeting attendance (minutes),</p> <p>delivering toolbox talks</p> <p>Monthly reports</p>	<p><a href="#">Leadership and Culture</a></p>
Environmental expectations are clearly defined with appropriate reward and disciplinary processes in place.	<p><b>Environmental Requirements</b></p> <p>Environmental requirements are documented and communicated to project personnel through multiple processes (see Section B.3).</p>	<p><b>Contractor's Representative</b></p> <p>Environmental Manager</p>	<p>SEPs</p> <p>CAPs</p> <p>Work Packs</p> <p>SWMS</p> <p>Pre-start Meetings</p>	<p><a href="#">Construction Procedures</a></p>

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference
	<p><b>Performance Targets</b> Environmental performance targets for the project have been identified in Section 2.4 of this document. These include lead and lag Key Performance Indications (KPI).</p>	<b>Contractor's Representative</b> Environmental Manager	Monthly reports	
	<p><b>Managing Personal Performance</b> Environmental performance goals will be set and reviewed for individuals with environmental leadership roles (refer to each Element) during the performance and development review process. Any person who breaches the environmental requirements will be managed in accordance with the SHE Culture and Just Culture Frameworks.</p>	<b>Contractor's Representative</b> Line Managers	Performance and development reviews	<a href="#">Conduct Performance and Development Review</a>  <a href="#">Manage Just Culture</a>

### C.1.2. Element 2: Planning

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference
Adequate resources are provided to effectively implement the EMP	<p><b>Resources</b> The budget includes enough allowances to implement the EMP, including people, technical environmental expertise, equipment, materials, training, plant, and infrastructure. The Environmental Manager is consulted in setting and revising (forecasting) the budget.</p>	<b>Contractor's Representative</b> Commercial Manager Environmental Manager HR Manager	Cost Plan & Forecasts Organisational structure Training matrix	
	<p><b>Environmental Monitoring Planning</b> The Environmental Manager has developed the Environmental Monitoring Schedule(s) which identifies:</p> <ul style="list-style-type: none"> <li>• Equipment and maintenance requirements (including calibration)</li> <li>• Personnel required to implement the schedule</li> </ul>	<b>Environmental Manager</b>	Monitoring, Inspections, Reporting, Review, Audit (MIRRA) Schedule Environmental Sub-plans	
Business systems are defined and established	<p><b>Define and set up IT Systems</b> Applications required to manage the environment on the RRP are defined and established prior to works commencing. Systems to be used include:</p> <ul style="list-style-type: none"> <li>• <b>Synergy</b> - Reporting and recording all environmental incidents, audit results and corrective actions.</li> <li>• <b>Synergy</b> – Record all water use and waste generation data.</li> <li>• <b>JD Edwards</b> (NGER module) to capture energy use and emissions.</li> <li>• <b>Aconex</b> – Records and documents management and archiving</li> <li>• <b>Environmental Monitoring Spreadsheets</b> – To capture and review all environmental monitoring data.</li> </ul>	<b>Environmental Manager</b> Commercial Manager	Applicable business systems	<a href="#">CPB Applications</a>

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference
Identify Significant Environmental Aspects	<b>Identify Significant Environmental Aspects (SEA)</b> Significant Environmental Aspects (SEAs) are identified as described in Section 4.	<b>Environmental Manager</b>	Significant Environmental Aspects and Sub-plans	<a href="#">Establish Project Risk Management</a>
Environmental Sub-plans are prepared and maintained	<b>Environmental Sub-plans</b> Environmental Sub-plans (Part C) are reviewed for on-going relevance and accuracy by the Environmental Manager. The frequency of review is triggered by either incident history, substantial changes to the scope, including contract variations, and/or management review requirements. Reviews are documented and records retained in the document management system. Sub-plans are developed for: <ul style="list-style-type: none"> <li>• Potential Significant Environmental Aspects</li> <li>• Aspects that require targeted environmental management as per Approval or contractual obligations</li> </ul>	<b>Environmental Manager</b>	Reviews of SEA and Sub-plans	
Environmental Management prior to construction	<b>Environmental Clearance Certificate (ECC)</b> To be completed and approved prior to the commencement of works by ESM.	Environmental Manager ESM	ECC	

### C.1.3. Element 3: Legal and Other Requirements

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
Relevant legal, contractual and other requirements are identified and maintained in a legal and other obligations register	<b>Identifying Environmental Obligations</b> The Environmental Manager has reviewed the Contract, construction methodology and program and identified all: <ul style="list-style-type: none"> <li>• Contractual conditions specific to environmental management.</li> <li>• Regulatory approvals required and associated conditions.</li> <li>• Local, state, and federal laws using the online subscription to EnviroLaw (Enviro Essentials).</li> <li>• Targets and objectives.</li> </ul> The sources and details, and means of compliance with the above, are captured within an Environmental Obligations Register. Documentary evidence will be available to show that all owners of obligations have been informed of their responsibility and can deliver the obligation.	<b>Environmental Manager</b> Construction Manager	Environmental Obligations Register(s)	<a href="#">Enviro Essentials</a>

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
All necessary environmental approvals are obtained prior to commencing relevant works and surrendered on completion	<p><b>Obtaining and Surrendering Environmental Approvals</b>  Approvals required to deliver the project are obtained prior to the commencement of any activities relating to the scope of the approval. The timing to obtain each necessary regulatory approval is determined and included within the program linked to relevant activities.  Details of all approvals and licenses (including applications and decision notices where appropriate) are maintained in the Environmental Obligations Register and Section B.3.6). All regulatory approvals will be surrendered according to the requirements of the approval or, where not stated, as soon as practical following the completion of the activity to which the approval relates.</p>	<p><b>Environmental Manager</b>  Engineers  Construction Manager</p>	<p>Environmental approvals in program   Environmental approval documentation   Approval and license conditions entered into   Environmental Obligations Register</p>	
Work is planned and executed to ensure compliance	<p><b>Planning for Compliance</b>  The Environmental Manager is consulted upon commencement of development of all Construction Area Plans (CAPs) and Work Packs, and throughout their development. All controls necessary to ensure compliance are included in the CAPs and Work Packs and in the Environmental Sub-plans (Part C of this Plan).  CAP's and Work Packs should include Site Environmental Plans that clearly show the controls to be implemented. The program is updated to include new approvals determined necessary after the review of work plans.  CAPs and Work Packs are reviewed by the Environmental Manager before the start of works described in their scope.</p>	<p><b>Construction Manager</b>  Supervisors  Engineers  Environmental Manager  Engineering Manager</p>	<p>Reviewed CAPs and Work Packs including relevant Permits, SEPs   Update program</p>	<p><a href="#">Develop Construction Area Plan</a>   <a href="#">Manager Work Permits Develop and Implement Site Environment Plan</a></p>
Inspections, observations and monitoring are performed	<p><b>Implementing Controls</b>  Controls required to achieve compliance, as detailed in the CAPs and Work Packs, will be implemented before relevant works commence.</p>	<p><b>Supervisors</b>  Engineers  Environmental Manager</p>	<p>Engineered (physical) and administrative controls (e.g. procedures, forms, training) in place</p>	<p><a href="#">Conduct Task Observations and Workplace Inspections</a></p>
	<p><b>Inspections and Observations</b>  Controls are to be inspected regularly to ensure their ongoing suitability and effectiveness.  Inspections and observations are planned and conducted according to the requirements of the Conduct Task Observations and Workplace Inspections procedure.  Inspections undertaken by the Environmental Manager (or delegate) are scheduled using the MIRRA schedule (Appendix D).</p>	<p><b>Supervisors</b>  Engineers  Environmental Manager</p>	<p>Observation records  Inspection schedules  Inspection checklists  Corrective actions in Synergy – Action Plan Module or inspection records</p>	<p><a href="#">Conduct task observations and workplace inspections</a></p>

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
	<p>The outcomes of inspections are captured on the inspection checklists. Corrective actions are raised, tracked and closed out in the Synergy – Action Plan Module or via the site inspection records.</p>		<p>MIRRA Schedule</p>	
	<p><b>Environmental Monitoring</b>  Environmental monitoring is carried out in accordance with the Approval, contractual and legislative requirements, and to provide early indication of potential adverse impacts to the environment or community.  Environmental monitoring results are interpreted to identify actual and potential non-compliances and events that may result in nuisance, environmental harm, and unacceptable loss of amenity or community complaints. Corrective actions are taken immediately or are raised and managed using Synergy</p>	<p><b>Environmental Manager</b></p>	<p>MIRRA Schedule  Monitoring records  Calibration records  Corrective actions  Environmental Sub-plans</p>	
<p>All non-compliances are recorded and corrective/preventative actions implemented.</p>	<p><b>Reporting non-compliances</b>  All non-compliances are recorded. Non-compliances resulting in regulatory action or incidents are recorded as Notice of Violations and/or incidents in Synergy.  All Notice of Violations are recorded as Class 2 (or above) incidents.</p>	<p><b>Environmental Manager</b>  All personnel</p>	<p>Incident reports</p>	
<p>All energy and greenhouse data are collected and entered into JDE</p>	<p><b>Greenhouse and Energy</b>  ‘Operational Control’ identifies which companies need to report in accordance with the National Greenhouse and Energy Reporting Act 2007 and is determined as part of the start-up process.  A copy of the operational control determination assessment is obtained by the Environmental Manager.  Reporting on energy consumption monthly.  Where subcontractors provide their own fuel, they will provide a monthly fuel consumption report to the RRJV commercial team along with their claim. This data is then entered into the JDE NGER Module.  Subcontractor reporting is tracked by the Commercial Team.</p>	<p><b>Commercial Manager</b>  Construction Manager  Environmental Manager</p>	<p>NGERS operational control assessment  NGER subcontractor register  NGER data checklist  Completed NGER subcontractor records  Monthly HSE Statistical reports</p>	<p><a href="#">Subcontractor Fuel Reporting Form</a></p>
<p>Personnel on the site have access to current versions of relevant legislation, standards and codes of practice</p>	<p><b>Updates to Legislation, Standards and Codes of Practice</b>  Access to all relevant legislation will be available to personnel through <b>Enviro Essentials</b> or other online resources. Updates to any specific legal registers will be made relevant to the Commercial Manager.</p>	<p><b>Environmental Manager</b>  Commercial Manager</p>	<p>Updates distributed. Relevant documents updated</p>	<p><a href="#">Enviro Essentials</a></p>

## C.1.4. Element 4: Risk and Opportunity Management

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
Systematic processes are implemented for identifying environmental risks and opportunities at all stages of the works	<p><b>Identifying Environmental Risks and Opportunities</b>            Environmental risks and opportunities associated with activities, products and services of the project will be identified, recorded and tracked in accordance with the risk management process (see Sections B.3 and 4). Significant environmental aspects will be identified in accordance with Section 4.</p>	<p><b>Contractor's Representative</b>            Environmental Manager            Engineering Manager            Engineers            Supervisors</p>	<p>Principal Risk Review            Construction Area Plan Risk Reviews            Work Pack Risk Assessments            Prestart Meeting</p>	
Identified risks and opportunities are evaluated according to agreed criteria and recorded	<p><b>Analysing Environmental Risks and Opportunities</b>            Each environmental risk and opportunity will be evaluated and assigned a rating determined using the consequence and likelihood criteria in the Risk Rating Matrix.            Opportunities will be assessed to determine whether they can be implemented on the project and shall be assessed using a cost-benefit analysis and/or business case for the opportunity.</p>	<p><b>Environmental Manager Engineers</b></p>	<p>Work Pack risk assessments            Prestart Meeting</p>	<p>Identify Significant Environmental Aspects</p> <p><a href="#">Establish Project Risk Management</a></p> <p><a href="#">Undertake Construction Area Risk Review</a></p>
Environmental controls appropriate to the level of risk are identified, documented and implemented	<p><b>Identifying Adequate Controls</b>            Risks with a high, very high or extreme risk rating will be considered 'significant' and will be controlled using appropriate systems of work, including Environmental Sub-plans and work procedures, along with available 'hard controls'<sup>1</sup> Refer to Section 4 for further information regarding the identification of Significant Environmental Aspects. Accountability for the implementation of each control is assigned in the respective Sub-plan and SEPs Controls are selected in consultation with the Environmental Manager to achieve the following, in order of preference:</p> <ul style="list-style-type: none"> <li>• Eliminate the risk by not performing the relevant activity.</li> <li>• Substitute by performing the relevant activity in a way that presents a lower risk.</li> <li>• Implement physical (engineered) controls (e.g. sediment basins, check dams).</li> <li>• Implement administrative controls (e.g. procedures, training, inspections).</li> </ul>	<p><b>Environmental Manager</b>            Construction Manager            Project Engineers</p>	<p>Controls agreed (engineered or administrative)</p>	<p><a href="#">Undertake Work Pack Risk Assessment</a></p> <p>Risk Rating Matrix</p> <p>Risk Tolerability Framework for Environmental Management</p>

<sup>1</sup> Hard controls may include physical separation, concrete/ water filled barriers, sediment basins, check dams, locks, spill prevention measures.

<b>Expectations</b>	<b>How we will meet the Expectations (minimum requirements)</b>	<b>Responsible Key Contributor</b>	<b>Deliverables</b>	<b>CMS Links / Reference docs</b>
	<b>Implementing Controls</b> Controls are implemented by the accountable person as specified in the Sub-plan or SEP. No activity is commenced until all relevant controls are implemented.	<b>Risk owners</b> Supervisors	Controls in place (engineered or administrative)	
Feasible opportunities are implemented	<b>Implementing Opportunities</b> Opportunities identified and for which a cost benefit and/or business case has been developed, are submitted to the appropriate member of the RRJV leadership team for approval. Once approved, accountability for the opportunity is assigned and implemented. Environmental and cost benefits are recorded and reported in monthly reporting.	<b>Construction Manager</b> Opportunity Owner	Monthly reports Case studies	
Identified environmental risks and controls are communicated to all relevant personnel	<b>Communications in line with Construction Planning</b> The environmental risks, controls and accountabilities identified are communicated to all relevant personnel. This is achieved through the preparation and communication of the construction methodology, CAPs, Work Packs, SEPs, and the conduct of Safety/Environment-in-Design workshops.	<b>Construction Manager</b> Engineers Environmental Manager	Pre-start meeting content. Records of communications and meetings CAP, Work Pack and SEP	
	<b>HSE Communications</b> Environmental risks, controls and accountabilities are also communicated through delivery of HSE communications, including HSE Committee meetings, toolbox talks and pre-start meetings.	<b>Engineers</b> Supervisors Environmental Manager Construction Manager Health and Safety Manager	Site induction content Toolbox talk content and attendee records. Pre-start meeting content. Records of communications and meetings	
	<b>Communication through Training</b> Nominated administrative controls, including procedures and training, will be communicated through training in their requirements. The planning and delivery of this training is provided according to the requirements of Human Resources Management Plan.	<b>Environmental Manager</b> HR Manager	Training schedule Training matrix Training records	
Environmental risks and controls are regularly reviewed.	<b>Risk Review</b> The relevance and adequacy of environmental risks and controls identified in this EMP, the Principal Project Risk Review, CAP and Work Pack risk review/assessments are reviewed and updated.	<b>Contractor's Representative</b> Environmental Manager Engineers	Updated CAPs and Work Packs risk registers	



## C.1.5. Element 5: Change Management

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
Changes to planned operations that have potential environmental consequences are identified	<p><b>Identifying Change</b>            Personnel promptly report any 'medium' or 'major' changes that could affect the environment and/or community.            A 'medium' or 'major' change could result from a change to design, plant (fixed and mobile), systems, personnel and work methods such that the absence of a considered review could compromise the project's ability to comply with its obligations and/or result in an inadequate range of controls which could lead to an incident or result in community nuisance.            A 'medium' change is one which includes permanent changes to Work Pack methodology or work conditions. A 'major' change is one which is site-wide or requires a revision of CAP's.</p>	<p><b>Construction Manager</b>            Environmental Manager            Engineering Manager            Engineers            Supervisors</p>	<p>Change management process included in Induction and/or Training matrix            Change Management Training records            Change Requests</p>	
Risks associated with identified changes are assessed and controlled before changes are implemented	<p><b>Risks Associated with Change</b>            All proposed changes are documented, including the assessment of risks relating to the change. Key personnel affected by the change are involved in the risk assessment. All changes are requested or sponsored by a supervisor or Manager, who then becomes the change owner. Input from environmental personnel is sought as necessary.            The approach to risk assessment and the implementation of controls will follow the requirements of Elements 2, 3 and 4 of the EMP.</p>	<p><b>Construction Manager</b>            Change owner            Supervisors            Environmental Manager</p>	<p>Change Requests            Revised risk assessments</p>	
All changes with environmental consequences are authorised before they are implemented	<p><b>Changes Approved</b>            All change requests are approved by the Supervisor or manager of the change owner, or as otherwise required by the project delegations, before any relevant work commences, and a record is maintained. This will include any approvals associated with revised CAPs and Work Packs by the Environmental Manager.</p>	<p><b>Construction Manager</b>            Construction Manager            Environmental Manager</p>	<p>Change Requests            Additional environmental assessment (if triggered)</p>	
Controls associated with change are communicated to all affected personnel	<p><b>Communication of Change</b>            Affected personnel will be consulted and understand the effects of change before the relevant work commences. This is achieved through toolbox talks, daily pre-start meetings, HSE committees or forums arranged to specifically address changes.</p>	<p><b>Change Owner</b>            Supervisors</p>	<p>Toolbox talk material.            Pre-start meetings            Attendance records            Meeting minutes</p>	

## C.1.6. Element 6: Communication and Consultation

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
We will create a culture of collaboration across all functional disciplines	<p><b>Internal Culture of Collaboration</b> The project team will work together collaboratively to formulate integrated project specific management systems. Interdisciplinary meetings will be held on key issues to promote collaboration.</p>	<p><b>Contractor's Representative</b> Discipline leads</p>	<p>Integrated project specific management systems</p>	
External Environmental stakeholders are identified	<p><b>Identifying External Stakeholders</b> A comprehensive stakeholder analysis will be performed to identify stakeholders and their interests in the environmental management of the project. This will include community members and others who could be affected by the works, as well as government and environmental lobby groups. The Environmental Manager will be involved in the analysis process.</p>	<p><b>Environmental Manager</b></p>	<p>Stakeholders register or database Stakeholder Analysis</p>	
Relationships with external stakeholders are effectively managed	<p><b>Managing Relationships</b> Activities performed to effectively manage relationships with external stakeholders include:</p> <ul style="list-style-type: none"> <li>• Identifying environmental risks that relate to stakeholder interests by considering the impacts to stakeholders (documented in Environmental Risk Register)</li> <li>• Determining suitable controls and activities to mitigate risks (general controls and activities documented in risk registers, details in Environmental Sub-plans, CAPs, and Work Packs).</li> <li>• Performing inspections, audits, stakeholder engagement and monitoring activities to assess the effectiveness of controls.</li> </ul> <p>Actively engaging stakeholders through open communication and involvement.</p>	<p><b>Environmental Manager</b> Contractor's Representative Construction Manager</p>	<p>Risk reviews/assessments in CAPs, Work Packs, Environmental Sub-plans and Procedures Audit reports Monitoring results Communication s material Forums and opportunities for stakeholder engagement</p>	
Internal consultative forums are established with regular meetings scheduled, conducted, documented and communicated	<p><b>Consultative Forums</b> A schedule of communication forums will be developed which includes:</p> <ul style="list-style-type: none"> <li>• Managers' meetings that are to address environmental matters at least monthly.</li> <li>• Environmental Toolbox Talks at least monthly; and,</li> <li>• Pre-start meetings prior to commencing a shift.</li> </ul>	<p><b>Contractor's Representative</b> Environmental Manager H&amp;S Manager</p>	<p>Minutes of meetings Toolbox Talks Pre-Start meetings Attendance records</p>	

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
	<p>Establish appropriate environmental interfaces with the Client and regulatory bodies. Records will be kept of all HSE communication activities (e.g. attendance records). The effectiveness of the meeting outcomes will be reviewed as required.</p>			
	<p><b>Actions from Consultative Forums</b>            Actions arising from consultative forums are assigned and communicated to a responsible person and confirmed as being completed.            The RRJV will identify, track and complete environmental related actions using Synergy – Action Plans Module.</p>	<p><b>Environmental Manager</b></p>	<p>Synergy – Action Plans Module</p>	
	<p><b>HSE Signs and Notice Boards</b>            Dedicated HSE notice boards will be prominently located and maintained with current environmental information.</p>	<p><b>Environmental Manager</b></p>	<p>Signs and notice boards installed with current environmental content</p>	
<p>Environmental complaints and enquiries are recorded and responded to appropriately</p>	<p><b>Responding to Complaints</b>            All environmental-related complaints found to be related to the project will be investigated and recorded in the appropriate complaints management system.            Any relevant corrective actions are to be agreed and implemented, with accountabilities and time frames assigned. The complainant or enquirer is notified of the response once approved by the Contractor's Representative.</p>	<p><b>Environmental Manager</b>            Representative Contractor's Representative</p>	<p>Records of communications</p>	
	<p><b>Changes to Environmental Monitoring</b>            Environmental monitoring programs will be reviewed to address matters raised through valid complaints and consultations with stakeholders. Amendments to the monitoring program will be adequate to allow early identification of conditions that are likely to result in further complaints and/or exceedances. Data will be analysed to identify actual and potential impacts to the community, and corrective actions implemented.</p>	<p><b>Environmental Manager</b></p>	<p>Monitoring schedule            Monitoring records            Corrective actions in Synergy</p>	
	<p><b>Client and Internal Notifications</b>            The Business Unit Environment Manager and Corporate Environment Manager are notified of complaints that have or are likely to generate media interest.</p>	<p><b>Contractor's Representative</b></p>	<p>Record of communication</p>	

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
	The Client is notified according to the conditions outlined in the Contract.			
The effectiveness of internal and external stakeholder engagement is evaluated and improved.	<p><b>Evaluation of Internal and External Communications</b> The effectiveness of internal and external communication, including Client and key stakeholder consultation activities will be reviewed as required and within six months of construction commencement. The Environmental Manager participates in these reviews, which are led by the Contractor's Representative and include the Community and Stakeholder Manager and Health and Safety Manager.</p>	<b>Contractor's Representative</b> Environmental Manager H&S Manager	Meeting minutes	
Share knowledge from lessons learnt internally and consider the need for knowledge sharing with stakeholders and the construction industry	<p><b>Knowledge Sharing</b> The Contractor's Representative will ensure knowledge sharing internally to ensure that lessons learnt are implemented across worksites. The need for broader knowledge sharing with key stakeholders will be considered in consultation with corporate representatives to ensure contribution to knowledge and capacity building and assist in a larger market shift towards improved environmental performance.</p>	<b>Contractor's Representative</b> Environmental Manager	Toolbox talks Environmental alerts Conference presentations	

### C.1.7. Element 7: Training and Competency

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
All personnel have completed an induction containing relevant environmental information before they are authorised to work	<p><b>Inductions</b> All personnel, subcontractors and visitors will undergo an induction before commencing work on-site. The induction addresses general and project-specific environmental issues, including:</p> <ul style="list-style-type: none"> <li>• Environmental policy</li> <li>• How the EMP will be implemented on-site</li> <li>• High-risk environmental activities on the project and their controls</li> <li>• What to do in the event of an environmental incident.</li> </ul> <p>An assessment will be conducted upon completion of the induction. Induction materials are reviewed at least annually and amended to reflect changes to the environmental risks,</p>	<b>Environmental Manager</b> HR Manager Health and Safety Manager	Induction materials Training attendance records Completed induction assessments	

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
	the status of community relations and the occurrence of incidents.			
A training matrix is developed and documented	<p><b>Identifying Training Needs</b>  Environmental training needs are identified and documented within the training matrix within three months of commencement. In populating the training matrix, the environmental training requirements for each role are addressed, including competency, needs and capability.  The Environmental Manager will contribute to the development of the training matrix.  At a minimum environmental training (and/or induction training) will include:</p> <ul style="list-style-type: none"> <li>• Project specific Significant Environment Aspects and associated controls</li> <li>• Change management training - to identify changes and apply change management processes. This includes all supervisory staff being informed of the need to have changes approved prior to commencing relevant work.</li> <li>• Subcontractor training and competency responsibilities. This will also be included in subcontractor agreements.</li> <li>• Environmental emergency preparedness</li> <li>• Incident response and notification</li> </ul>	<b>Environment Representative</b> HR Manager	Identify and Manage Training  Training Plan Template  Training Startup Checklist  Training matrix  Performance and Development management plans  Subcontractor agreements Subcontractor Start-Up Meeting minutes	<a href="#">Identify and Manage Project Training</a>
	<p><b>Scheduling Training Needs</b>  A training schedule will be developed to plan the delivery of environmental training needs identified in the training matrix. Refresher training intervals will also be stated where applicable.</p>	<b>HR Manager</b> Environmental Manager	Training schedule Training records	
Personnel are trained and assessed according to the training plan	<p><b>Provide Training</b>  All resources to deliver the environmental training in the schedule, including personnel, equipment, funding and materials, will be allowed in the budget.  Subcontractors will undergo all necessary environmental training including any required by the project.  The required training will be determined by reviewing the training matrix relative to the scope of work and roles being filled or supplied by the subcontractor.</p>	<b>Contractor's Representative</b> Environmental Manager	Cost Plan  Training records including Subcontractor records	
	<p><b>Training Evaluation and Review</b>  Training assessments and evaluation forms will be used to assess the effectiveness of training. Training evaluation and feedback will be</p>	<b>HR Manager</b> Environmental Manager	Training evaluation forms Training matrix	

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
	reviewed and used to improve the quality of environmental training. The training matrix and schedule will be reviewed at least annually or before major new tasks begin.			
Training records are maintained and accessible to relevant personnel.	<b>Training Records</b> Records of all training activities, including inductions, will be maintained. Records will include the name and role of the attendee, the name of the course and, where applicable, reference to the document-controlled version of the material presented, and a copy of the assessment completed.	<b>HR Manager</b> Environmental Manager	Training records	

### C.1.8. Element 8: Subcontractor Relationships

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference
Selection processes ensure that subcontractors meet minimum environmental requirements	<b>Subcontractor Selection and Engagement</b> The Environmental Manager will be consulted regarding minimum subcontractor environmental management capabilities and sub-contractor suitability relevant to project obligations. Subcontractors will be made aware of their responsibilities when undertaking works in accordance with contract requirements and associated project obligations during the tender process and again at start-up meetings.	<b>Commercial Manager</b> Engineers Environmental Manager	Completed Supplier Prequalification Questionnaires  Subcontractor Agreements	<a href="#">Completed Supplier Prequalification Questionnaires</a>
Planning requirements of all subcontractor work scopes are completed and communicated prior to commencing work	<b>Identify, Complete and Communicate Planning Requirements and Documentation</b> The scope of work to be performed by key subcontractors is reviewed to determine whether it includes works for which planning and environmental risk assessments have been completed. If so, the subcontractor is formally informed of all relevant risks and existing project documents, systems and procedures to be followed prior to commencing works (in addition to having been informed of these during the tendering process).	<b>Engineers</b> Environmental Manager Commercial Manager	Construction Area Plans (CAPs) Work Packs SEPs Records of subcontractor notification	
Compliance requirements for high-risk environmental activities are identified and enforced	<b>Compliance requirements</b> For high, very high or extreme environmental risk activities, the Environmental Manager will review the subcontractor's scope of works with the supervising Engineer and: <ul style="list-style-type: none"><li>Identify any new issues relevant to the subcontractor's scope of works.</li></ul>	<b>Engineers</b> Environmental Manager Commercial Manager	Records of subcontractor notification	

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference
	<ul style="list-style-type: none"> <li>Identify any additional compliance requirement not captured.</li> <li>Identify necessary approvals not already in place and obtain those approvals prior to any works commencing.</li> <li>Update the relevant Environmental Sub-plans, SEPs, and Environmental Obligations Register with details of new approvals and their conditions.</li> </ul> <p>The subcontractor will be informed of the requirement to provide all relevant data relating to their works as per the National Greenhouse and Energy Reporting Act 2007 (Cth).</p>			
Subcontractor documentation is submitted and reviewed to meet project requirements	<p><b>Documentation Preparation and Review</b></p> <p>The subcontractor will provide all required environmental documentation prior to commencing work as described in the executed agreement, including any requirement to produce an Environmental Management Plan. Any further requirements will be agreed to by the Commercial Manager and the Environmental Manager.</p>	<p><b>Environmental Manager</b> Engineer Commercial Manager</p>	Subcontractor environmental documentation	
Changes to the scope of work are managed as a project change	<p><b>Manage Changes/ Variations</b></p> <p>Changes and variations to subcontractor scopes of work will be assessed as a change according to the requirements of Element 5 of the EMP. Documentation will be amended accordingly.</p>	<p><b>Commercial Manager</b> Engineers</p>	Change Requests	
Subcontractors actively participate in environmental management and training on the project	<p><b>Subcontractor Environmental Participation</b></p> <p>Subcontractors will participate in HSE communication forums and monitoring activities, as a minimum, including:</p> <ul style="list-style-type: none"> <li>Induction.</li> <li>Scheduled HSE management meetings, toolbox talks, pre-start meetings, HSE committees (as required);</li> <li>HSE observations, inspections and audits.</li> <li>Incident investigations (as required);</li> <li>Development or review of safe work systems and SEPs (as required).</li> </ul>	<p><b>Commercial Manager</b> Environmental Manager Subcontractors Engineers</p>	Attendance records Monitoring records	
Subcontractors are reviewed to assess their performance and compliance with our minimum environmental requirements.	<p><b>Subcontractor Audits and Reviews</b></p> <p>Subcontractors will be regularly inspected and observed for environmental performance as per Element 3.4 of this EMP.</p>	<p><b>Environmental Manager</b> Engineers Supervisors</p>	Audit reports Inspection and monitoring records	

## C.1.9. Element 9: Incident Management

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
<p>All incidents are followed by appropriate response and notification</p>	<p><b>Incident Response</b> The immediate response to all incidents is to make the area safe and undertake measures to prevent further environmental harm. An assessment will be made with the Environmental Manager to ensure responses do not result in further harm.</p> <p><b>Preserve the Incident Scene</b> Scenes of environmental Class 1A and Class 2A incidents and Class 1Ps are to be preserved until the incident investigation team has collected relevant data and evidence (see below).</p> <p><b>Internal Incident Notifications</b> The Contractor's Representative and Environmental Manager are to be notified immediately of incidents classified (defined in Appendix E) as:</p> <ul style="list-style-type: none"> <li>• Class 1A and Class 1P</li> <li>• Class 2A and Class 2P</li> </ul> <p>For these incidents the Contractor's Representative will immediately notify the Business Unit General Manager and the Business Unit Environment Manager. The Contractor's Representative will also notify the Business Unit General Manager of the need to activate the Emergency Response Procedure and the Group Crisis Management Plan if necessary.</p> <p>The Environmental Manager is also to be notified of all other Actual or Potential Class 3 incidents and Near Hit events.</p> <p><b>Client Notifications</b> Defence ESM and BM is notified of all environmental incidents as per the agreed contractual arrangements. PMCA to be notified by Contractors Representative within 24 hours.</p> <p><b>Regulatory Notifications</b> Environmental incidents will be reported to regulators in accordance with the requirements of local, state and federal government regulations by the Environmental Manager or delegate.</p>	<p><b>Contractor's Representative</b> Environmental Manager Engineers Supervisors</p>	<p>Records of incident notifications</p>	<p><a href="#">Manage and Report SHE Incidents</a></p>
<p>All incidents are entered and managed in Synergy</p>	<p><b>Incident Classification and Reporting</b></p>	<p><b>Environmental Manager</b></p>	<p>Incident records</p>	



Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
	<p>All environmental incidents, including community complaints resulting from an environmental incident or breach, will be reported in Synergy within three calendar days.</p> <p>Root causes will be identified and recorded in Synergy for all actual Class 1 and 2 incidents (and optionally for Class 3 incidents). All statutory notices received from regulators, including penalty notices and fines, will be entered as Regulatory Actions within the Notice of Violations sub form in Synergy upon receipt. All Notice of Violations are also recorded as Class 2 (or above) incidents.</p>	Contractor's Representative Construction Manager	<p>Root cause coding</p> <p>Regulatory Action (if applicable)</p>	
Incident investigations are conducted appropriate to the type of incident	<p><b>Incident Investigations</b> The level of investigation needed will depend on the incident classification. Corrective actions, including those required to help prevent future incident occurrences, are a key outcome of incident investigations. Incident investigation reports are to be uploaded to Synergy.</p> <p><b>Statutory Authority Investigations</b> Before any staff member is questioned by officers of a statutory authority or in the case of regulator requests for further information, they are to consult the Contractor's Representative and Business Unit Environment Manager to determine if Legal Counsel assistance is needed. Regulatory inspectors will be given appropriate assistance during their own investigations.</p>	<b>Contractor's Representative</b> Construction Manager Environmental Manager Supervisors Engineers	Incident investigation reports	
All personnel conducting incident investigations are trained to competently perform the task	<p><b>Incident Investigation Teams Competent and Trained</b> The investigation team selection will be up to the Contractor's Representative and depend on the incident's severity and the availability of experienced personnel. However, the investigation team needs a mix of Operational and HSE Staff. The following should be considered when selecting an investigation team:</p> <ul style="list-style-type: none"> <li>• Statutory requirements.</li> <li>• Technical specialists with an understanding of the work process.</li> <li>• Administrative Support.</li> <li>• Mix of skills and experience.</li> </ul>	<b>Contractor's Representative</b> HR Manager	<p>Evidence of Training</p> <p>Training Register</p>	

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
Corrective and preventive actions are taken after incidents and lessons are shared with other projects	<ul style="list-style-type: none"> <li>Potential conflict of interest for any proposed member.</li> </ul>			
	Following an incident, corrective and preventive actions will be identified, assigned to the appropriate person/s and closed out according to set time frames. Time frames are set to ensure damage incurred is rectified and any chance of recurrence is eliminated as soon as practicable. Synergy will be used to assign and track corrective actions. All corrective actions will include reference to the relevant incident record for ease of tracking.	<b>Contractor's Representative</b> Environmental Manager	Corrective action records on Synergy	
	<b>HSE Alerts/Lessons Learnt</b> HSE Alerts or Lessons Learnt will be submitted for all Class 1 and 2 incidents to the Contractor's Representative, Business Unit Environment Manager and Group Manager, Environment for distribution outside of the RRJV team. HSE Alerts or Lessons Learnt will also be raised for all other incident types at the discretion of the Environmental Manager, Contractor's Representative or Business Unit Environment Manager.	<b>Environmental Manager</b> Contractor's Representative Construction Manager	HSE Alerts/ Lessons Learnt	<a href="#">SHEQ Lessons Learnt Template</a>  <a href="#">SHEQ Alert Template</a>
Repeat incidents are regularly reviewed by the RRJV management team	Each month the Environmental Manager will identify trends in incidents (all Class 1 and 2 actual and potential incidents) and trends in root causes to suggest the nature of preventative actions warranted. The Contractor's Representative will approve actions to address incident occurrences and incident and root cause trends. Actions will be managed using Synergy.	<b>Environmental Manager</b> Contractor's Representative Construction Manager	Monthly reports Corrective actions	

### C.1.10. Element 10: Emergency Planning and Response

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
Potential emergencies are identified using a formal risk assessment process	<b>Identifying Potential Emergencies</b> Risk assessments conducted in accordance with Element 4 of the EMP are used to identify potential emergencies on the project.	<b>Contractor's Representative</b> Construction Manager Environmental Manager	Environmental Risk Register  Principal Project Risk Review  CAP Risk Review	

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
			Work Pack Risk Assessment	
Emergency response plans and procedures are developed and regularly reviewed	<p><b>Emergency Response Plan</b> An Emergency Response Plan that addresses all identified potential environmental emergencies with specific emergency procedures for each different potential emergency will be developed. The Emergency Response Plan will be updated at least annually or when there are significant changes to site activities or in response to revised and new risk assessments.</p>	<p><b>Contractor's Representative</b> Construction Manager Environmental Manager H&amp;S Manager</p>	Emergency Response Plan and procedures	
Adequate resources are provided to effectively implement emergency response plans and procedures	<p><b>Emergency Response Plans Adequately Resourced</b> Resources required to implement the Emergency Response Plan will be available on the site and be maintained.</p>	<p><b>Construction Manager</b> Environmental Manager H&amp;S Manager</p>	Resources for Emergency Response Plan and procedures	
Environmental emergency response drills are conducted	<p><b>Environmental Emergency Response Drills</b> Environmental emergency response drills will be conducted at least every six months. The emergency scenario of the drills will be rotated to avoid repetition and be relevant to the activities occurring at the time. Records will be kept of the results for all drills. Where testing and evaluation shows a deficiency in either emergency preparations or the Emergency Response Plan, appropriate corrective and preventive actions are taken and raised and managed using Synergy.</p>	<p><b>Construction Manager</b> Environmental Manager Health and Safety Manager</p>	Emergency response drill records Corrective action records in Synergy	
Employees, contractors and visitors are given appropriate emergency response training.	<p><b>Emergency Training</b> Emergency coordinators and wardens are trained to implement the emergency response plans. Specific training requirements will be identified and captured within the training matrix and will be delivered according to company procedures. <b>General Workforce Training and Awareness</b> All personnel and subcontractors will be trained to inform them of their roles and responsibilities in an emergency. This training and awareness will be provided during induction.</p>	<p><b>HR Manager</b> Environmental Manager Health and Safety Manager</p>	Training matrix Training schedule Training and induction records	

## C.1.11. Element 11: Document and Record Management

Expectations	How we will meet the Expectations (minimum requirements)	Responsibilities Key Contributor	Deliverables	CMS Links / Reference docs
<p>Current versions of all relevant documents and records are available and controlled.</p>	<p>The project will ensure that all documents and records referred to and required to implement the EMP, including the plan, are controlled and maintained according to requirements. This includes but is not limited to all:</p> <ul style="list-style-type: none"> <li>• Management plans &amp; Procedures</li> <li>• Knowledge and Tools</li> <li>• Templates (e.g. audit template, training matrix)</li> <li>• All electronic records saved in electronic databases such as Synergy, ChemAlert etc.</li> </ul> <p><b>Document Types</b> The types of records to be generated on the pproject that are to be stored and maintained include:</p> <ul style="list-style-type: none"> <li>• Environmental monitoring results - 30 years from the date of any incident or completion of the works, whichever is later.</li> <li>• Environmental performance metrics will be managed and stored in Synergy, including Water and Waste</li> <li>• Records as required under the National Greenhouse and Energy Reporting Act 2007 in JDE - 7 years from the creation of the record</li> <li>• Incident reports and corrective actions will be stored and managed using Synergy - 30 years from the creation of the record.</li> <li>• Risk registers</li> <li>• Complaints and enquiries received - 7 years from completion of the works.</li> <li>• Notifications received by regulators - 30 years after the completion of the project.</li> <li>• Audit reports - 7 years from completion of the works.</li> <li>• Completed inspections and observations - 30 years from the creation of the record.</li> <li>• Waste tracking certificates - 7 years from the creation of the record</li> <li>• Training records - 7 years from the end of the employee's employment</li> </ul>	<p><b>Environmental Manager</b> Quality Manager</p>	<p>Controlled and maintained documents and records.</p>	

Expectations	How we will meet the Expectations (minimum requirements)	Responsibilities Key Contributor	Deliverables	CMS Links / Reference docs
	<ul style="list-style-type: none"> <li>Calibration records for monitoring equipment</li> <li>Monthly reports and Meeting minutes - 7 years from completion of the works or from the date on which work was last performed on the project.</li> <li>HSE Alerts</li> </ul> <p>Any editing and access restrictions to environmental documents and records and who has authority to dispose of nominated documents and records comprise:</p> <ul style="list-style-type: none"> <li>Environmental Manager to authorise the disposal of any environmental documents or records.</li> </ul>			

### C.1.12. Element 12: Auditing, Review and Improvement

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
Environmental performance trends are identified, and corrective actions are implemented as required	<p><b>Performance Trends</b> Environmental performance will be reviewed and reported at least monthly to identify trends. Performance will be assessed against both lead and lag measures and relative to specific targets agreed as per Section 2.4 and Expectation 1.4 of the EMP. Action plans will be developed to improve performance as required, corrective and preventative actions will be managed using the Synergy – Action Plan Module.</p>	<b>Contractor's Representative</b> Environmental Manager	Monthly reports Corrective & Preventative actions in Synergy – Action Plan Module	
A monthly environmental report is produced and distributed	<p><b>Monthly Reporting</b> Monthly environment reports or dashboards will be prepared in accordance with monthly Synergy campaigns and other relevant project specific requirements. The following shall be reported:</p> <ul style="list-style-type: none"> <li>Environmental Performance Summary (e.g. key highlights/issues/innovations, incidents, and Notice of Violation updates)</li> <li>Analysis of performance against project, business unit and corporate environmental targets</li> <li>Analysis of monitoring results</li> <li>Complaints relating to environmental or compliance performance.</li> </ul>	<b>Environmental Manager</b>	Monthly environment report	<a href="#">Report on Water supply and Waste Management</a>  <a href="#">Environment &amp; Sustainability Dashboard Quick Reference Guide</a>  <a href="#">Environment &amp; Sustainability Dashboard Reporting Frequently Asked Questions and Definitions</a>

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
	<ul style="list-style-type: none"> <li>• Details of environmental incidents including actions taken or outstanding</li> <li>• Number and results of inspections, audits, observations and monitoring.</li> <li>• Synergy water and waste reporting</li> <li>• Energy report</li> </ul>			<a href="#">Tool: Environment and Sustainability Synergy Dashboard Campaign</a>
	All monthly reporting will be reviewed by the Contractor's Representative.	<b>Contractor's Representative</b>	Monthly Environment Report	
Regular management reviews are conducted to determine the continuing suitability, adequacy and effectiveness of the Environmental Management	<p>The RRJV team will conduct annual management reviews to assess the adequacy of the Environmental Management System. The review will consider the results of:</p> <ul style="list-style-type: none"> <li>• Audits undertaken.</li> <li>• Communication, participation and consultation.</li> <li>• Relevant communication including complaints from external stakeholders.</li> <li>• The overall environmental performance of the project includes any non-conformances or actions arising from task observations.</li> <li>• The extent to which the objectives and targets have been met;</li> <li>• The outcomes of incident investigations and any corrective actions.</li> <li>• Changes to legislation.</li> <li>• Actions from previous management reviews and recommendations for improvement.</li> </ul>	<b>Contractor's Representative</b> RRJV Leadership Group Environmental Manager	Management review report Actions in Synergy	
Audits are undertaken to ensure compliance with the requirements of the EMP	<p><b>Compliance with Environmental Management Plan</b> A schedule of audits and reviews will be developed and maintained, including the following:</p> <ul style="list-style-type: none"> <li>• Start Up reviews (conducted by Business Unit SHEQ Manager or delegate)</li> <li>• EMS audits (conducted by Business Unit SHEQ Manager or delegate)</li> <li>• Subcontractor audits (for subcontractors performing high risk activities)</li> <li>• High-risk activity audits/ task observations</li> </ul>	<b>Contractor's Representative</b> Business Unit Environmental Management Representative Business Unit HSE Manager	Audit schedule Audit reports Corrective actions in Synergy	<a href="#">Conduct Audits</a>

Expectations	How we will meet the Expectations (minimum requirements)	Responsible Key Contributor	Deliverables	CMS Links / Reference docs
	<ul style="list-style-type: none"> <li>• Environmental Management Plan audits (conducted by Environmental Manager (or delegate), Client or independent auditor)</li> <li>• Compliance and Legislative audits (conducted by Environmental Manager, Client or independent auditor)</li> </ul> <p>Action plans will be developed to improve performance as required. Corrective actions will be managed using Synergy.</p>			
All audits are undertaken by suitably qualified and experienced personnel	<p><b>Auditor Competency</b> Persons conducting audits will be suitably experienced and qualified. A mix of general education, specific auditor training and work experience are considered in determining the suitability of an auditor. Auditors are to be approved by the Business Unit Environment Manager.</p>	<b>Business Unit Environmental Management Representative</b>	Training and qualifications records	

# D. Significant Environmental Hazards and Environmental Sub-Plans

This EMP includes Environmental Sub Plans for Significant Environmental Hazards (SEH), and Environmental Sub Plans for Other Environmental Hazards. SEH's have been identified through the review and analysis of environmental reports, contractual documents and legal compliance requirements relating to the project. Each of the Sub Plans listed in Table 9 below will be regularly reviewed during construction as the risks are reviewed.

The environmental assessment of BBK activities examines broader non-facilities aspects of Base operational capability, such as noise impact on stakeholders and local communities, which may influence planning and design considerations under the works.

Management of Ecologically Sustainable Development (ESD) Principles and Whole of Life (WOL) Objectives is addressed in:

- (c) Design Management Plan, and the
- (d) ESD Report & WOL Analysis.

**Table 9: Significant Environmental Hazards and associated Management Plans and Sub-Plans**

Significant Environmental Hazards (Aspect)	Associated Significant Environmental Impact (Risk)	Environmental Sub-Plans (Part D)
Accidental Release/Leaks and Spills – Impacts to soil and Water	Damage to surface and ground water ecosystems.	Soil and Water Management - Sub-Plan (D1)
Disturbance of Soil – Contaminated	Contaminated soils uncovered during excavation or environmental remediation could be eroded and transported to receiving waters via storm water	Soil and Water Management - Sub-Plan (D1) Contamination Management Sub-Plan (D2) Hazardous Substance Management Sub-Plan (D3)
Impact to Flora and/or Fauna	Loss of or harm to flora and/or fauna	Flora and Fauna Management Sub-Plan (D5)
European Heritage	To allow for the construction of new facilities as part of the redevelopment some heritage-listed buildings may need to be demolished	Heritage Management Sub-Plan (D4)
Indigenous Heritage	Redevelopment works may affect the Indigenous cultural heritage landscape identified at the base.	Heritage Management Sub-Plan (D4)
Contamination- (PFAS) surface water, ground water & soil	Damage to ecosystems and/or adverse impact on sensitive receivers.	Soil and Water Management Sub-Plan (D1) Hazardous Substance Management Sub-Plan (D3)
Construction waste - Solid Waste and liquid waste	Loss of or harm to ecosystems	Waste management Sub-Plan (D10)



Significant Environmental Hazards (Aspect)	Associated Significant Environmental Impact (Risk)	Environmental Sub-Plans (Part D)
Accidental Release/Leaks and Spills - Hazardous Materials	Loss of or harm to ecosystems	Hazardous Substance Management Sub-Plan (D3)
Impacts on Air Quality	Degradation of Air Quality	Air Quality Management Sub-Plan (7)
Energy Usage	Failure to record energy usage	Energy Management Sub Plan (D10)
Noise	Disturbance to fauna and nearby residents	Noise Management Sub-Plan (D6)
Vibration	Disturbance to fauna, and nearby residents, including damage to Heritage buildings	Vibration Management Sub-Plan (D8)

A detailed assessment of potential risks associated with the environmental issues against the project Elements was undertaken at during the Planning Phase. A reassessment of Environmental Aspects and Impacts has been completed and is attached Environmental Risk Assessment. The assessment is updated following completion of Risk Workshops.

Following the identification of the key environmental impacts, the issues were rated according to their likelihood of occurrence and their consequences to provide an overall risk priority of very high, high, medium or low, in accordance with the Defence Environmental Risk Assessment Tool (ERAT). The risk assessment matrix was used to prioritise areas of risk and potential areas of impact that would require mitigation strategies within the Delivery Phase of the works.

The risks were assessed by comparing the severity of a possible adverse consequence, and the probability of occurrence of each consequence. The activities considered for the construction of the works were assessed against the key environmental and heritage factors.

Mitigation measures for the high-risk activities have been documented within the Sub plans of the EMP. These mitigation measures have been made appropriate to the level of determined impact. The mitigation measures aim to reduce the identified potential impacts to a lower risk level.

Site activities have the potential to cause major environmental damage. Some potential risks are:

- Storage of fuel,
- Refuelling of site equipment,
- Rupture of site machinery fuel/oil lines, and
- Loss of contaminated material.
- Loss/ Exposure to Hazardous materials

The management of these risks will be highlighted within the safe work method statements and work procedures for these tasks. What to do in emergency situations are discussed during mandatory site inductions and are described within the Emergency Response Plan.

## D.1 Soil and Water Sub-Plan

This plan addresses erosion sediment control and water movement and includes guidance for managing PFAS contaminated surface and ground water, storage and managing of materials on site.

### D.1.1. Background / Context

Blamey Barracks Kapooka, BBK is located approximately 9.5 km south-west of Wagga Wagga in western NSW. Accessible via Camp Access Road from the Olympic Highway. BBK contains facilities for training, for housing Base personnel and recruits, and for housing the families of Base personnel. These facilities are clustered in the southern and eastern areas of BBK, with the majority of the Base being devoted to a large, open training area that includes minimal manmade structures and large areas devoid of vegetation.

BBK has a total area of approximately 1,990 ha (19.9 km<sup>2</sup>). The area of disturbance associated with these works represents only a small fraction of the total Base area, consisting of approximately 25 ha (0.25 km<sup>2</sup>) concentrated within the south-east of the Base.

Beneficial reuse of soil is defined in the PFAS NEMP Version 2.0. Examples include where there is an existing need for soil for purposes such as landscaping, construction works, roadworks etc. Waste disposal is not supported on the Defence Estate, except under exceptional circumstances, and is subject to approval by the BSM/ESM with supporting documentation. Consultation and planning for reuse will occur in the early planning phases of the works to ensure budget allocation and prevent delays. Where reuse is not possible, and disposal is required the following actions will be completed:

Wherever possible, any spoil material will be retained on-site if deemed suitable through risk assessment processes and endorsed by Defence ESM. Where this is not possible or viable, it will need to be disposed of in an approved disposal facility by an appropriately qualified contractor. Spoil transport and offsite disposal procedures will be established in compliance with DCM and NSW EPA transport requirements' containing waste products, are Dangerous Goods Class 9 products. The disposal facility will be approved to receive contaminated materials.

#### D.1.1.1. Geology

The geology of the Wagga region is defined by alluvial deposits from the Murrumbidgee River. Within BBK, ordovician aged metamorphic and sedimentary rocks which meets silurian aged collingullie granite in the west of BBK, and both are covered by a layer of colluvial soil deposits comprised of clay, silt, sands and gravel.

The 1:250,000 Wagga Wagga geological shows BBK is predominantly underlain by the Palaeozoic Wagga Marginal Basin which consists of shale, sub-greywacke, quartzite, impure sandstone, black (carbonaceous) slate and siltstone. The western portion of BBK is underlain by palaeozoic granite and cainozoic quaternary alluvium consisting of gravel, sand, silt and clay. A portion in the south-west is underlain by the collingullie granite which consists of unfractionated granite.

The Wagga Wagga 1:100,000 soil landscape series indicates BBK includes the following soil landscape groups: Belfrayden, East Bowmen, Currawarna, Kurrajong Plain, Livingstone, Lloyd, Pulletop, Yarragundry, Becks Lane, Becks Lane variant a, Benloch variant a, Glenmornon. The soil types at BBK predominantly comprise chromosol, kandosol and sodosol soils.

#### D.1.1.2. Hydrology

The Murrumbidgee River is located approximately 2.5 km north of BBK and Sandy Creek is approximately 1 km to the west. There are several ephemeral watercourses at BBK running from the ridgeline to the east and west.

Water courses on BBK are typically mildly incised and moderately to sparsely grassed, accepting run-off from roadways, verges, and buildings. The majority of kerb and gutter stormwater infrastructure is east of the ridgeline with the western (and some southern portions) serviced by earthen swales.

The Hydrogeology Map of Australia identified two aquifers at and within 2000m of BBK:

- fractured or fissured, extensive aquifers of low to moderate productivity; and
- porous, extensive highly productive aquifers.

Groundwater is likely to be restricted to fractures within the metasediments and granite, with some groundwater also likely to occur in the weathered material and colluvium in the lower slope areas, above the fractured rock. Perched groundwater is likely to be present in the vicinity of the Wastewater Treatment Plant (WWTP). Perched and shallow groundwater flow is expected to be consistent with the topography of BBK. See Figure 3.

There are potential pathways for impacted water to reach Sandy Creek, Kapooka Creek, Murrumbidgee River and potentially other tributaries.

There is the potential for impacts to result from uncontrolled surface water run-off during construction that impacts nearby waterways with sediments, grits, oils and other contaminants.

This potential impact during construction can be managed via standard construction management measures of increased hardstand areas, these increase stormwater volume and flow into nearby waterways including increases in roof area and hardstand areas for car parking. This is a known potential impact and an understood issue that is readily foreseen and mitigated via detailed design.

The Murrumbidgee River and groundwater from the Wagga Wagga region are the most significant water resources to BBK. The Murrumbidgee River is the closest large body of water, lying approximately 2 km north, and is fed by several smaller tributaries nearby including Sandy Creek and Kapooka Creek. BBK is fully contained within the Murrumbidgee River catchment, which covers an area of approximately 84,000 km<sup>2</sup>.

### **D.1.1.3. Topography and Ground Water Movement**

The topography of BBK is characterised by a ridgeline which runs north/south along the centre of the Base. The ridge is a local maximum, with elevation decreasing towards all sides of the Base. Maximum elevation within the Base is 370 metres Australian Height Datum (m AHD) towards the centre, while its minimum is 190 m AHD to the north where the Base approaches the Murrumbidgee River's floodplain. Regional topography is typified by ridges and minor tablelands which increase in height to the east of the Base and decrease in height to the west of the Base.

There is a north-south oriented ridgeline immediately west of the main operational area of BBK which peaks at approximately 370 m AHD. The land east of the ridgeline slopes down to the east toward an un-named creek at approximately 230 m AHD and the land west of the ridgeline slopes down toward Sandy Creek, approximately 1 km west of BBK, at approximately 200 m AHD.

Impacts to water resources resulting from the proposed developments are not anticipated to be significant due to the nature of the works.

The proposed new ring road in the Cantonment area is likely to have the most significant impacts on hydrology in increasing hardstand from which surface water can flow into adjoining areas of threatened species. The design will provide effective drainage solutions to ensure that the surrounding environment is not adversely impacted to changes in water flow or exposed to runoff containing harmful grits and oils.

Groundwater impacts may also arise as a result of excavation required for the installation of underground pipelines associated with inground services infrastructure (sewer & stormwater), these are considered to be

unlikely due to the depth of the groundwater within the study area. Excavation during construction is anticipated to remain above the groundwater level.

Groundwater investigations are not considered warranted due to the general depth of groundwater at BBK and the low likelihood that extensive dewatering during construction will be required. Minor intersection of unidentified, discontinuous and localised lenses of shallow perched groundwater (e.g. in fill) is possible, however can be appropriately managed in accordance with the EMP if required.

#### **D.1.1.4. Surface Water movement - flood modelling**

Flood modelling results show that the surface water runoff from the catchment upstream of the site area is conveyed within the site through a channel that runs parallel to Soldiers Road and crosses Parade Avenue to the north-east. Water flow progresses downstream towards Kapooka Road where it merges with the overland flow runoff generated from the catchments southeast of Olympic Highway. Overland flow is then conveyed in a north direction towards the Murrumbidgee River.

Flood depths at the site are generally shallow. Within the channel peak water depths are up to 1.5 m. Water ponding was observed in few areas within the site (water depth around 0.5 – to 0.75m). Water ponding occurs around buildings; this is due to terrain depressions that cause water ponding. (Hydrology Report 2023).

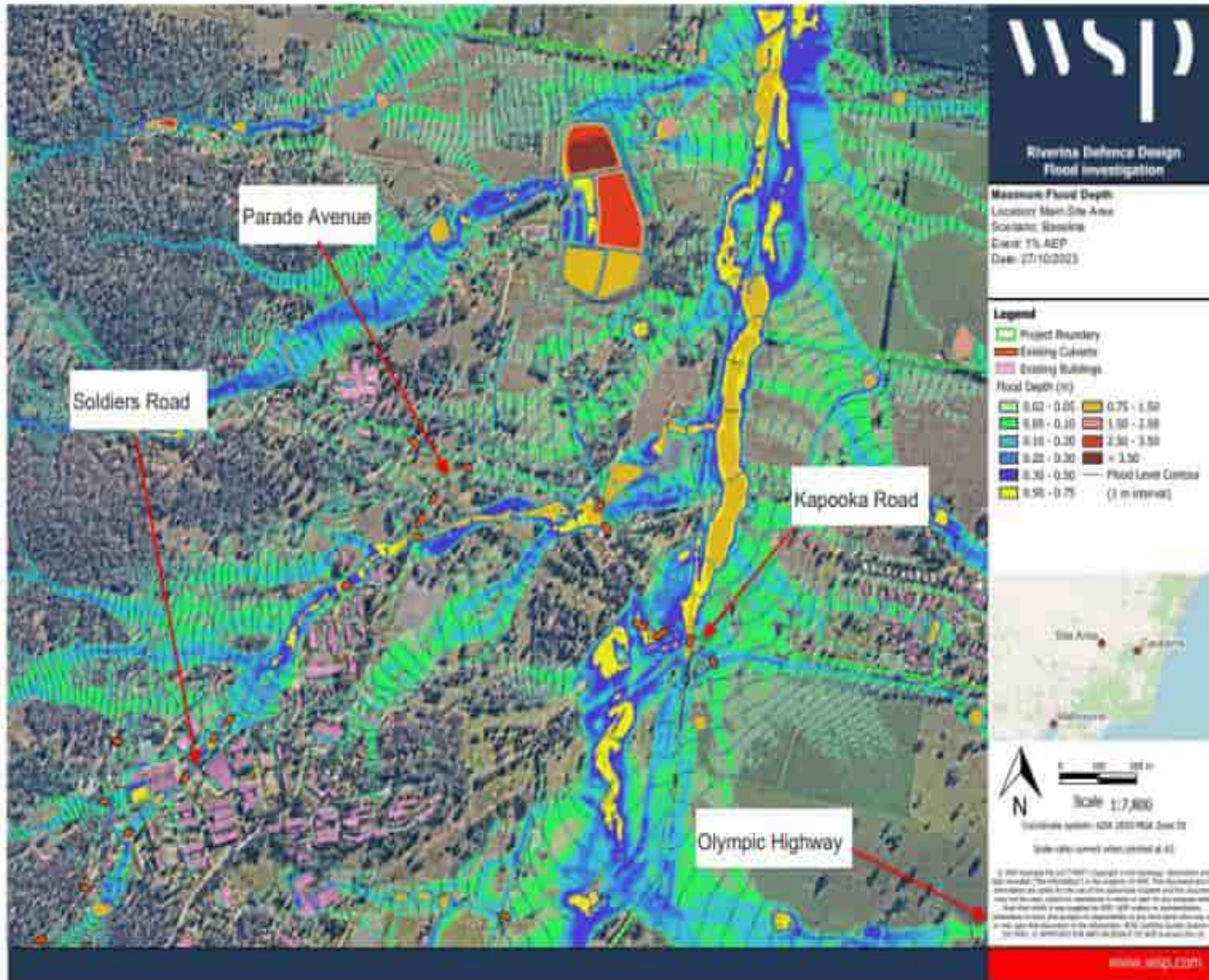


Figure 3: Surface water runoff to illustrate flood depth baseline condition in 1%,2% 10% and 635 AEP flood events

### **D.1.1.5. Known Extent of Existing PFAS Contamination**

Widespread PFAS contamination in soil has been detected at Blamey Barracks Kapooka (BBK). RRJV's strategy is to maximise retention of spoil material on-site is in line with Defence's Waste Minimisation Policy. There has been significant PFAS monitoring by the PFAS Management Area Plan, and this is ongoing. The PMAP team provide ongoing support and the project will continue to liaise with the PMAP to share PFAS data, new technology and innovations to minimise the risk of spreading PFAS.

This Subplan provides a summary of assessments required to manage the risk of mobilising per and poly-fluoroalkyl substances (PFAS) during construction

Previous studies identified PFAS source areas at BBK, with those of highest level of impact at the Fire Station, fire training areas testing identified isolated detections of Category 2 (High Risk) soils. Similar sources have been in the vicinity of the Recruit Welfare Facility (RWF). And buried waste areas south of the Wastewater Treatment Plant (WWTP).

Those areas are on the eastern side of BBK where surface water runoff feeds into Kapooka Creek. Leachability testing of soil indicated potential for discharge of PFAS to surface water and groundwater from those areas (BBK PMAP, 2019).

#### **Potential risks identified to human health and ecological receptors includes:**

- Human health risks to construction and maintenance workers from direct contact with soil or perched water in impacted source zones.
- Human health risks to off Base residents from consumption of home grown produce irrigated with impacted surface water from and near to Kapooka Creek. Preliminary precautionary advice has been provided by NSW government agencies to individual properties.
- Human health risks for recreational fishers due to consumption of fish and yabbies from Kapooka Creek, Sandy Creek and the Murrumbidgee River.
- Direct and indirect exposure of ecological receptors impacts surface water, sediment and soil.

Location maps have been developed as an indication of PFAS contamination at BBK (REF: BBK PMAP 2022) see Figure 4.

Blamey Barracks - PFOS + PFHxS Soil Categories (28/03/2023)

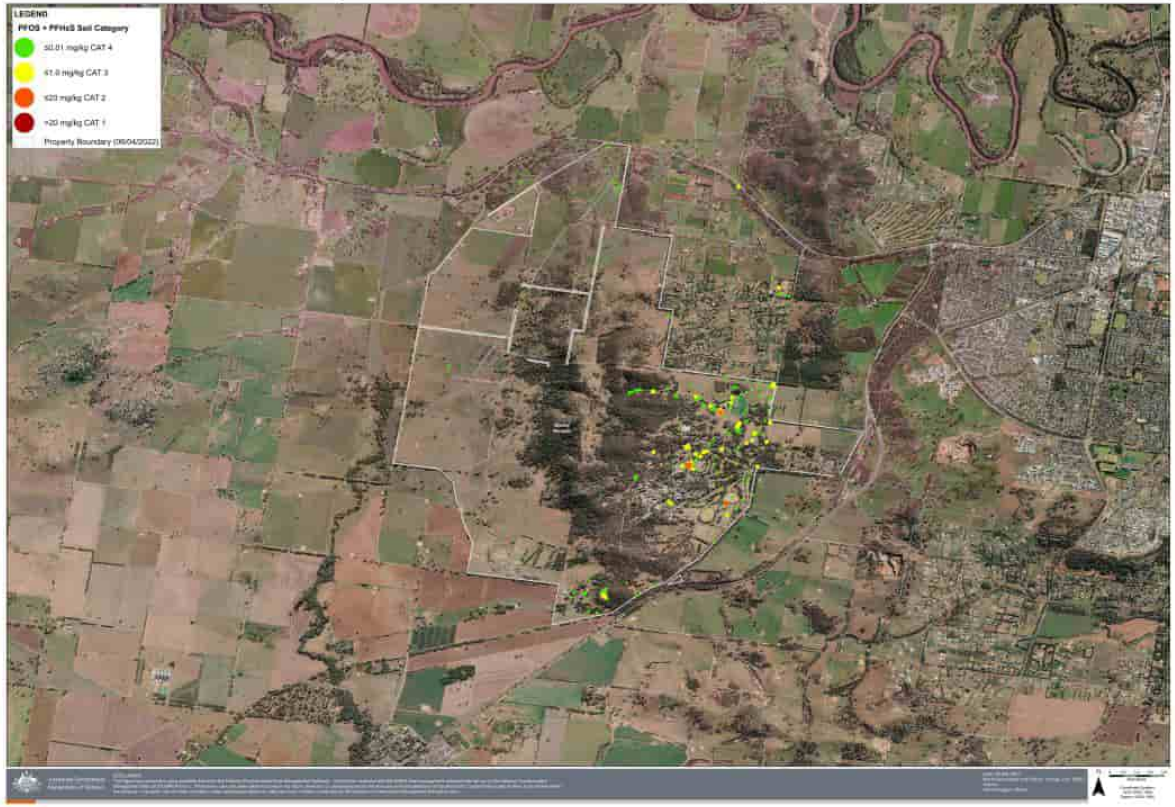


Figure 4: Known locations of PFAS contamination at BBK:

**Heat maps:**

Heat maps are a valuable tool to understand the contamination risk of PFAS across BBK. The data was collated from RRJV investigations and the collection of data in the Defence Esdat system. Interpolations have been created using the Kriging Method and Surfer Software.

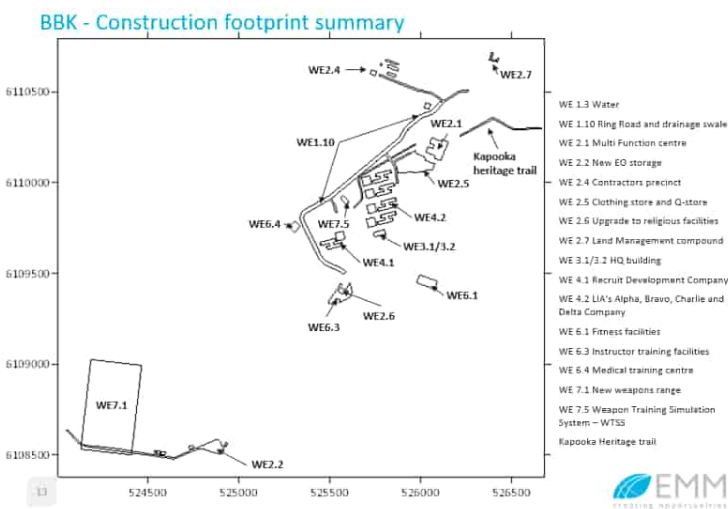


Figure 5: BBK RRJV Site Work elements

## BBK - PFOS + PFHxS Heat Map Full property

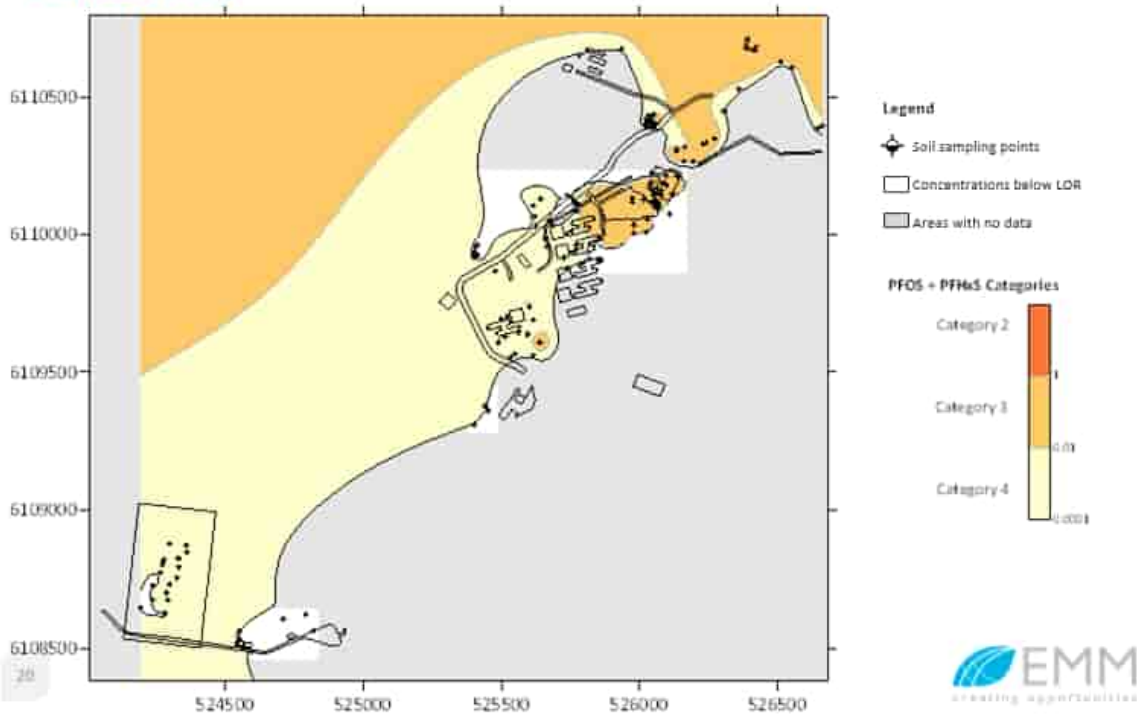


Figure 6: Full BBK site mapping

## BBK - PFOS + PFHxS Heat Map WE 1.10 Ring Road and drainage swale

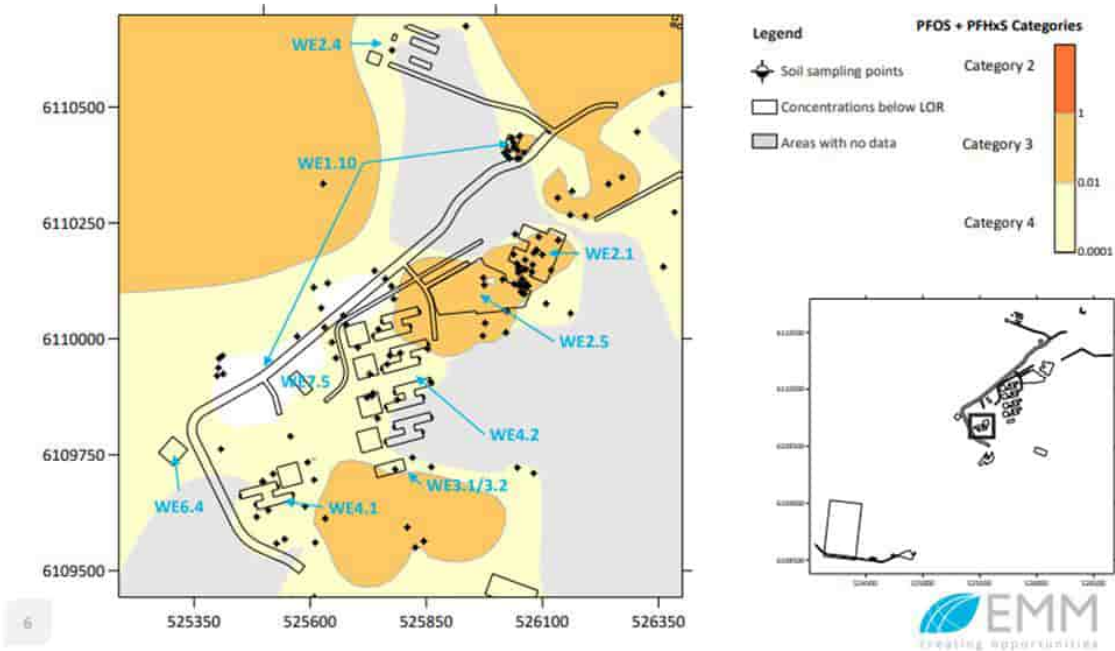


Figure 7: Ring Road and drainage Swale



## BBK - PFOS + PFHxS Heat Map WE 2.1 Multi function centre

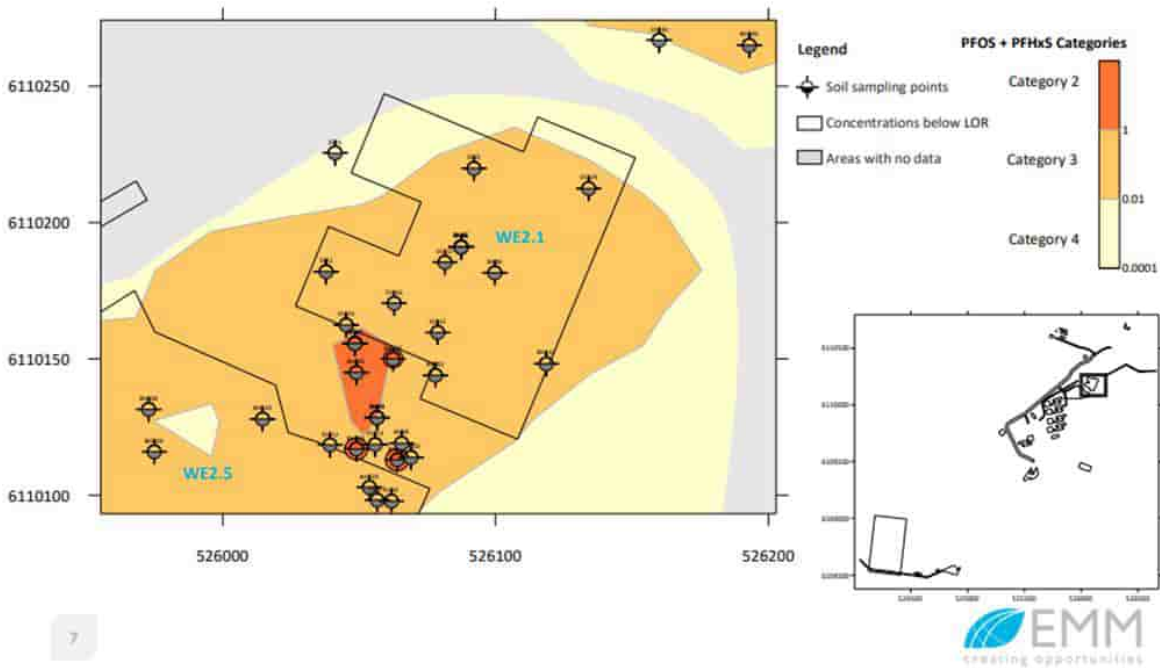


Figure 8: Multi-Function Centre /Recruit Welfare Facility centre

## BBK - PFOS + PFHxS Heat Map WE 2.5 Clothing store and Q-Store

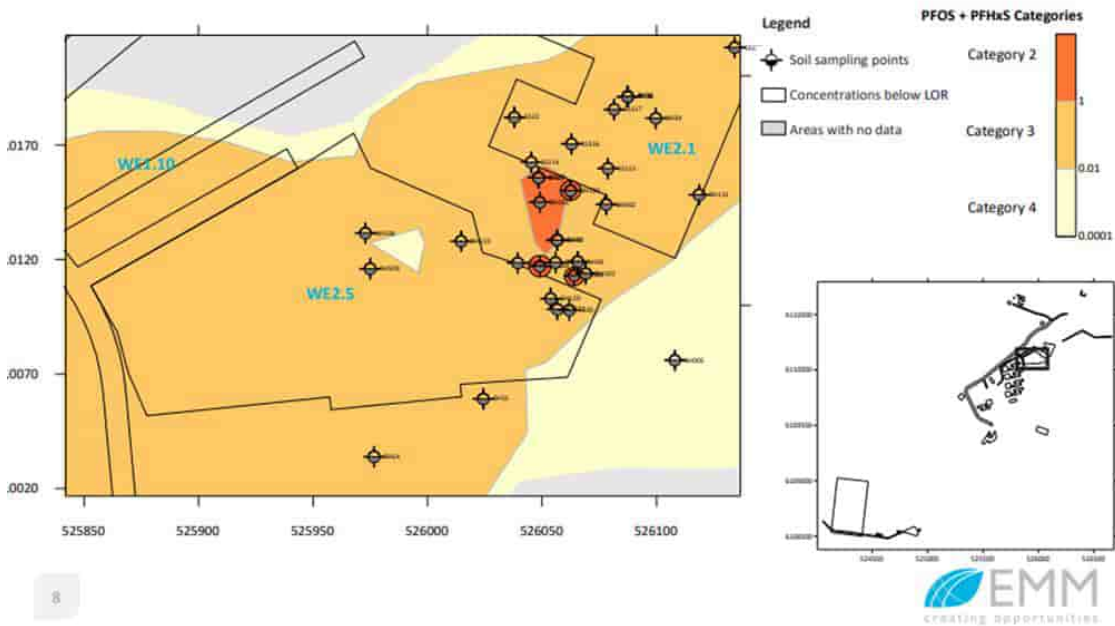


Figure 9: Clothing and Q Store

## BBK - PFOS + PFHxS Heat Map WE 4.2 LIA's Alpha, Bravo, Charlie and Delta Company

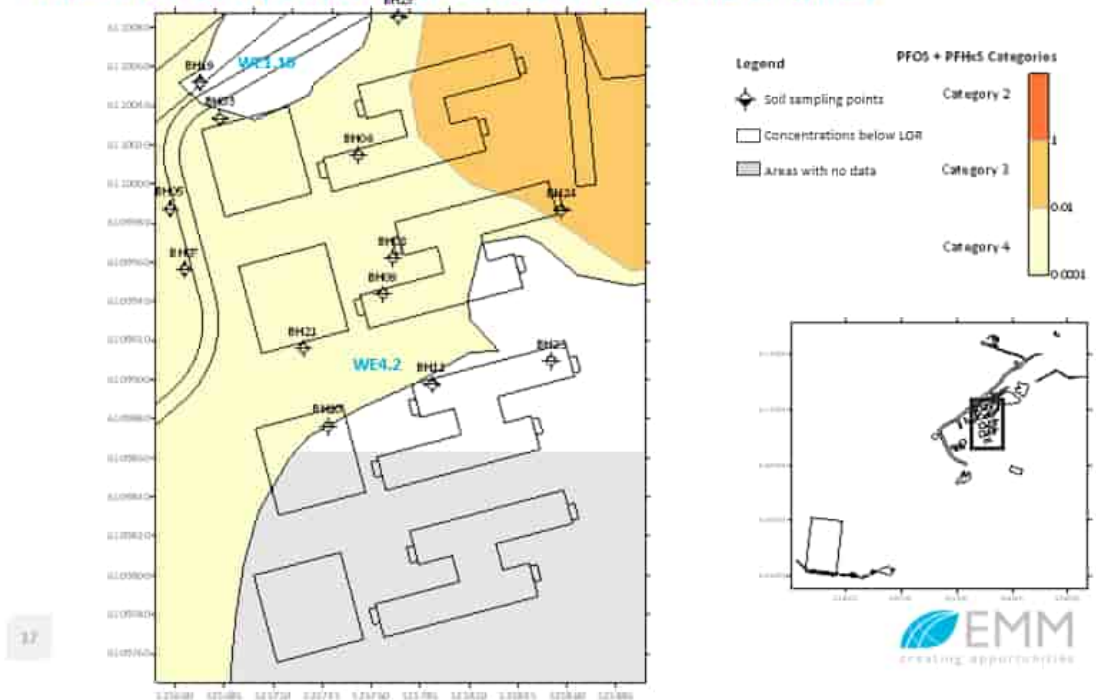


Figure 10: LIA A, B, C, D COY

## BBK - PFOS + PFHxS Heat Map WE 4.1 Recruit Development Company

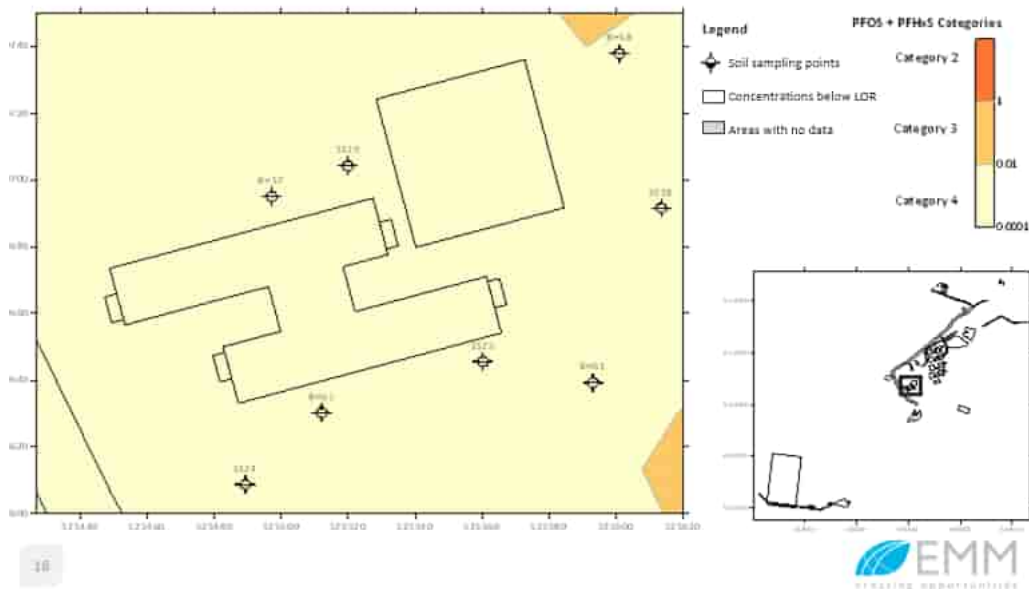


Figure 11: Recruit Development Company

BBK - PFOS + PFHxS Heat Map  
 WE 2.2 New EO storage  
 WE 7.1 New weapons range

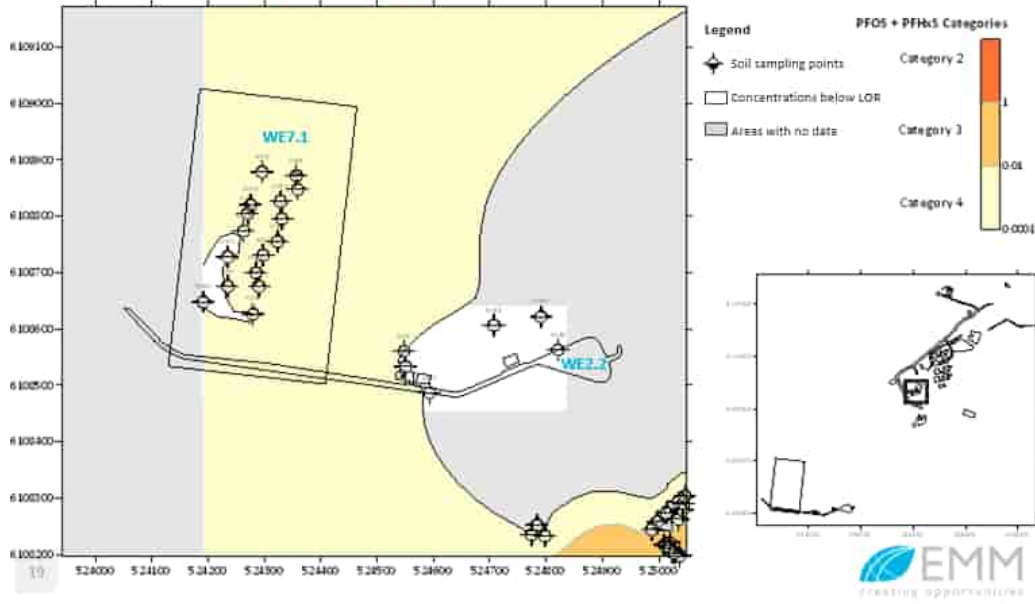


Figure 12: New EO Storage and Weapons Range

## D.1.2. Scope

This Soil and Water Sub-Plan addresses the movement of soil water on the project and the management of potential impacts to water quality and/or quantity that may be caused by site activities which will have the potential to adversely affect water quality and availability, to the environment and/or community.

Activities conducted on the project that have the potential to impact water quality and/or quantity are provided below.

**Table 10: Hazards and Impacts Soil & Water**

Hazard	Potential Environmental Impact
Clearing and grubbing	Increased sediment load in run off impacting aquatic fauna and flora Spills of fuel/hydraulic fluids impacting soil and water quality PFAS mobilisation – surface and ground water
Excavation/earth works Civil Works	Impacts to aquatic/terrestrial fauna and flora—may facilitate the movement of surface water – increasing moisture and provide opportunity for the spread of high threat weeds, via grading ripping or topsoil stockpiling during construction. Water quality negatively impacted. Discharge of contaminates (PFAS) to Kapooka Creek and drainage lines
Storage and use of flammable and combustible liquids and solids	Water quality negatively impacted. Impacts to aquatic flora and fauna. Waste concrete slurry discharged into storm water systems
Stockpiling of materials	Water quality negatively impacted. Weed infestation of topsoil PFAS contaminated spoil mixed spreading contamination during reuse.
Dust suppression	Unnecessary load on water resources contributing to resource availability
Storage and use of flammable and combustible liquids and solids	Water quality negatively impacted. Spills of fuel/hydraulic fluids impacting soil and water quality
Dewatering	Water quality negatively impacted. Impact on groundwater levels and flows
Demolition of asbestos, lead paint & hydrocarbons	Spread of contamination, exposure to contaminated material
Encountering contaminated materials/water during construction	Delaying the works or requiring additional controls to be implemented Impacts to aquatic fauna and flora. Water quality negatively impacted
Groundwater interaction	Impacts to aquatic fauna and flora. Water quality negatively impacted
Wet weather flooding	Water quality negatively impacted. Impact on groundwater levels and flows Contamination mobilisation
Sediment tracking onto public roads from vehicles leaving construction site	Sediment and gravel on roads Sediment entering into stormwater systems and/or directly into receiving waters, causing pollution

## **D.1.3. Soil, Water and Sediment**

### **D.1.3.1. Soil and Spoil Management**

Before undertaking work and during construction activities, site-specific Erosion and Sediment Control Plans (ESCPs) will be progressively developed for each work area. The above Erosion and Sediment Control Strategy will be used as a guide by the project team in developing and implementing ESCPs. All ESCPs require sign-off by the Environmental Manager (or delegate) prior to implementation. ESCPs are to meet best practice, Defence Materials Management Protocol (DMMP), NSW Sediment Management Protocols (Blue Book), and NSW Managing Urban Stormwater and Construction (Blue Book).

Any areas disturbed during construction will be stabilised in accordance with the DMMP or the final design, as soon as feasible.

ESCPs will be updated as works progress to ensure they are always relevant to on-ground activities. For minor changes, these can be notated onto the ESCP. Major changes to the type or nature of sediment controls or to stormwater runoff will warrant preparation of an updated ESCP.

Copies of the current ESCPs will be kept by the project team in Work Packs for all active sites.

Temporary sediment basins will be implemented where required, based on the calculations and details established in each site ESCP. The sediment basins will capture water runoff from BBK work areas and be designed in accordance with the DMMP and NSW Sediment Management protocols (Blue Book). Any modifications required will be undertaken in consultation with the supervisor/Engineer in accordance with the design calculations. Where possible, any runoff contained in temporary basins would be used for dust suppression to maintain sufficient capacity in the basin. Where immediate emptying of the basin is required in anticipation of a rainfall event, water treatment will be undertaken to treat water to required standards for discharge to stormwater systems or waterways.

Treatment will involve removal of oil and grease (if visible), PFAS via carbon filters, accumulated rubbish, coarse sediment, chemical flocculation and pH correction. Maintenance of these sediment basins may be required in accordance with codes of practice and RRJV PFAS Risk Assessment Plan and Tool requirements. This is to ensure these basins are operating effectively. Copies of the current ESCPs will be kept by the RRJV team and recorded in the Work Packs for all work elements.

### **D.1.3.2. Managing Vehicle and road sediment movement**

Trucks and other vehicles will be required to regularly move on, and off site may include transport of PFAS contaminated material. There is a risk from vehicle movement for the potential to transport soil off the site and deposit on public roads.

- Trucks will use designated haul roads on site to eliminate the potential for picking up soil on tyres.
- Trucks will be inspected prior to departing site to ensure they are not overloaded and there is no soil on tyres.
- A nominated road sweeping company will be on standby in the event soil/mud be tracked roads.
- Trucks carting contaminated material will be covered prior to leaving the site and will be inspected and cleaned if required at end of day if any residual soil is remaining in the truck.

The vehicle cleaning process will be carried out at a designated location. Excavators and construction plant in identified areas will require cleaning due to potential PFAS impacted soil to prevent cross contamination. Equipment will be cleaned prior to relocating between work areas and demobilisation.

This Sub-Plan will incorporate erosion sediment and surface water pollution as an element of Water Management. Separate work elements will be assessed at each stage to determine if erosion and sedimentation will be identified as a Significant Environmental Hazard. An Erosion and Sediment Control Plan (ESCP) will be produced for each work element and added to each work pack as required.

### D.1.3.3. Wet Weather Preparedness Procedure

During construction, five-day weather forecasts will be monitored via the Bureau of Meteorology website to assist in programming of works and minimising the environmental impact. Wind direction and wind speed records will be obtained via the internet from local weather stations.

These records will be utilised during programming of works to assist in dealing with air quality (e.g., dust – during construction) issues that may arise. In the event of significant rain forecast, works will be completed prior to prevent any sediment, flooding or environmental issues.

BBK has a daily observation BOM weather station – monitoring rainfall and temperature - Elevation 187 m and located and Lon: 147.25° E and Lat 35.13.

**Table 11: BBK BOM (Defence) Mean rainfall 2023.**

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	47.7	50.3	51.4	33.3	37.8	52.5	43.9	44.0	41.7	44.2	67.4	51.4
Median	31.2	29.8	40.0	25.2	31.4	54.7	41.8	41.6	35.6	26.4	53.6	49.0
Highest Daily	67.0	62.0	127.0	35.2	40.8	43.0	25.4	28.0	42.0	39.0	66.6	65.0

**Table 12: BBK BOM (Defence) Mean temperature 2023**

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Lowest	22.0	21.5	18.1	15.9	10.8	8.6	9.6	8.8	11.2	14.7	18.1	20.7	23.0
Highest	30.0	25.2	22.6	21.3	16.9	13.8	10.8	12.5	19.2	21.9	23.7	29.4	30.0

The following actions will be implemented a minimum 24 hours prior to a rain event >10mm.

- Engineering Site supervisor will conduct Environmental Site Inspection.
- Inspection of sediment controls and any repairs, replacements, additional controls required.
- Additional pumping of dams (where water quality meets discharge criteria) to minimise potential for flooding of works area with a minimum free board water level of 1 metre.
- Additional stock of sediment fencing, coir logs, geofabric material on site at all times.
- Exposed soil areas susceptible to erosion or sediment run-off will be covered with a geofabric material and coir logs and sediment fencing installed.
- Works prior to forecast significant wet weather will be focused on preparing site to minimise impact to works area during rain event.
- Subject to stage of works, work activities will cease for the day or certain activities ceased (ie excavation of soil) during significant wet weather events.
- Personnel will monitor pumping of water from dams and ensure environmental controls are in place and effective.
- Additional pumps and filter bags will be installed in the event of a 1 in 100-year rain event.
- Environmental Site Inspection will be completed following each >10mm rain event.

Any environmental incidents will be reported immediately in Synergy and within 24 hours to Defence ESM/BM/PMCA with corrective actions implement as soon as possible.

#### **D.1.3.4. PFAS Management Plan**

Investigations indicate that the predominant contaminant of concern at BBK is PFAS surface water and soil sediment movement. There has been significant PFAS monitoring by the PFAS Management Area Plan, and this is ongoing. The PMAP team provide ongoing support and the RRJV will continue to liaise with the PMAP to share PFAS data, new technology and innovations to minimise the risk of spreading PFAS.

Potential issues and risks include the following:

- PFAS chemical properties have a dispersive behaviour in the environment.
- PFAS compounds may be detected in soil and laterally widespread remotely from primary PFAS sources (e.g. fire training areas).
- The project will generate large volumes of spoil, which may be impacted by low concentrations of PFAS which requires careful management.

The presence of PFAS narrows the options for re-use or disposal. Beneficial reuse on-site may be permissible subject to siting options and stabilisation reagents treatments which will require risk assessment process in accordance with Defence guidance and approval by the relevant Defence technical authorities.

RRJV's strategy is to maximise retention of spoil material on-site and reuse as much as possible in line with Defence's Waste Minimisation Policy.

#### **Potential risks associated with PFAS contaminated soil at BBK include:**

- Due to the variability in soil waste classifications, material tracking, and segregation protocols and stockpile management procedures will be established documented in the EMP and implemented during the Delivery Phase.
- The chemical properties and dispersive behaviour of PFAS in the environment, compounds may be detected in soil and spread from primary PFAS sources (e.g. Fire training areas).
- The redevelopment at BBK will generate large volumes of spoil which may be impacted by low concentrations of PFAS and will require assessment by the PFAS Risk Assessment tool.
- The presence of PFAS reduces options for reuse, disposal or temporary stockpiling. Beneficial reuse on-site will be subject to siting options, a rigorous risk assessment process in accordance with Defence PFAS Risk Assessments and approval by Defence BM/ESM and technical authorities will be completed.
- A plan and risk assessment will be completed for each work element, prior to beneficial reuse spoil/Disposal/Temporary Stockpiling (See Preliminary PFAS Risk Assessment & Tool 2023 and Appendix J stockpile management).
- Options for the management of high PFAS concentrations in spoil (such as disposal, treatment or remediation) are limited and will increase costs.

**Potential risks associated with Surface water and Groundwater PFAS contaminated water at BBK includes:**

- Surface water management, including restricting infiltration of PFAS contaminated surface water to sewer and stormwater, dewatering of excavations if surface water ingress is encountered.
- Groundwater Surface Water management, including managing PFAS contaminated water into the construction area, and dewatering of excavations.

**Potential Risks Importing soils and stockpiling**

- Variability in soil waste classifications, material tracking, and segregation protocols and stockpile management procedures will be established documented in the EMP and implemented during the Delivery Phase.
- Procedures for the importation of materials such as Virgin Excavated Natural Material (VENM), Excavated Natural Material (ENM) and fill material to attain design levels, or for backfill in service trenches will ensure that the material is suitable prior to acceptance on-site.
- Wherever possible, any spoil material will be retained on-site if deemed suitable through risk assessment processes and endorsed by Defence ESM. Where this is not possible or viable, it will need to be disposed of in an approved disposal facility by an appropriately qualified contractor.
- Stockpiling Management – minimum requirements for short-medium- and long-term temporary stockpiling of PFAS impacted Material. Preparation of stockpiles will be undertaken to minimise potential contamination of underlying and surrounding areas including uncontrolled runoff. Generally, this involves keeping stockpiles dry by installing covering and base layers and bunding. The level of management required will depend on contamination category.

Refer to Defence reference documents for further details, DCMM, PPMM, PMF in references section.

Soils disturbed during construction or maintenance work will fall into one of four categories for PFAS concentrations in soil. Category 1 is the highest and all other categories and Category 4 is the lowest, LOR is classed as non-detect.

**The following tables explain the NEMP Categories 1-4 and protocols for management of PFAS & PFOS contaminated soils.**

**Category 1 PFAS Management Actions**

Category 1 soils are to be excavated and treated or temporarily placed in a lined and covered stockpile on-Base at a location authorised by a Defence environmental officer (ADES/ESM/ESO) following consultation with work teams.

DPFASIM is to be notified when Category 1 soils are encountered. The PMAP for the Base has also identified a preferred management approach for the contamination. Where practicable double-handling should be avoided through aligning the excavation with the treatment.

**Table 13: Category 1 Spoil Management Actions**

Category 1	Management actions
Soil - Human Health –Property Users Commercial / Industrial Setting PFOS + PFHxS > 20 mg/kg	Soils with PFOS + PFHxS of 20 mg/kg or more must be excavated and treated or temporarily stockpiled for later treatment with like materials according to Defence policy. The design of the stockpile cell must be impermeable and prevent leaching. Low-density polyethylene (LLDPE) with 300mm overlap to prevent contamination leaching.
PFOS, PFOA, or PFHxS >50 mg/kg	The reuse of PFAS contaminated material above the Stockholm Convention low content limit of 50 mg/kg will not be considered.



## Category 2 PFAS Management Actions

Category 2 soils may be reused within the works site with appropriate mitigation strategies provided that reuse does not:

- increase the cumulative risk profile at the site i.e. increasing risk from additions of contaminated material over time; each volume assessed on its own might be acceptable but cumulatively they may not be. Increasing total mass of PFAS at a site might become an unacceptable risk.
- create new pathways to sensitive environmental receptors (including impacted soil runoff into waterways and migration of leached PFAS into surface waterways or groundwater).

**Table 14: Category PFAS Management Actions**

Category 2	Management actions
PFOS + PFHxS 1.0 mg/kg to < 20 mg/kg	Exceedance of the Category 2 trigger level does not preclude reuse of these materials on the site. Re-use would require careful assessment of risk. Reuse elsewhere on base will likely require mitigation strategies or any other additional measures to prevent new exposure pathways or an increase in risk to environmental or human health. Off-base disposal is permitted subject to the requirements of the jurisdictional regulator. Pre-treatment may be required
	Approval of locations by ESM/ BM If stabilisation is the method chosen to mitigate risk, Remediation Action Plan (RAP). The Defence draft Guidance on Stabilisation and Reinstatement of PFAS Impacted Soils Policy details Defence requirements including how to choose acceptable amendment products, testing for appropriate addition rates and monitoring to ensure long-term performance.
	Approval of locations by ESM/ BM If stabilisation is the method chosen to mitigate risk, Remediation Action Plan (RAP).

## Category 3 PFAS Management Actions

Category 3 soils can be reused on the works site without further treatment or management or on-Base at locations authorised by a Defence environmental officer (ADES, ESM, ESO) following consultation with works teams and an assessment of risk PFAS risk assessment tool (EMM,2023).

In general, the concentration of PFAS in the re-use materials should be lower than those at the proposed re-use location, unless management measures have been assessed and can control risk to the environment.

### For example:

Reuse of Category 3 material in a Category 4 area – managed by use of capping layers, compaction, impermeable membranes or clay liners. Capping may be under a bitumen sealed road, runway, apron, car park or designed within a platform, pad or mound and separated from lower concentration material with an impermeable marker layer.

**Table 15: Category 3 PFAS Management Actions**

Category 3	Management actions
PFOS + PFHxS 0.01 to < 1.0 mg/kg	No additional mitigation is required for work-site re-use. An assessment of risk will be conducted prior to re-use elsewhere on base. If it cannot be determined whether the risk profile of the receiving area will be impacted by the reuse, the management actions for soils will be the same as for Category 2 (table 16). Off-Base disposal is permitted subject to the requirements of the jurisdictional regulator
	Approval of locations by ESM/ BM If stabilisation is the method chosen to mitigate risk, Remediation Action Plan (RAP).

### Category 4 PFAS Management Actions

Category 4 Soils with PFOS + PFHxS less than 0.01 mg/kg<sup>8</sup> are available for reuse on the works site or on-Base, without further treatment or management, unless other considerations indicate that additional management and risk assessment may be required, such as where sensitive environmental receptors are present (E.g., protected marine areas; wetlands) or the scale of soil volumes involved (>1,500m<sup>3</sup>) create a potential risk.

For example, if soil is to be moved to an area near the boundary of the base where wetlands/waterways are present. Additional risk assessment may be required if:

- The likelihood of runoff and the sensitivity of the potential receiving environment
- Total PFAS load compared to load at the proposed reuse site, where large volumes of soil are to be moved.
- Transfer of risk from one area of base to another.
- Leaching into surface drainage and off-base transport pathways may occur.

**Table 16: Category 4: PFAS Management Actions**

Category 4	Management actions
PFOS + PFHxS LOR < 0.01 mg/kg	Available for reuse on the works site or on-Base, without further assessment or mitigation unless: <ul style="list-style-type: none"> <li>• soil volumes &gt;1,500m<sup>3</sup> where total PFAS load may require further assessment and potential mitigation</li> <li>• in a high-sensitivity area</li> <li>• previous site assessment suggests otherwise.</li> </ul> Reuse will be subject to Defence approval, such as agreement with the BM or their representative on the works team, or where other considerations indicate that additional management may be required, such as where sensitive environmental receptors are present. Off-Base disposal is permitted subject to the requirements of the jurisdictional regulator

Reference – Defence PFAS Construction and Management Framework (2022)

#### Local facilities approved to accept PFAS contaminated Soil:

**Note confirmation will be required to ensure no changes to approvals prior to transport is required.**

- Bowser Landfill: 5 Coleman Rd, North Wangaratta VIC 3678
- Benalla Landfill and Resource Recovery Centre: 96 Old Farnley Rd, Benalla VIC 3672
- Swan Hill Landfill: 6859 Sea Lake-Swan Hill Rd, Swan Hill VIC 3585
- Cleanaway Wodonga Industrial Waste Service: 2/9 Romet Rd, West Wodonga VIC 3690
- Ganmain Landfill: Grave St, Ganmain NSW 2702
- Leeton Landfill & Recycling Centre: 732 Corbie Hill Rd, Corbie Hill NSW 2705 Gregadoo

All containers will be managed as contaminated materials, until appropriately cleaned prior to transporting non-contaminated materials.

Waste classification letters must accompany all soil or groundwater proposed to be disposed of offsite.

All soil that is excavated and temporarily stockpiled is to be tracked and documented. The following information will be recorded:

- Soil quality information – based on sampling results and visual observations.
- GPS coordinates – where soil has been removed from and where the soil is placed. Soil volumes – to be provided by excavation contractors.

Beneficial reuse is defined in the PFAS NEMP Version 2.0. Examples include where there is an existing need for soil for purposes such as landscaping, construction works, roadworks etc. Waste disposal is not supported on the Defence Estate, except under exceptional circumstances, and is subject to approval by the BSM/ESM with supporting documentation. Consultation and planning for reuse will occur in the early planning phases of the project to ensure budget allocation and prevent delays.

All soil that is removed and temporarily stockpiled as part of the construction program will be tracked and documented.

**The following information will be recorded:**

- Soil quality information – based on sampling results and visual observations.
- GPS coordinates – where soil has been removed from and where the soil is placed. Soil volumes – to be provided by Civil engineers and confirmed by excavation contractors.
- Wherever possible any spoil material should be retained on site, if deemed suitable via risk assessment and approved by Defence. Disposal will only occur if unsuitable for reuse and disposed of to an approved waste management facility.
- Material segregation will be maintained at all times with respect to classification and or source material (stopbutt, PFAS category, presence of other contaminants asbestos, inert waste and acid sulphate soil).

RRJV will continue to Liaise and consult with the Directorate of Contamination Assessment & Remediation & Management (DCARM). And will supply data and update Defence system including ESDAT, GEMS, and NSIMS.

### **D.1.3.5. Stockpile Soil/Spoil Management**

In accordance with the Defence Material Management Protocol (DMMP), RRJV have developed a Stockpile Management Protocol for the management of any proposed temporary or permanent stockpiles. See Appendix J. for the Stockpile Management Strategy.

The protocol should be read in conjunction with Erosion and Sediment Control Plans (ESCPs).

The objective is to minimise the generation of excess spoil. Reuse of soil within the works is the preference provided the soil quality is fit for purpose and is not contaminated beyond the accepted criteria. As defined in Defence PFAS Construction and Maintenance framework (2021) and the DCMM 2021.

Stockpiled waste material will be segregated to avoid cross contamination and appropriate classification for reuse or disposal. All material suspected to contain contaminants must be stored on top of an impermeable material while the classification procedure is carried out.

The potential PFAS contaminated stockpiles will be temporarily stockpiled in areas approved by Defence ESM. The designated area will be bunded in accordance with Defence PFAS Construction Management Framework. Material tracking will be conducted to track source and destination of each load with a plan updated daily with location and source of all materials with stockpiles identified on site with signage and stockpile reference numbers.

**Table 17: Management Objectives- Soils**

Metric/Measure	Objective	Timeframe	Accountability
All soil types to be separately stockpiled for inspection and verification of contamination	All types	At all times	Construction Manager Environment Manager
Minimise contamination / degradation to the soil environment within the project area	All contaminated soil is managed and disposed in accordance with the EMP requirements	At all times	Construction Manager Environment Manager
All contaminated soils with contamination levels in excess of health investigation levels for Commercial/ Industrial Land Use criteria to be treated	As directed by DoD	At all times	Construction Manager Environment Manager
All contaminated soils with contamination levels in excess of the relevant environmental investigation levels criteria to be managed IAW DPCMF to be only used for re-use in non-environmental sensitive areas	As directed by DoD	At all times	Construction Manager Environment Manager

If any potentially contaminated material is to be reused or disposed, an appropriately qualified person will be engaged to characterise it in accordance NSW EPA and the Defence Contamination Management Manual (DCMM).

Stockpiles located at BBK will be temporary and located according to the following criteria:

- Will be temporary located on approved locations at BBK for no longer than 2 years.
- Located outside of the tree protection zone of trees or native vegetation identified for retention in accordance with requirements specified in AS4970.
- On land that does not require the removal of threatened species, Endangered Ecological Communities or roosting habitat for listed threatened fauna species or native vegetation clearing beyond what is already required for the works.
- At least 50m from likely areas of concentrated water flows and at least 20m from waterways that are classified as Class 1 and Class 2 from the DPI Fisheries guideline *“Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings”*.
- Constructed to ensure any slump of the stockpile will not affect erosion and sediment control measures or infringe specified minimum clearance requirements.
- Ensure no cross contamination of contaminated materials with non-contaminated materials.
- Located in areas of low heritage conservation significance (including identified Aboriginal cultural value) and will not impact on heritage sites beyond those already impacted by the works.
- Located a suitable distance from sensitive noise and vibration receivers to minimise disruption.
- Where possible, away from key views and visual receptors.
- Readily accessible via the site or road network.
- Located to minimise heavy vehicles to movement on local roads.
- On relatively level land.
- Outside of utility easement corridors.
- Located within the approved project boundary.

### D.1.3.6. Stockpile Location Approvals

Prior to the establishment of any stockpile on site, RRJV will consider if there are any existing stockpile sites. Undertake an advanced contamination assessment prior to disturbance of any land being or intended to be used for the location of stockpiles. The proposed locations of the proposed stockpiles will be detailed on the relevant ESCP (Erosion and Sediment Control Plan) and submitted to the Defence ESM and BM (or delegate) and for approval before stockpiling of material is due to commence.



Figure 13: Potential stockpile locations in BBK (subject to approval by BM/ESM)

### D.1.3.7. Controls to manage Stockpiles

The type of environmental controls required for stockpile management will depend on the location, surrounding environment and material being stored at the stockpile site. The environmental controls for a particular stockpile site may change during construction depending on the type of material being stored at any particular time. The mitigation measures will be implemented prior to establishment of stockpiles by the Construction Manager in consultation with the Environmental Manager. Any change in use will be reflected where required in the ESCP (Erosion and Sediment Control Plan).

Site-specific mitigation measures, where they are necessary to further reduce impacts, will be detailed in the ESCP which will be developed for each work element, and included in the work packs.

Before undertaking work and during construction activities, site-specific Erosion and Sediment Control Plans (ESCPs) will be progressively developed for each work area.

All ESCPs require sign-off by the Environmental Manager (or delegate) prior to implementation. The Soil Conservationist will also conduct regular reviews, as required, of ESCPs to ensure they meet Defence best practice. Any ESCPs developed and associated further revisions will be provided to Defence ESM for information.

Any areas disturbed during construction will be stabilised in accordance with the DCM or the final design plan, as soon as feasible. ESCPs will be updated as works progress to ensure they are always relevant to on-ground activities. For minor changes, these can be notated onto the ESCP. Major changes to the type or nature of sediment controls or to stormwater runoff will warrant preparation of an updated ESCP.

Stockpile Strategy is in Appendix J.

## **D.1.4. Water Quality Criteria**

### **D.1.4.1. Reuse**

Reuse on site will only occur if:

- There is no visible oil or grease
- Water is tested for PFAS contamination - below acceptable rate as per current PNEMP standards.
- pH levels are between 6.5 – 8.5.
- No erosion is caused from the discharge

Any runoff generated by the reuse is controlled entirely within the site boundary and appropriate sediment controls are installed and maintained in accordance with the SMP (BLUE BOOK).

In addition to the above, reuse on site for watering of landscaped areas will only occur if:

- If all criteria above are met, then the water may be authorised for reuse by the Environmental Manager (or delegate).
- If the criteria are not met, treatment of water will occur as outlined below.

### **D.1.4.2. Discharge to Land**

Discharge to land within the site boundary will only occur if:

- There is no visible oil or grease
- No surface runoff will be generated from the discharge and there is no potential for discharged water to reach any watercourse (within or outside the site)
- No erosion is caused from the discharge and appropriate erosion and sediment control are installed in accordance with the SMP (BLUE BOOK)
- All discharge water can be wholly contained within the site boundary
- pH levels are between 6.5 – 8.5.

Where there is a risk that runoff can leave the site boundary, agreement is to be sought from property owner/tenant. If all criteria above are met, then the water may be authorised for discharge to land by the Environmental Manager (or delegate). If the criteria are not met, treatment of water will occur as outlined below.

- Water quality testing will be undertaken less than 24 hours prior to a controlled discharge and daily for any continued controlled discharge or when rainfall causes runoff to the source of water under control discharge.
- If the criteria are met, the water is suitable for discharge. If the criteria are not met, treatment of water will occur as outlined below in table 22 below.

**Table 18: Discharge water quality criteria**

Parameter	Criteria	Sampling Method	Analytical Method
pH	6.5 – 8.5	Probe or Grab Sample	Field analysis and confirmed as required with laboratory assessment
Turbidity	50NTU	Probe or Grab Sample	Field analysis and confirmed as required with laboratory assessment
Oil and Grease	No visible	Visual observation	Field analysis and confirmed as required with laboratory assessment
PFAS PFAS NEMP	Where PFAS concentrations are less than the NEMP screening criteria.	Grab samples surface water and soil	Field analysis and confirmed as required with laboratory assessment

If discharge to the environment is not possible, seek approval and discharge criteria from the Defence ESM prior to discharge to the wastewater system. Otherwise, tanker by a licensed waste contractor and dispose off-site to an appropriately licensed facility.

### D.1.4.3. Water Testing

Before any water can be discharged, the water must meet the water quality parameter limits for discharges of pollutants to water set out above. Water quality testing will be undertaken less than 24 hours prior to a controlled discharge and daily for any continued controlled discharge or when rainfall causes runoff to the source of water under control discharge. If the criteria are met, the water is suitable for discharge. If the criteria are not met, treatment of water will occur as outlined above.

**Water quality testing will be conducted in accordance with:**

- Australian Standard 5667:1998 Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS/NZS 5667.1:1998).
- Australian Standard 5667:1998 Water Quality – Sampling, Part 6: Guidance on sampling of rivers and streams (AS/NZS 5667.6:1998).

### D.1.4.4. Storage of Water Treatment Chemicals

Flocculants and other water treatment chemicals will be appropriately stored on site. Bulk powdered flocculants like gypsum and lime will be covered and positioned within erosion and sediment controls away from areas with the potential for water runoff. All treatment chemicals will be stored in appropriately banded locations within secure compound areas that prevent unauthorised access. Requirements of the Safety Data Sheets will be followed.

## D.1.5. Discharge Controls

Water discharge will only occur following approval by the Environment Manager (or delegate) who will issue a Permit to Dewater.

Prior to the commencement of dewatering, the permit acceptor will inspect the entire system, including intakes and outlets, pumping and discharge locations.

If the dewatering is not directly supervised, a risk assessment will be carried out and mitigation measures implemented to eliminate the risks of pollution and to prevent the occurrence of the following:

- Intake suction placed within the deposited sediments resulting in discharge of sediment laden waters.
- Erosion at discharge locations and downstream areas.
- Inadvertent or intentional controlled discharge of untreated waters.

Dewatering will cease immediately if any negative environmental impact such as flooding, erosion dirty water discharge is observed.

Controls that are adequate to minimise water use and potential water quality impacts, to ensure compliance, and to reduce risk are implemented before any relevant works commence.

Elimination of the hazard is the first preference of control, followed by engineering, then administrative controls. Typical controls used on this project are outlined in the below table.

**Table 19: Water quality controls**

Ref.	Control	Accountability
SW1	Ensure all soil and water risks are considered as part of the development of Construction Area Plans and Work Packs.	Project Engineers
SW2	Erosion and Sediment Control Plans (ESCP) are developed by a suitably qualified person (e.g., Certified Professional in Erosion and Sediment Control (CPESC) or other demonstrated experience) in consultation with the construction team.	Environmental Manager
SW3	Erosion and Sediment Controls (ESC) will be designed (stability, location, type and size), constructed, operated and maintained in accordance with the relevant, local guidelines, and approved by the Environmental Manager and Site Supervisor. Locations are on the Environmental Site Plan	Construction Manager Environmental Manager
SW4	Ensure erosion & sediment control devices are constructed and installed as per the approved drawings, ESCP or Site Environment Plan as relevant.	Construction Manager Environmental Manager Project Engineer
SW5	Clean water diversions will be installed before work starts.	Construction Manager Environmental Manager Project Engineer Site Supervisor
SW6	ESC will be installed prior to (or immediately upon) any disturbance to vegetation or soil. These controls will remain in place until revegetation, stabilisation or hard scraping has occurred.	Construction Manager Environmental Manager Project Engineer Site Supervisor
SW7	So far as reasonably practical cleared areas will be kept to a minimum and will be progressively rehabilitated/revegetated as they become available.	Environmental Manager Project Engineer Site Supervisor
SW8	All materials will be stockpiled away from water flow paths.	Site Supervisor Environmental Manager
SW9	Sediment laden water (dirty water) captured onsite will be settled and treated to stabilise sediment.	Site Supervisor Environmental Manager



Ref.	Control	Accountability
SW10	Water transfers / movement around site and discharged from site will be undertaken in accordance with the project's dewatering procedure/ Permit to Dewater.	Construction Manager Project Engineer
SW11	An adequate number of concrete washout facilities will be available & maintained. The washout facilities will be isolated from surface water flows using bunds to prevent contamination of clean surface waters and will be lined to prevent contamination of soil and ground water. Locations are on the Environmental Site Plan	Construction Manager Environmental Manager Project Engineer Site Supervisor
SW12	The quantity of water consumed on the project from each of the following sources are reported monthly: <ul style="list-style-type: none"> <li>Potable water,</li> <li>Water from WWTP will not be utilised, until risk of PFAS contamination has been removed.</li> </ul>	Construction Manager Environmental Manager Project Engineer Site Supervisor
SW13	All hazardous substances (liquids and solids) are stored and managed according to AS1940.	Site Supervisor
SW14	All refuelling points, including refuelling/lube trucks, will have hydrocarbon spill kit Ensure spill kits: <ul style="list-style-type: none"> <li>Are of adequate type and volume for materials stored, as well as potential operational spills.</li> <li>Are located adjacent to all hazardous substance storage units, in refuelling and maintenance areas.</li> <li>Are located at worksites in close proximity to waterways and are specific for aquatic use.</li> </ul> Locations are identified on the Site Environment Plan and other emergency response documentation.	Site Supervisor Project Engineer Environmental Manager
SW15	Opportunities to minimise the use of potable/ fresh water will be continually sought. and adopted as appropriate.	Construction Manager Environmental Manager
SW16	Water treatment plants used are designed and constructed by a competent person and to meet the quantity and quality of water predicted to require treatment. The quantity and quality prediction are based on the outcomes of a model that is provided by a suitably qualified person	Environmental Manager Design Manager
SW17	Water /PFAS treatment plants are subject to scheduled routine maintenance. That complies with the requirements of the supplier. Records of water quality discharged through the treatment plants will be retained by the operator.	Construction Manager
SW18	All dewatering related complaints will be investigated and recorded. Relevant corrective actions are to be agreed and implemented, with accountabilities and time frames assigned. The complainant or enquirer is notified of the response as soon as practical. All environmental complaints and close out actions are immediately reported to the Environmental Manager.	Environmental Manager Project Engineers
SW19	In accordance with standard construction practices, weather forecasts will guide work activities undertaken on-site. Forecasts shall be checked at the start of each day and before undertaking new work activities affected by rainfall or adverse weather. Where weather forecasts predict conditions that may pose an environmental risk, site environmental controls shall be inspected and secured to reduce erosion and sediment control impacts. Contingency planning to prevent spills shall also involve monitoring for predicted flood events and the removal of plant, equipment, fuels and chemicals from flood prone areas.	Environmental Manager Project Engineers

Ref.	Control	Accountability
SEW 20	Installation of culverts berms and detention basins to capture and settle sediment in the no contaminated locations (clean). Utilise hydrology assessment data to determine water movement and sediment traps to be implemented.	Construction Manager Environmental Manager Project Engineers
SEW 21	Spoil from trenching works, containing contaminant concentrations above the spoil reuse criteria may be reinstated directly into excavations. Where initial contamination investigation or unexpected finds investigations have identified "hot spots" contaminated material will be separated and managed. (Moved to an approved spoil stockpile for sampling and waste classification) A hot spot is defined as being an area where concentrations of contaminants in excess of 250% of the site reuse criteria for total PAH and benzo(a)pyrene (BaP).	Construction Manager Environmental Manager Project Engineers
SEW 22	Specific approvals are required for any PFAS contaminated material leaving site. This material requires case-by-case EPA waste classification and can only be sent to an appropriately licensed waste facility, and all loads must be covered to prevent spillage or dust generation.	Construction Manager Environmental Manager Project Engineers

## D.1.6. Occupational Exposure Controls

Details of controls that will be implemented to prevent occupational exposure to PFOS / PFOA contamination are outlined in the Work Health and Safety (WHS) Exposure Human Health Risk Assessment (HHRA) for Per- and Poly-fluoro-alkyl substances (PFAS).

**Table 20: Exposure Controls for PFAS**

Control	Accountability
Ensuring hands and face are washed prior to eating, even if gloves are worn	Supervisory staff, Subcontractors
Use disposal coveralls where risk of contaminating clothing exists.	Supervisory staff, Subcontractors
Use of water-proof disposable nitrile gloves (either instead of or in conjunction with other gloves)	Supervisory staff, Subcontractors
Use of P2 dust masks associated with use of a water truck that is spraying water drawn from areas where the triggers are exceeded	Supervisory staff, Subcontractors
If skin contact with contaminated water above the trigger level is unavoidable, ensure sleeves are rolled down and wet clothing is changed immediately post-work activities	Supervisory staff, Subcontractors

## D.1.7. Monitoring

The quantity of water used from potable supplies or water obtained under an extraction licence or other regulatory authority or agreement, including recycled water obtained from outside the project, will be captured and reported in Synergy. Where the information is not available from an invoice, other processes will be put in place to obtain the data and the information entered manually.

Water quality monitoring is performed that complies with legal and contract requirements. The requirements for monitoring are detailed in the MIRRA schedule Appendix D and in Table 20.

Where monitoring determines non-compliance to be a risk or to have occurred, an incident report and corrective actions are raised in Synergy.

Monitoring and analysis of data will be carried out by a competent person. Evidence of competence will be retained.

It is the accountability of the Environmental Manager to ensure all monitoring is performed according to these requirements

### D.1.7.1. Water Quality Monitoring

The following water quality monitoring will be ongoing, as the project is scheduled from 2024 to 2034 monitoring plans will be developed for each work element/stage and included in the work pack.

**Table 21: Water quality monitoring details**

Location	Parameter	Methodology	Frequency
BBK	BBK upstream / downstream of drainage lines	Assesses sediment load-visual contamination load.	Visual inspection weekly
BBK	Storage Dams sediment basins	Assesses sediment load-visual contamination load.	Visual inspection weekly

### D.1.7.2. Meteorological Monitoring

Meteorological data adequate to allow the interpretation of monitoring data to assess compliance and identify potential non-compliances is collected. The sources of this data are:

**Table 22: Meteorological monitoring details**

Location	Parameter	Equipment Type	Frequency
BBK	Monitor temperatures/rain events for prevention of Dust /Erosion/Sediment movement	Rain Gauge Temperature Evaporation Rates Utilise local Wagga/Kapooka BOM Data	Daily monitoring Rain events in preparation for erosion/sediment movement risk Weekly reporting

### D.1.7.3. PFAS Specific Monitoring

During construction monitoring for PFAS contamination, in ground water and spoil, will be undertaken in accordance with the Dewatering Plan. Monitoring will comply with the project requirements reuse and discharge criteria of PFAS National Environmental Management Plan (PNEMP) and the Defence PFAS Construction Management Framework (DPCMF) as well as any recommendations made by the Contamination Consultant.

Where monitoring determines non-compliance to be a risk or to have occurred, an incident report and corrective actions are raised in Synergy.

Monitoring and analysis of data will be carried out by a competent person. Evidence of competence will be retained.

It is the accountability of the Environmental Manager to ensure all monitoring is performed according to these requirements.

## D.1.8. Records

The project team will keep records of the following and make them available to Defence as required:

- Dewatering procedures and permit
- Date and time for each discharge at each location
- Water quality test results for each discharge
- Personnel approving the dewatering activities
- Evidence of discharge monitoring, or risk assessment and mitigation measures used to eliminate the risks of pollution or erosion.

All site personnel undertaking dewatering activities during construction of the project will be trained and inducted in the use of the dewatering procedures.

Where a flocculant or coagulant is proposed to treat site water, we will demonstrate that the proposed flocculant or coagulant is suitable for use.

Water quality monitoring is performed that complies with legal and contract requirements. The requirements for monitoring are detailed in the MIRRA schedule in the work pack monitoring Locations

Location plan for monitoring will be provide at staged intervals in work pack for each work element.

### **D.1.9. References**

- Defence PFAS Construction and Maintenance Framework V3.0 2021
- Defence's Heavy Metals Risk Management Tool (HMRMT)
- Defence (2021a) Blamey Barracks Kapooka PFAS Management Area Plan, Department of Defence, June 2021.
- Defence PFAS Investigation and Management Branch (DPFASIM)
- Defence Asbestos Management Plan (2023) V5.2
- Department of Defence, Contamination Management Manual, Annex B, Investigations, Remediation and Management, March 2018, Amended June 2021a.
- Department of Defence, Contamination Management Manual DCMM, Annex E *Fuel Facilities and Annex M, the Manual for the Management and Remediation of Petroleum Hydrocarbon Contaminated Soil and Sediments*
- Environment Report (2023)
- Contamination Assessment – PSR DDR
- Contamination Strategy (2023)
- PFAS Preliminary Risk Assessment (2023)
- PFAS Risk Assessment Tool (2023)
- EPA – NSW VENM Fact sheets
- PFAS NEMP Version 2.

## D.2 Contamination Management Sub-Plan

### D.2.1. Background / Context

Risks associated with managing contamination should be balanced with other project risks. Evidence-based decision making, through use of available data and site-specific information, will optimise the risk management.

The project will avoid oversampling and over-testing by careful planning, consultation and assessment of current data, site characteristics and whether material is intended for reuse on base, stockpiling (generally a temporary measure) or disposal. While scoping work during the procurement phase, RRJV will ensure that the level of sampling and testing for contamination is fully justified and conforms to the requirements of the DCARM, DPFASIM Branch and the DCMM.

Defence has historic data collection, and the project will review Defence Contaminated Sites Records located in the Garrison Estate Management System, Environmental Factor Management - Contaminated Sites Records (GEMS EFM-CSR). Contamination on the works site will be registered in GEMS EFM-CSR.

The Environmental Data Management Software (ESdat) is a specialist environmental database system used to compile a broad range of environmental data including chemistry results and sampling information. Laboratory analytical results for environmental samples including PFAS and other contaminants is to be entered into ESdat in accordance with the Defence Contamination Management Manual (Annex L). Consultants/contractors can request datasets from contamination/environmental testing, and other potential contaminants, to inform desktop analysis.

Contamination management and risk mitigation strategies will be documented in construction phase including:

- Unexpected Finds Protocol (UFP).
- Materials Management Plan (MMP). A Materials Management Plan will be prepared once estimates of spoil volumes are more refined when siting options for beneficial re-use of spoil are identified and a PFAS risk assessment for re-use has been undertaken and endorsed by Defence.

Known potential contamination risks include,

- PFAS (refer D1 Soil & Water Management Sub Plan for further details),
- Petroleum Hydrocarbons
- Lead heavy metals (Firing Ranges)
- Asbestos
- UXO, Explosive Ordnance (EO) and EO Waste
- Historical unknown waste dumping sites
- Biohazard waste
- materials which may be odorous, aesthetically unsuitable, or unsuitable from an engineering perspective.

Beneficial reuse is defined in the PFAS NEMP Version 2.0. Examples include where there is an existing need for soil for purposes such as landscaping, construction works, roadworks etc. Waste disposal is not supported on the Defence Estate, except under exceptional circumstances, and is subject to approval by the BSM/ESM with supporting documentation. Consultation and planning for reuse will occur in the early planning phases of the project to ensure budget allocation and prevent delays. Where reuse is not possible, and disposal is required the following actions will be completed:

Wherever possible, any spoil material will be retained on-site if deemed suitable through risk assessment processes and endorsed by Defence ESM. Where this is not possible or viable, it will need to be disposed of in an approved disposal facility by an appropriately qualified contractor.

Spoil transport and offsite disposal procedures will be established in compliance with DCM and NSW EPA transport requirements.

PFAS containing waste products, are Dangerous Goods Class 9 products. The disposal facility will be approved to receive contaminated materials.

#### **D.2.1.1. Known Existing Asbestos Contamination**

Widespread asbestos contamination was not identified during the investigation phase. Asbestos containing material (ACM), asbestos fines (AF) and fibrous asbestos (FA) in soil has the potential to be disturbed during construction activity. Any such material will be managed in accordance with the DCMM and the Defence Estate and Infrastructure Group Asbestos Management Plan (DAMP, refer to Chapter 5 for management of asbestos in soil). Where ACM is identified, the area will be cordoned off and isolated to prevent access and advice sought from an appropriately qualified asbestos consultant.

Specific safe work procedures, control measures and monitoring programs will be compliant with Defence Asbestos Management Plan (AMP) and WHSMP in line with the Work Health and Safety Act 2011, Work Health and Safety Regulations 2011.

Procedures will include training, visual inspections, occupational hygiene and monitoring, stop work protocols and work practices (SWMS) that minimise the possibility of disturbance of asbestos in soil and that may release asbestos fines and/or asbestos fibres. See Hazardous Substances Sub Plan section 3. for further description.

#### **D.2.1.2. Known Existing Petroleum/Hydrocarbon Contamination**

Petroleum hydrocarbon hotspots were not identified during the investigation phase. Notwithstanding, petroleum hydrocarbon contaminated material may be disturbed during construction activity and must be managed in line with the DCMM, including Annex E Fuel Facilities and Annex M, the Manual for the Management and Remediation of Petroleum Hydrocarbon Contaminated Soil and Sediments. Unexpected finds identified during construction will be managed as outlined in Section 3.2.7.

#### **D.2.1.3. Known Existing Lead Contamination**

Work element 7.1 New Weapons range will require, realignment of the existing range, and soil movement will generate movement of lead and heavy metals.

Where there is any work that involves the development or excavation of areas on or within the vicinity of current or former firing ranges, an assessment to determine if there is contaminated soil, water or sediment will be conducted ensuring spoil can be treated as per the DCM Annex G. This will include:

- appropriate occupational hygiene measures are to be implemented to minimise exposure of site workers to contamination during works
- management measures such as erosion control and appropriate dust mitigation activities are adopted during works to prevent mobilisation and movement of contamination to impact the surrounding environment.

Lead and other heavy metals (arsenic, copper, tin, zinc, iron) may be disturbed at active or former live firing ranges. These must be managed in accordance with the DCMM, including Annex G Firing Ranges. Defence's Heavy Metals Risk Management Tool (HMRMT) should be used to assess a range's potential environmental risks and appropriate environmental management actions.

**Table 23: Contamination Range controls**

Physical Controls	Description
Controlling access and capping	Prevents people and animals from being exposed to contamination. Achieved with fencing, including controls such as stop butt capping to further control access to metal impacted stop butt material.
Water management	Maintenance of vegetative ground cover to help control surface water contamination. Stormwater capture and treatment. Redirecting surface runoff to minimise flow onto the shooting range and runoff from the shooting range. Appropriate construction and maintenance of drains and sediment basins can be effective in controlling the migration and flow of contaminants and assist with future remediation requirements.
Vegetation management	Ground covering vegetation can reduce the spread of pollution through dust, surface water or erosion. Maintenance native grasses landscaped vegetation will reduce in the risk of lead and other contaminants migrating via surface water entrainment, runoff and via wind, dust movement is reduced.
Bullet traps	Bullet traps will be installed to capture and contain fired bullets at rifle ranges to mitigate future contamination associated with the use of firing ranges.
Stop butt design	Stop butts will be designed to better manage contamination. Existing stop butts will be delead (to remove lead via excavation and removal or sieving prior to reuse,) and capped to create a temporary infiltration barrier to minimise the potential for runoff and leaching of contamination into the surrounding environment.
Management plans	Preparation and implementation of a site specific MMP that ensures appropriate actions are undertaken to control and mitigate existing and future contamination present on firing ranges. Shooting range design and layout should always prevent any impact on sensitive environments or off-range areas. Overlapping shot fall areas may also improve the efficiency of future lead recovery.
Lead recovery	Lead recovery involves collecting and removing bullets and shot from the ground at a shooting range for recycling or appropriate disposal. Lead recovery may involve bulk excavation and deleading of stop butts or other methods such as sieving, residual contaminant may remain using this method that (if present) may require further management or remediation.

#### D.2.1.4. Known Existing Biohazards

Defence sites have considerable movement of materials and storage over the longer term. The RRJV will monitor and complete risk assessments to minimise movement of contamination. I.e. Fire Ants from imported soil and mulch, fungi and soil borne pathogens such as *Phythora Cimmoni*.

#### D.2.2. Scope

This Sub-plan addresses Contaminated Land management on the project and the management of potential impacts to the environment and/or community. Separate plans will be developed if the risk assessment identifies a moderate to high risk of mobilising contamination sources across the base.

Known potential contamination risks include,

- PFAS (refer D1 Soil & Water Management Sub Plan for further details),
- Petroleum Hydrocarbons
- Lead heavy metals (Firing Ranges)
- Asbestos
- UXO, Explosive Ordnance (EO) and EO Waste
- Historical unknown waste dumping sites
- Biohazard waste
- materials which may be odorous, aesthetically unsuitable, or unsuitable from an engineering perspective.

This assessment will include a Contamination Risk Assessment (CRAT) in accordance with the Defence Contamination Management Manual (DCM).

Activities conducted on the project that have the potential to create soil contamination are listed below.

**Table 24 BBK Hazards and Impacts**

Hazard	Potential Environmental Impact
Asbestos fines (buried)	OHS risk
PFAS	Contamination of waterways and groundwater -
Unexpected finds	Mobilisation of contamination in surface water and sediment/dust/vapour
Hydrocarbons	Contamination of waterways and groundwater -
Lead Firing ranges (Lead copper tin, zinc)	Air, soil and waterways contamination
Accidental spills/releases Cross contamination or new contaminating events.	Potential contamination of clean sites, increased contamination
Contaminated soils	Spreading of contamination soils/water to clean areas
Biohazard – for site users	Air, soil and waterways contamination Fungi and soil borne pathogens i.e. <i>Phytophthora cinnamomi</i>

### D.2.2.1. Controls Used to Manage Contamination

Controls that are adequate to manage Contamination and to reduce risk to the lowest acceptable rating achievable are implemented before any relevant works commence. Elimination of the hazard is the first preference of control, followed by engineering, then administrative controls. Typical controls used on this project include:

**Table 25: Contamination controls**

Ref	Control	Accountability
C1	Contaminated land & general contamination risks shall be considered when developing Construction Area Plans and Work Packs.	All
C2	When contaminated materials are discovered or suspected, works will cease, and the Supervisor and Environmental Manager notified immediately. Following Risk Assessments Environmental Manager shall advise if testing by a competent person will be conducted, and a management strategy developed.	All
C3	Ensure contaminated land is handled, stockpiled, reused and/or disposed of as per the contamination/Materials Management Plan (as applicable).	Site Supervisor
C4	The movement of materials will be tracked via a Materials Tracking form/system.	Project Engineers Site supervisor
C5	Contaminated water runoff from suspected or actual contaminated land and stockpiles will be contained, treated and managed in accordance with contractual and approval obligations.	Site Supervisor Project engineers
C6	All vehicles, plant and other machinery operating in contact with contaminated soil will be decontaminated prior to leaving site.	Site Supervisors Environmental Manager
C7	Testing shall comply with the contractual and legislative requirements.	Environmental Manager Construction Manager
C8	Soil, and soil leachate, containing contaminant concentrations below the relevant environmental investigation level will be assessed for unrestricted reuse, subject to other site restrictions and excluding any geotechnical requirements. This assessment will be undertaken by a competent person.	Environment Manager Construction Manager
C9	Soil, and soil leachate, containing contaminant concentrations above the relevant environmental investigation level will be assessed for controlled reuse in non-environmental sensitive areas of the site	Environment Manager Construction Manager



Ref	Control	Accountability
C10	Where the above outcomes are not acceptable, other options such as (re)treatment, off-site disposal or a site-specific risk assessment be considered, as determined by Regulators and Competent Assessors.	Environment Manager
C11	VENM soils protocol to ensure only clean virgin natural materials is brought on site. This will require certification Materials testing by NADA approved Laboratory See VENM Fact sheet NSW Link <a href="#">NSW VENM FACT sheet</a> <a href="#">NSW Excavated Natural Materials link</a> EPA VENM certification template and Notices 143 completed	Environment Manager
C12	PFAS – Conduct PFAS Risk Assessment -and Tool to determine risk of spreading contamination. Stockpiling protocol	Environment Manager
C13	Specific EPA approvals are required for any PFAS contaminated material leaving site. This material requires case-by-case EPA waste classification and can only be sent to an appropriately EPA licensed waste facility, and all loads must be covered to prevent spillage or dust generation.	Supervisor Project Engineer Environment Manager Construction Manager
C14	Water runoff from contaminated land and stockpiles must be contained, treated or disposed to ensure there is no pollution of land or waterways.	Supervisor Project Engineer Environment Manager Construction Manager
C15	No water from excavations is discharged to the storm water or sewer system	Supervisor Project Engineer Environment Manager Construction Manager
C16	Activate unexpected finds if unknown contamination is identified.	Environment Manager
C17	Soil, and soil leachate, containing contaminant concentrations above the relevant environmental investigation level will be assessed for controlled reuse in non-environmental sensitive areas of the site	Supervisor Project Engineer Environment Manager Construction Manager
C18	Spoil from trenching works, containing contaminant concentrations above the spoil reuse criteria may be reinstated directly into excavations. Where initial contamination investigation or unexpected finds investigations have identified “hot spots” contaminated material will be separated and managed. (moved to an approved spoil stockpile for sampling and waste classification)	Supervisor Project Engineer Environment Manager Construction Manager
C19	An adequate number of concrete washout facilities must be maintained at all times. The washout facilities will be isolated from surface water flows using bunds to prevent contamination of clean surface waters. It will be lined to prevent contamination of soil and groundwater.	Supervisor Project Engineer Environment Manager Construction Manager

**Table 26: Occupational Exposure controls for PFAS**

Control	Accountability
Ensuring hands and face are washed prior to eating, even if gloves are worn	Supervisory staff, Subcontractors
Use disposal coveralls where the risk of contaminating clothing exists.	Supervisory staff, Subcontractors
Use of water-proof disposable nitrile gloves (either instead of or in conjunction with other gloves)	Supervisory staff, Subcontractors
Use of P2 dust masks associated with use of a water truck that is spraying water drawn from areas where the triggers are exceeded	Supervisory staff, Subcontractors
If skin contact with contaminated water above the trigger level is unavoidable, ensure sleeves are rolled down and wet clothing is changed immediately post-work activities	Supervisory staff, Subcontractors

## D.2.3. Monitoring

Contaminated land monitoring is performed that complies with legal and contract requirements.

During construction monitoring for PFAS contamination, in ground water and spoil, will be undertaken in as detailed in the D1 Soil & Water Management Sub Plan.

**Table 27: Monitoring**

Location	Parameter	Equipment Type	Frequency
BBK	Testing contaminates for disposal off site CRAT	NATA accredited sampling protocol EPA transfer certificates DCM	Each truck loads.
BBK	Testing for Tool PFAS Temporary stockpile in high-risk area	NATA accredited sampling protocol DCM	Additional stockpiles
BBK	Lead level Heavy metals Range redevelopment CRAT	NATA accredited sampling protocol DCM	Each truck loads.
BBK	Hydrocarbons -odor/discoloration CRAT	NATA accredited sampling protocol DCM	Each truck loads.
BBK	Asbestos fines	NATA accredited sampling protocol DCM ACM	Each truck loads.

Where monitoring determines a non-conformance has occurred, a non-conformance report and/or incident report and corrective actions will be raised.

Monitoring and analysis of data will be carried out by a competent person. Evidence of competence will be retained.

Certification of all source materials, completed EPA 143 -VENM and Natural Extracted Material

It is the accountability of the Environmental Manager (or delegate) to ensure all monitoring is performed according to these requirements.

## D.2.4. References

- Defence PFAS Construction and Maintenance Framework V3.0 (2022)
- Defence's Heavy Metals Risk Management Tool (HMRMT) (2022)
- Defence (2021a) Blamey Barracks Kapooka PFAS Management Area Plan, Department of Defence, June 2021.
- Defence PFAS Investigation and Management Branch
- Defence Asbestos Management Plan (2023) V5.2
- Department of Defence, Contamination Management Manual, Annex B, Investigations, Remediation and Management, March 2018, Amended June 2021a.
- Department of Defence, Contamination Management Manual DCMM, Annex E *Fuel Facilities and Annex M, the Manual for the Management and Remediation of Petroleum Hydrocarbon Contaminated Soil and Sediments*
- Environment Report (2023)
- Contamination Assessment – PSR DDR
- Contamination Strategy 2023

- PFAS Preliminary Risk Assessment
- PFAS Risk Assessment Tool
- EPA – NSW VENM Fact sheets
- EPA- NSW Extracted Natural Material Fact sheet
- PFAS NEMP Version 2

## D.3 Hazardous Substances Sub-Plan

### D.3.1. Background

The Defence estate has a history of use of Hazardous substances. Past land use and disposal practices have been known to utilise unauthorised dumping/burial activities. The Defence Asbestos Management Plan (AMP, 2021) provides clear pathways for management and removal on the site. RRJV will raise awareness and provide processes to identify and manage Hazardous substances risks. The RRJV Risk Assessments and the Defence CRAT will be conducted when developing the individual work element work plans including the Unexpected Finds Protocol (Appendix H) and hazardous material flow chart (See Figure 28 below).

### D.3.2. Scope

This Sub-plan addresses Hazardous substances management on the project and the management of potential impacts to the environment and/or community.

These could include, Asbestos, Hydrocarbons Lead, PFAS and UXO.

A hazardous material is one that possesses a hazard to human health or the environment when improperly handled, stored or disposed of. The hazard may arise from acute or chronic toxicity or carcinogenicity of the substance or its corrosive or flammable nature.

Hazardous materials that may be encountered during construction work are broadly identified and categorized as solid, liquid or gaseous

- Solid hazardous materials are normally associated with activities involving hazardous spoil, construction materials and explosives.
- Liquid hazardous materials comprise flammable and combustible liquids and toxic chemicals including insecticides and liquefied gases, acids, solvents and degreasing agents.
- Gaseous materials which may be hazardous are flammable gases, toxic gases and gaseous emissions from construction works.

Note: Management of PFAS is addressed in the D1 Soil and Water Sub Plan

Asbestos is a key Hazardous material on the Defence estate and there is a well-developed data base for each building on site, protocols are provided in section D3.4

Activities conducted on the project that have the potential to create impacts associated with hazardous substances are provided below.

**Table 28: BBK Hazards and Impacts**

Hazard	Potential Environmental Impact
Escape of hazardous materials	Damage to environment from contamination
Know (asbestos, chromates, etc.) and Unknown of hazardous substances buried or in structures	Damage to environment from contamination Uncontrolled spread or disposal of hazardous material

### D.3.3. Specific Conditions of Local, State and Commonwealth Legislation

The assessment of hazardous substances will be in accordance with the National Environment Protection (Assessment of Site Contamination) Measure 2013.

The transport, storage and management of hazardous substances will be in accordance with the Work Health and Safety Act 2011 and the Dangerous Goods (Road and Rail Transport) Act 2008 (NSW).

The Environmentally Hazardous Chemicals Act 1985 (NSW) provides a mechanism for regulating chemicals of environmental concern throughout their entire life cycle. The Act allows DECCW to regulate activities utilising chemicals of environmental concern. These requirements are set out in chemical control orders and may require a licence or prohibit certain activities. The activities may include storing, transporting or treating chemicals and/or their wastes.

This Act would only be relevant to the project as environmentally hazardous chemicals (as defined by the Act) require removal from the Base and their subsequent treatment and/or disposal within NSW.

Defence policy management instruments associated with management of hazardous substances include:

- Management of hazardous wastes and hazardous discharges — environmental health aspects

### **D.3.4. Management of Contamination Remediation of Hazardous Substances**

During construction the identification and management of Hazardous Substance contamination will follow the process below and in site specific Remediation Action Plans (RAPs). Development of RAPs will include review of the existing Base Hazardous substance register and include measures for management of unexpected finds of hazardous material, where the following is found during construction.

- Odorous or stained soil.
- Evidence of an oil sheen / staining.
- Buried chemical drums or containers.
- Soil containing tar or ash like substance.
- Bright or unusually coloured materials.

During general construction activities the Unexpected Find protocol and the below Contamination Assessment Flow Chart will be followed (Figure 14).

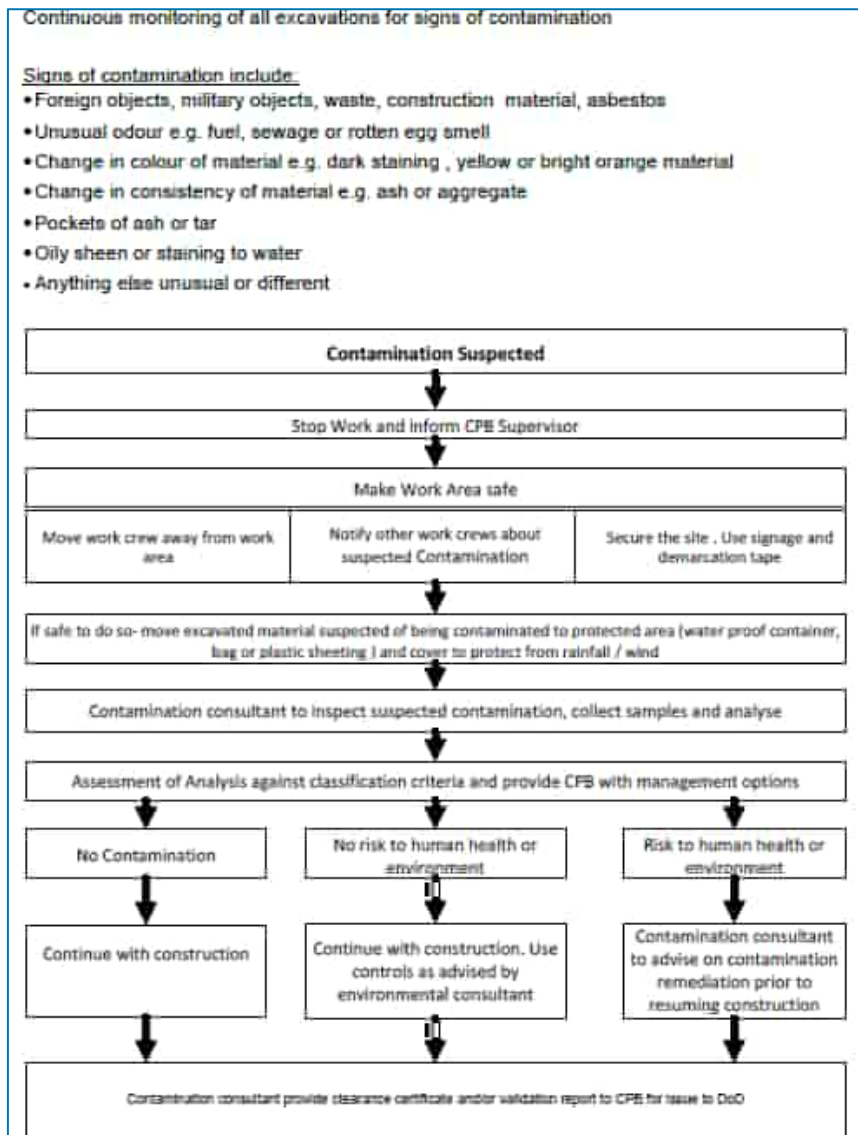


Figure 14: Contamination Assessment flow chart

### D.3.5. High Risk Hazardous Substance Asbestos

Asbestos is identified on the BBK Asbestos Register for facilities being demolished and/or renovated during the project. It is known to be potentially found in a variety of construction materials including as sprayed insulating coating on steelwork and concrete, lagging on pipes and boilers, insulation board in walls and on doors and ceilings, asbestos cement for roof and wall coverings, pipes and tanks, and decorative plasters.

#### D.3.5.1. Process

##### Asbestos Management Plan

Legislative compliance requires that an Asbestos Management Plan will be developed for a project or workplace where the presence or risk of exposure to asbestos has been identified. This will be developed once the work elements are progressed and included in the work packs.

Asbestos free certification of materials used on site will be provided by managing Contractors a certificate will be provided to the Contract Administrator in a form satisfactory to the Contract Administrator as a condition precedent to Completion which states that:

(i) all materials, goods, products, equipment and plant (including any imported materials, goods, products, equipment and plant) used, installed or incorporated into the Works are entirely (meaning 100%) free of Asbestos and ACM; Asbestos Control Plan to be provided by subcontractors prior to works, to include method of transport and disposal, certified hygienist and waste tracking information.

### **Managing Known Sources of Asbestos**

Asbestos is found in a large number of historical buildings or buildings built before 1980 and will also be found in landfill from early disposal methods under building foundations.

Where asbestos products are known to be in the vicinity of operations an Asbestos Removal Control Plan must be prepared including the correct handling techniques and a SHE Work Method Statement (SHEWMS) for the task.

If asbestos is known to be present within a building, its type and location will be shown in a Building Asbestos Register or Hazardous Materials audit report, which the architect (or appropriate person) is to arrange as part of his building audit prior to issuing tender documents.

EMOS are the responsible Asbestos Managers on Base, in the event Asbestos is located, Notification of Asbestos to Defence via the BSCC on 1300 658 975 to request relevant asbestos information for the building or site, and EMOS will coordinate information and site inspections and management requirements (do not raise AE547)- Request immediate/urgent response.

The Defence Regional Asbestos Officer and EMOS must be notified if asbestos is located and must follow all directions given by EMOS supported by the Asbestos Officer in order to comply with Defence requirements for asbestos management, as well as legislative requirements. In addition, a DS-NSW Asbestos Work Checklist (AWC) is to be developed and issued to Defence. For notifiable quantities WorkSafe/WorkCover NSW and Commcare are also to be advised. This will be coordinated by the Safety & Security Manager. (DAMP, 2021 V5.2).

All removal works are to be conducted under the supervision of a hygienist in accordance with the AWC.

During asbestos removal visual and air monitoring is to be conducted and a Clearance Certificate is to be provided by the hygienist to confirm all asbestos has been removed.

Only certified persons will undertake the removal and disposal of asbestos. Removal and disposal of asbestos will be subcontracted to a licensed Asbestos Removalist, who will prepare the required Safety and Health plans and inductions for the work. These will be reviewed by the Safety & Security Manager.

### **D.3.5.2. Asbestos Waste Testing and Tracking**

Any assessment of potential or known asbestos contamination on site should be in accordance with the National Environment Protection (Assessment of Site Contamination) Measure 1999.

Any potential asbestos material which will be sent for disposal will be tested to determine type and concentration of asbestos. All tests will be done by a NATA accredited laboratory.

Any asbestos material which needs to be disposed of will be sent to a licensed landfill facility. Depending on the amount of waste and State, the material will be tracked using waste tracking records.

Subcontractors who are handling and disposing of waste must be suitably qualified and licensed in handling and disposing of asbestos.

All test records and waste disposal records for asbestos will be kept for at least seven years.

## D.3.6. Hazardous Substances Management Objectives

Based on the findings of the risk management processes and the potential impacts to the onsite base community, the following targets have been set. Any deviance from the targets will result in RRJV immediately implementing corrective actions:

**Table 29 Management Objectives - Hazardous Substances**

Metric/Measure	Objective	Timeframe	Accountability
Environmental Spills reported	All	immediately	All site personnel
No Class 1 or 2 Incidents in relation to Hazardous Materials or Chemicals	Zero	At all times	Construction Manager
No noticeable impact in water quality as identified through water quality monitoring	Zero impact to water quality	At all times	Construction Manager
All spills are reported to the HSE Database within 3 days of occurring, and all actions closed out in a timely manner	All spills reported on HSE Database	< 3 days	Environment Manager

### D.3.6.1. Controls Used to Manage Hazardous Substances

Controls to manage hazardous substances are implemented before any relevant works commence.

Elimination of the hazard is the first preference of control, followed by engineering, then administrative controls. Typical controls used on this project include:

**Table 30: Hazardous substances controls**

Ref	Control	Accountability
HZ1	Prior to purchasing hazardous chemicals, a risk assessment shall be completed, and approval provided to purchase. Workers are to be consulted when considering the introduction of a hazardous chemical into a work task. Refer to Tool: Hazardous Materials & Dangerous Goods Risk Assessment	Senior Project Engineer, Project Engineer or Subcontractor
HZ2	Establish and maintain: 1. A register of approvals for the use of hazardous chemicals on the project 2. An Emergency Services Register that is accessible at all times by Emergency Services, of all hazardous chemicals and their locations and quantities 3. A file that includes the relevant Safety Data Sheet (SDS) and the hazardous chemicals risk assessment, for all hazardous chemicals approved for purchase and use on the project. Refer to Tool: SHE Register System Refer to Application: ChemAlert	Safety and Environment Managers
HZ3	Ensure all workers who will be required to purchase, use, store or dispose of hazardous chemicals are trained in the Hazardous Materials & Dangerous Goods Risk Assessment and SDS including: <ul style="list-style-type: none"> <li>▪ The use, storage and disposal of the Hazardous Chemical</li> <li>▪ The signage and emergency provisions</li> <li>▪ Any health surveillance or atmospheric monitoring required.</li> <li>▪ Spills containment and management, including the use of land and aquatic spill kits</li> </ul> Refer to Procedure: Manage Worker Competence Refer to Knowledge: Hazardous Material Dangerous Goods Refer to Knowledge: Hazardous Chemicals Training	Construction Manager
HZ4	Hazardous chemicals are to be stored in a bunded area with a minimum holding capacity of 110% of the largest container within the bund or 25% of the total capacity of all containers within it, whichever is the greatest. Refer to Knowledge: Hazardous Substance Incompatibility Guide The required placarding to be installed at the entrance to the works and storage areas. Refer to Procedure: Undertake Construction Area Risk Review	Construction Manager and Senior Project Engineer



Ref	Control	Accountability
	Refer to Knowledge: Hazardous Material Dangerous Goods	
HZ5	As part of the Work Pack Risk Assessment, incorporate relevant controls from the Construction Area Risk Review, identify additional hazards, assess the risks and further develop controls to eliminate/minimise risks to workers when working with hazardous substances. Refer to Procedure: Undertake Work Pack Risk Assessment	Project Engineers
HZ6	Ensure spill kits: <ul style="list-style-type: none"> <li>▪ are of adequate type and volume for materials stored, as well as potential operational spills.</li> <li>▪ are located adjacent to all hazardous substance storage units, in refueling and maintenance areas.</li> <li>▪ are located at worksites in close proximity to waterways and are specific for aquatic use.</li> <li>▪ locations are identified on the Site Environment Plan and other emergency response documentation</li> </ul>	Environmental Manager and Site Supervisors
HZ7	Refueling will not occur within 30m of a waterway (without appropriate controls in place).	Site Supervisors
HZ8	Containment devices, including bunds, separators and catch trays, will be used where there is a risk of spillage.	Site Supervisors
HZ9	Regular inspections will be carried out e.g. daily by supervisors, and weekly by HSE representatives] to assess the storage and handling of hazardous materials.	Construction Manager / Project Engineers
HZ10	Undertake routine maintenance of plant and equipment for prevention of fuel leaks, visible exhaust emissions or other maintenance issues.	Construction Manager / Project Engineers
HZ11	An Emergency Response Plan which incorporates a spill response procedure shall be maintained for the project	HSE Representatives

### D.3.7. Monitoring Hazardous Substances

Hazardous substances monitoring is performed that complies with legal and contract requirements.

Where monitoring determines a non-conformance has occurred, a non-conformance report and/or incident report and corrective actions will be raised.

Monitoring will be carried out by a competent person. Evidence of competence will be retained. It is the accountability of the Environmental Manager (or delegate) to ensure all monitoring is performed according to these requirements.

### D.3.8. References

- Dangerous Goods (Road and Rail Transport) Act 2008 (NSW).
- Defence Asbestos Management Plan (AMP, 2023)
- Defence CRAT – DCMP.
- Defence Asbestos Management Plan (2021)
- Environmentally Hazardous Chemicals Act 1985 (NSW).
- EMM Contamination Strategy.
- PFAS Risk Assessment & Tool.
- Unexpected Finds Protocol.

## D.4 Heritage Management Sub-Plan

### D.4.1. Background / Context

#### Heritage

BBK is a listed place on the Commonwealth Heritage List and is on the Register of the National Estate, in recognition of heritage values derived mainly from its development in WWII and home of the Soldier.

The Blamey Barracks are an intact and representative example of government design and construction from the 1960s containing buildings that date from all phases of development, which include Royal Australian Engineers training during World War II (WWII), migrant hostel by the Department of Immigration and as a dedicated military training area from the 1950s onwards. Associated with Field Marshall Thomas Blamey, after whom the 1965 era of development was named.



Figure 15: LIA 1950 Buildings BBK

#### Indigenous Heritage

The Cantonment area, located in the eastern portion of the Base, is where the proposed works will predominantly occur. The Cantonment area has been deemed by Umwelt (2022) to have low archaeological potential due to its lack of watercourses and stone outcrops that would provide suitable material for stone tool production.

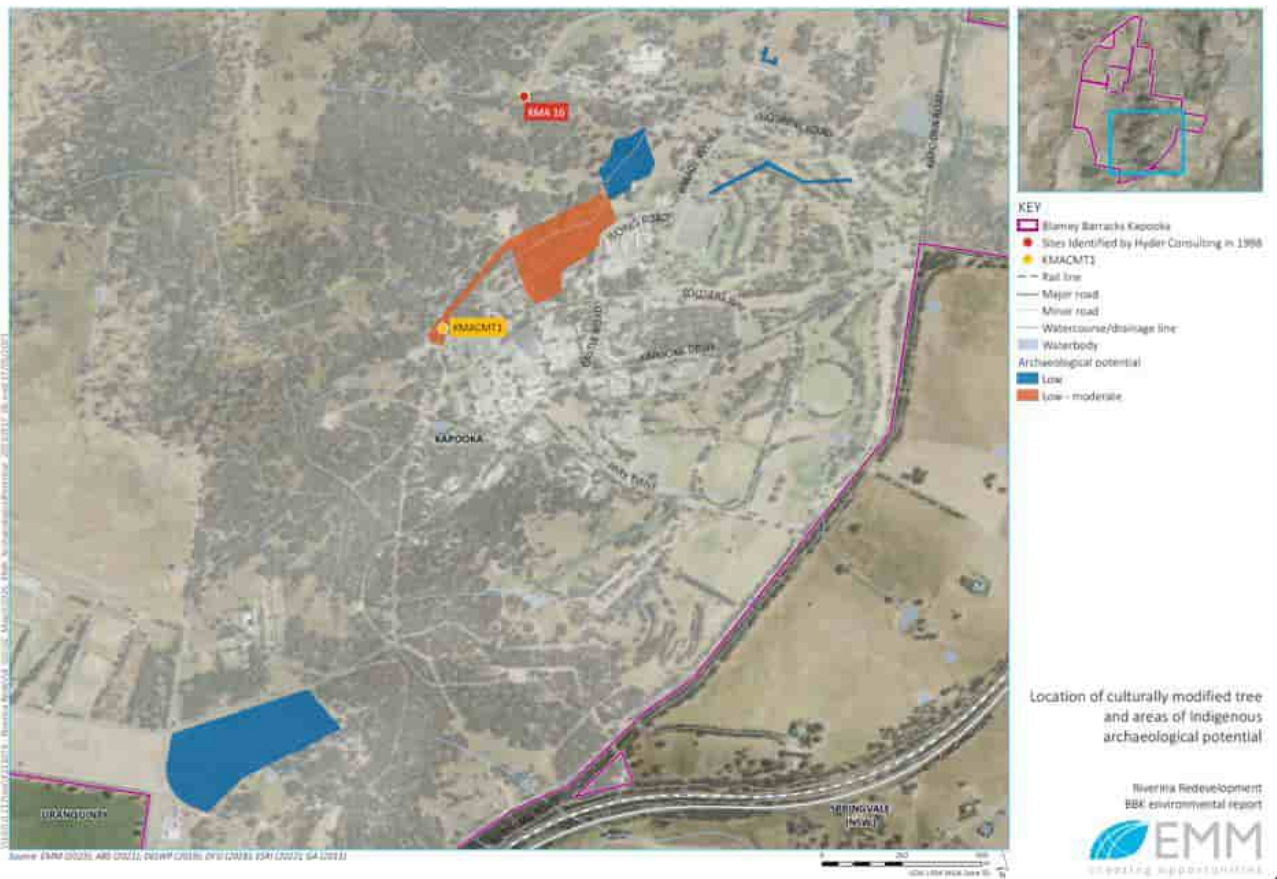
A site inspection, targeting previously undisturbed or minimally disturbed areas within the project footprint, was undertaken by Indigenous stakeholders. The area of low to moderate archaeological potential denotes an area that would once have had high archaeological potential but has been subject to substantial ground disturbance.

The Wadjari Elders Identified a potential culturally modified tree in the north-west section of the Cantonment Precinct adjacent to an existing track, with 2 additional sites identified one of low potential and one of low to moderate potential. Exclusion zones have been established around these significant trees and the ring road design avoids these areas.



**Figure 16: BBK Potential Culturally modified tree in cantonment near ring road**

A full breakdown of the potential heritage impacts of each proposed work element is provided in, HIA (RRJV Heritage Impact Assessment 2023)—see Figure 7 for locations.



**Figure 17: Location of culturally modified tree and areas of indigenous architectural interest**

## D.4.2. Scope

This Sub-plan addresses the heritage management on the project and the management of potential impacts to the environment and/or community.

Activities conducted on the project that has the potential to impact heritage values are listed below. These have been extracted from risk assessments and the Heritage Impact Assessment.

These recommendations have been provided to Defence: DEPAC and DEHPD who have determined a referral to the Minister for the Environment under the EPBC Act 1999 is required. Controlled actions are currently being developed and will be provided in mid-2024.

Activities conducted on the project that have the potential to impact heritage values are listed below.

**Table 31 Hazards and Impacts**

Hazard	Potential Environmental Impact
Unauthorised Demolition Heritage buildings	Damage of heritage items, places or values
Unauthorised Ground disturbance/grubbing	Incidents of damage to heritage items, places or values Complaints from the Regulators or traditional owners as a result of the works undertaken
Civil works (excavation) Plant and machinery operation	Damage to heritage items- Complaints from the Regulators or traditional owners as a result of the works undertaken

### D.4.3. Conditions of Environmental Approvals

Conditions of environmental approvals from DCCEEW that specifically address the management of heritage include:

**Table 32: DCCEEW Approval Conditions - Heritage**

Environmental Approval Document Reference	Relevant Condition	Limit/Requirement
EPBC referral 2024	TBA	<ul style="list-style-type: none"> <li>• Conduct full, professional archival recording of the current site with particular emphasis on the buildings to be demolished considering their internal and external layout and function.</li> <li>• Retain and seek to adaptively re-use the remaining Blamey Barracks (1960s) era rectangular buildings as representations of this era at Kapooka.</li> <li>• The Heritage Interpretation Strategy found at Appendix J in the HMP should be considered, particularly consultation with the Australian Army History Unit on the implementation of any heritage interpretation.</li> <li>• Conduct an oral history project that includes: <ul style="list-style-type: none"> <li>○ Audio and/or video interviews with graduates and staff from Kapooka. The participants should range across the decades of operation from the 1960s to the present.</li> <li>○ A report that summarises the main themes from the participants memories.</li> <li>○ The report and recordings should be made publicly accessible either on site or through an online archive.</li> </ul> </li> <li>• Development and completion of the Kapooka Heritage Trail from the visitor carpark to the proposed Multi-Function Centre and main parade ground.</li> <li>• Interpretation of Kapooka's history and heritage to be displayed through photographs, objects or signage in the following areas: <ul style="list-style-type: none"> <li>○ Kapooka Heritage Trail</li> <li>○ Proposed recruit live in accommodation precinct</li> <li>○ Proposed multi-function centre</li> <li>○ Main Parade Ground</li> <li>○ Former Post Office</li> </ul> </li> <li>• Consider how the architectural style and materiality of new buildings can be understood as an interpretive measure of the former buildings.</li> <li>• Consider reuse of materials, particularly the red bricks from the demolished buildings in landscaping.</li> <li>• The gun emplacements should be protected during construction. If the gun emplacements need to be moved, appropriate management measures are to be developed to protect and manage the move.</li> <li>• The new buildings to follow the following design principles:</li> </ul>

Environmental Approval Document Reference	Relevant Condition	Limit/Requirement
		<ul style="list-style-type: none"> <li>○ Large-scale buildings, arranged in a symmetrical 'disciplined' layout.</li> <li>○ Rectilinear forms, with an emphasis on rectangular footprints.</li> <li>○ Buildings are visible in the round and set in grassed areas.</li> <li>○ Vertical architectural expressions of the windows fenestration with no dominant horizontal expression, resulting in a solid, anchored building.</li> <li>○ Consideration should be given to whether the Fibre Cement Sheets that are proposed for the LIA redevelopment can be textured, or the size of the sheeting reduced to minimise the visual impact of large flat sheeting.</li> <li>○ LIA signage should be in red brick as per concept designs.</li> <li>● Regarding the proposed demolition of parade shelters: <ul style="list-style-type: none"> <li>○ Consult with the individuals and/or families that the parade shelters are named in honour of.</li> <li>○ Based on this feedback, consider where naming could be used in the new development.</li> </ul> </li> <li>● Regarding Indigenous Heritage: <ul style="list-style-type: none"> <li>○ All areas known to have Indigenous Heritage values must be fenced during construction to avoid inadvertent damage.</li> <li>○ Consultation is required with the Traditional Owners to determine the level of engagement they would like to have in actively monitoring the initial ground disturbance activities in the areas shown as holding low and low to moderate archaeological potential sites.</li> </ul> </li> <li>● Policies 58, 59 and 60 in the HMP should be adhered to in the event of unforeseen discoveries during construction.</li> </ul>

#### D.4.4. Project Objectives

Based on the requirements defined above, the findings of risk management processes and the potential impacts to the community, the following targets have been set. Any deviance from the targets will result in management immediately implementing corrective actions:

**Table 33: Project Objectives - Heritage**

Metric/Measure	Objective	Timeframe	Accountability
Incidents of damage to heritage items, places or values	Zero	At all times	Construction Manager
No complaints from the Regulators or traditional owners as a result of the works undertaken	Zero Complaints	At all times	Construction Manager

#### D.4.5. Controls Used to Manage Heritage

Controls that are adequate to manage heritage impact risks are implemented before any relevant works commence.

Elimination of the hazard is the first preference of control, followed by engineering, then administrative controls. Typical controls used on this project include:

**Table 34: Heritage controls**

Ref	Control	Accountability
H1	Ensure all risks to heritage features of the project are considered as part of the development of Construction Area Plans and Work Packs.	Project Engineers
H2	All site personnel will undertake a Site Induction which includes Aboriginal cultural awareness and heritage training, including any project specific management obligations. Site specific heritage management controls training will be provided for personnel who are likely to work near protected heritage items or areas.	Environment Manager / Construction Manager
H3	Obtain relevant pre-commencement work permits (e.g. Permit to Clear, permit to Dewater, permit to enter No Go zone, Permit to Work Outside of Standard Hours)	Project Engineers Site Supervisors

Ref	Control	Accountability
	All necessary approvals will be obtained prior to commencing any works in areas of known or potential heritage items.	
H4	All cultural heritage items and places to be protected will be fenced/flagged and sign posted as No-go zones. These sites shall be shown on site plans and communicated to relevant workforce. Entry to protected areas shall only be permitted following Environmental Manager approval.	Project Engineers Site Supervisors  All
H5	Install protective hard barriers (i.e., ATF fencing, concrete barriers or water-filled barriers) and signage around heritage items before construction, to protect them from damage.	All
H6	Specific training will be provided to persons likely to impact on work in close proximity to heritage items or values.	All
H7	Work will cease upon the discovery of any object which may be a heritage item within the meaning of the relevant legislation, or suspected human remains. The Supervisor and Environmental Manager will be notified immediately. No works will be allowed to continue until a permit or clearance has been received from the relevant authority (as applicable) and Environment Manager.	All
H8	If required by project obligations/ or risk assessment, vibration monitoring shall be undertaken for works near heritage areas.	Environmental Manager
H9	All site personnel must be inducted by a heritage specialist (or delegate) before starting work on site. The induction should include clear explanation of heritage constraints, go and no-go areas, processes and measures to avoid impacts, stop work procedures, and contact details to obtain further heritage guidance if needed.	All
H10	Formal documented engagement will be maintained with relevant heritage groups or traditional owners throughout the project.	Environmental Manager
H11	Construction works at or near heritage locations will be inspected and monitored in accordance with the obligations register. Consider Heritage buildings Review HIA (Umwelt 2022) Vibration sub plan.	Environmental Manager
H12	Contact representatives of the Aboriginal Stakeholders at least four weeks prior to the scheduled commencement of works. Offer the representatives an opportunity to inspect the proposed development area and to inspect controls put in place to protect the heritage values BBK.	Environmental Manager

#### D.4.6. Monitoring

Heritage monitoring is performed that complies with legal and contract requirements.

Where monitoring determines a non-conformance has occurred, a non-conformance report and/or incident report and corrective actions will be raised.

Monitoring and analysis of data will be carried out by a competent person. Evidence of competence will be retained.

#### D.4.7. Unexpected Finds Protocol –Valuable, Archaeological or Special interest items

When an item or object is found during construction that is suspected to be of Valuable Archaeological or Special interest items the following will occur in accordance with the below table.

**Table 35: Unexpected Finds Protocol, Valuable Archaeological or Special interest items**

Action	Requirement	Responsibility	Timing
Stop Work	If an object is found, then the worker will stop work. Do not move or handle the object. Notify Environment Manager	All  Site supervisor	When an object is found
Protect	Install flagging or other barrier to prevent works impacting on the area	Site supervisor	When an object is found
Notify	Archaeologist and registered stakeholders notified to attend site Defence Contract Administrator - ESM	Environmental Manager ESM/PMCA	ASAP Immediately

Action	Requirement	Responsibility	Timing
Assess	Archaeologists and stakeholders investigate and assess the find. Note. If human remains suspected, then contact Police	Archaeologist and/or Registered stakeholders Environmental Manager	ASAP (within 24 Hours)
Record	Archaeologist and stakeholders will consult with CPB regarding recording and salvage requirements. Completion of NSW OEH "Sites Card Basic" Form	Archaeologist and/or Registered stakeholders	ASAP
Storage	Consultation with Defence to agree on 'appropriate keeping place'	Site supervisor	After assessment and recording is completed
Potential Reburial	If reburial of an artefact is required, the minimum OEH requirements as specified in Requirement 26 of the Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW 2010 are to be followed	Site supervisor	After assessment and recording is completed
Restart work	Archaeologist and registered stakeholders to advise when works can recommence or where alternative work method may be required	Environmental Manager Archaeologist and Registered stakeholders	After assessment and recording is completed

It is the accountability of the Environmental Manager (or delegate) to ensure all monitoring is performed according to these requirements.

#### D.4.8. References

- AECOM KMA Heritage Management Plan 2020
- Defence Heritage Management Strategy (HMP) 2000
- EPBC 1999 Referral conditions of Approval 2023 Heritage Impact Assessment (HIA) 2023
- Umwelt Heritage Management Plan (HMP) 2022

## D.5 Flora and Fauna Sub-Plan

### D.5.1. Background / Context

#### D.5.1.1. Site description

BBK is classified as being situated within the Southwestern Slopes and the Inland Slopes. Bioregions Vegetation in the Base is primarily found around the Base's central ridgeline, with areas of relatively intact woodland present on the upper slopes. Woodland throughout the Base has been modified by historical agricultural practices, particularly grazing, and the western side of the Base consists of a flat, grass plain that continues to be used for cattle grazing in some areas.

The desktop assessment indicates that over 110 ha of native vegetation is present within the desktop assessment study area, with a further 10 ha of planted native vegetation found to the north of the study area near the Cantonment area. Trees outside these clusters are scattered throughout the Base and are a mix of remnant indigenous trees, planted indigenous trees, planted native trees, and planted exotic trees.

There is 1,557 ha of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland which has previously been mapped within the BBK site. The removal of 1.39 ha represents a small proportion (0.3%) of the total known area of the community within BBK. See below Figure 18: Threatened ecological communities (TEC) and proposed footprint mapped at BBK.

There is 146 ha of Grey Box (*Eucalyptus macrocarpa*) Grassy Woodlands and Derived Native Grasslands. The removal of 0.01 ha represents a small portion (0.0001%-0.00006%) of the total know area of the community within BBK.

The ring road has been purposely sited on the edge of a large contiguous area of Box Gum woodland minimising the level of fragmentation that occurs. The existing large tract of contiguous box gum woodland provides sufficient habitat areas for threatened species that utilise the EPBC listed ecological community.

One threatened fauna species (the Superb Parrot, *Polytelis swainsonii*) was recorded in the study area during the current surveys (September 2022 and April 2023).



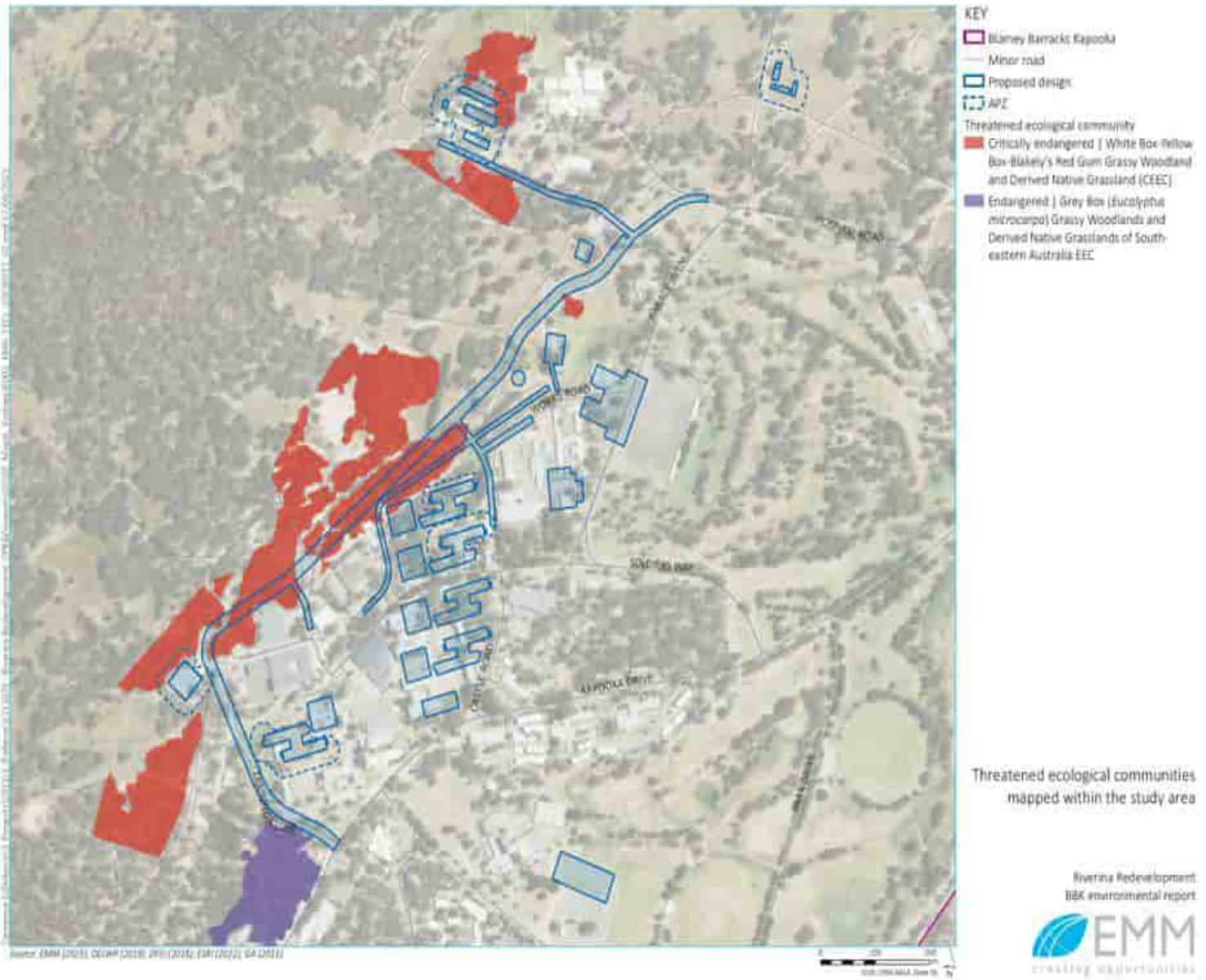


Figure 18: Threatened ecological communities (TEC) and proposed footprint mapped at BBK

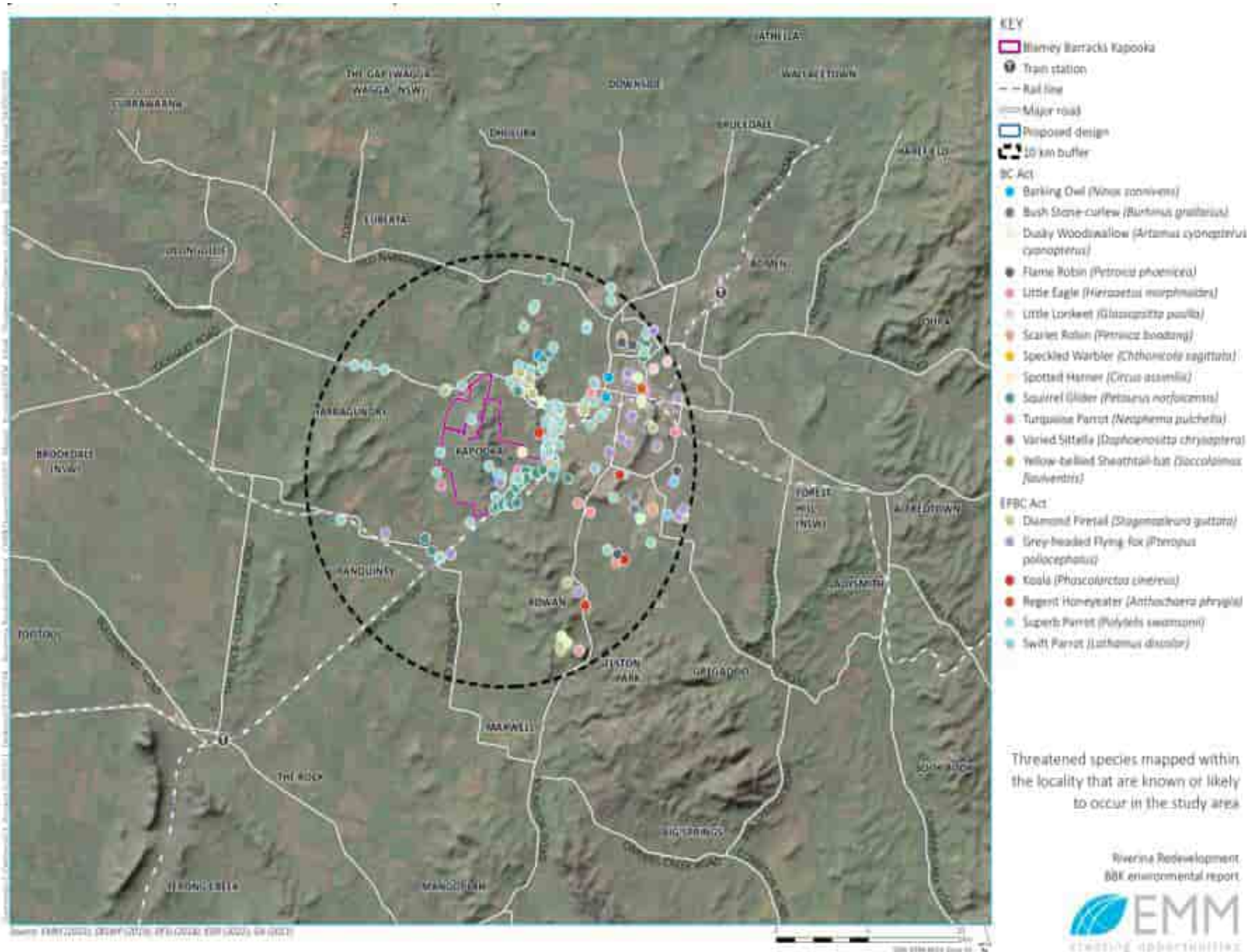
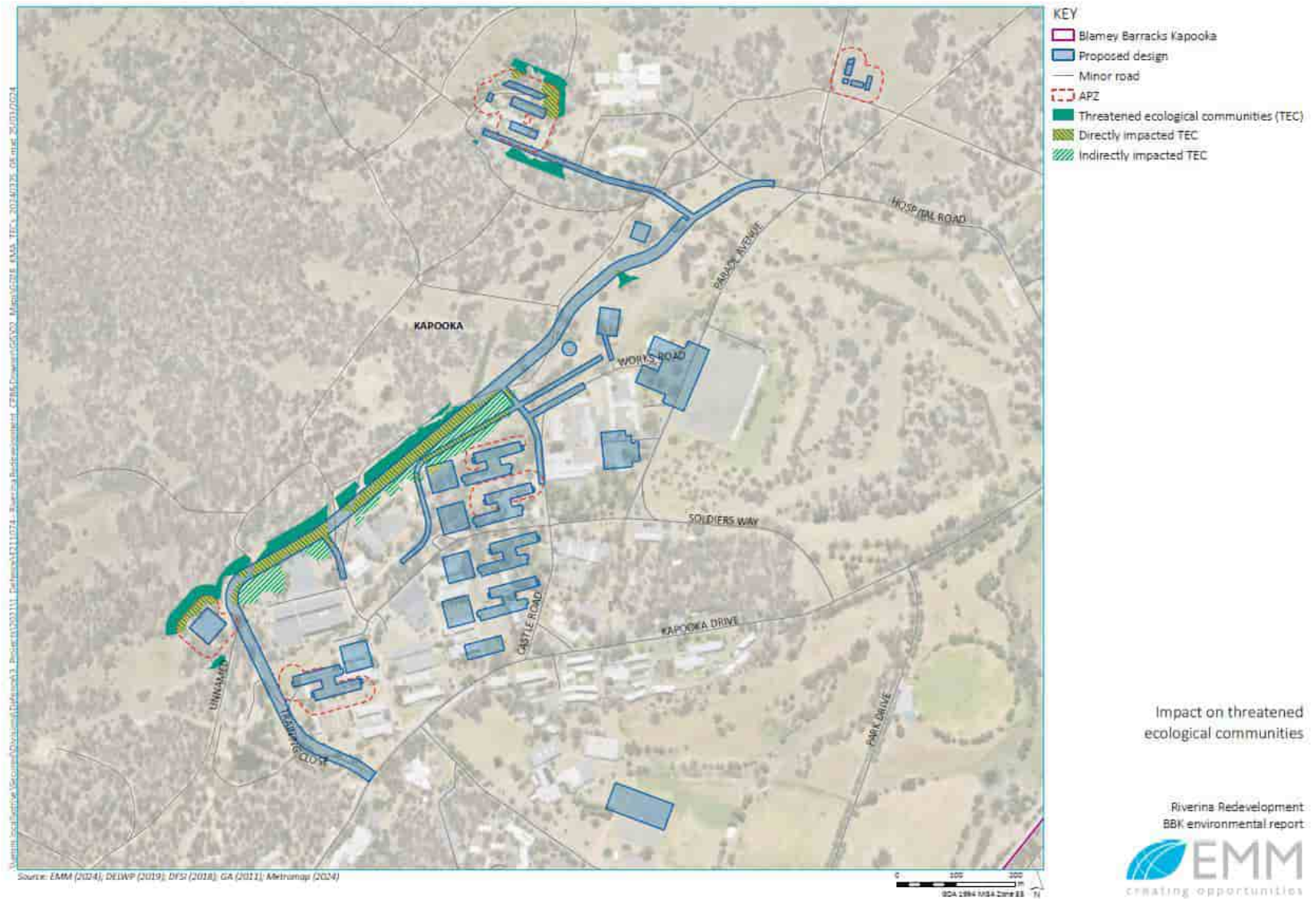


Figure 19: Threatened fauna species identified on site



**Figure 20 BBK Impact on Threatened Ecological Communities**

### D.5.1.2. Priority Weed Management

Weed control is a priority to prevent any further degradation of retained vegetation. Weed encroachment, has the potential to degrade the TEC further, the RRJV will actively manage the risk of introduction of introduced weeds by

- The Implementation of soil and vehicle hygiene measures.
- Monthly checks of construction areas, including documenting any significant growth of priority weeds (Weeds of National Significance or weeds listed as Priority weeds for Riverina Local Land Services Region in the Riverina Regional Strategic Weed Management Plan (LLS, 2017) (Spotless Weed Survey Management and Plan 2018)
- Weed management of all priority weeds will be undertaken within and at the edges of the construction area to reduce risk of spread.

### D.5.1.3. Bushfire Prone Land

The BBK is classified as Bushfire Prone under the Defence Manual of Fire Protection Engineering (MFPE) with locations of higher bushfire risk predominantly found in areas containing eucalypt forest (Refer Figure 19). The City of Wagga Wagga bushfire prone land online mapping identifies a band of category 1 (high risk) bushfire prone land extending from south to north along the ridgeline through the more heavily vegetated areas of the Base.

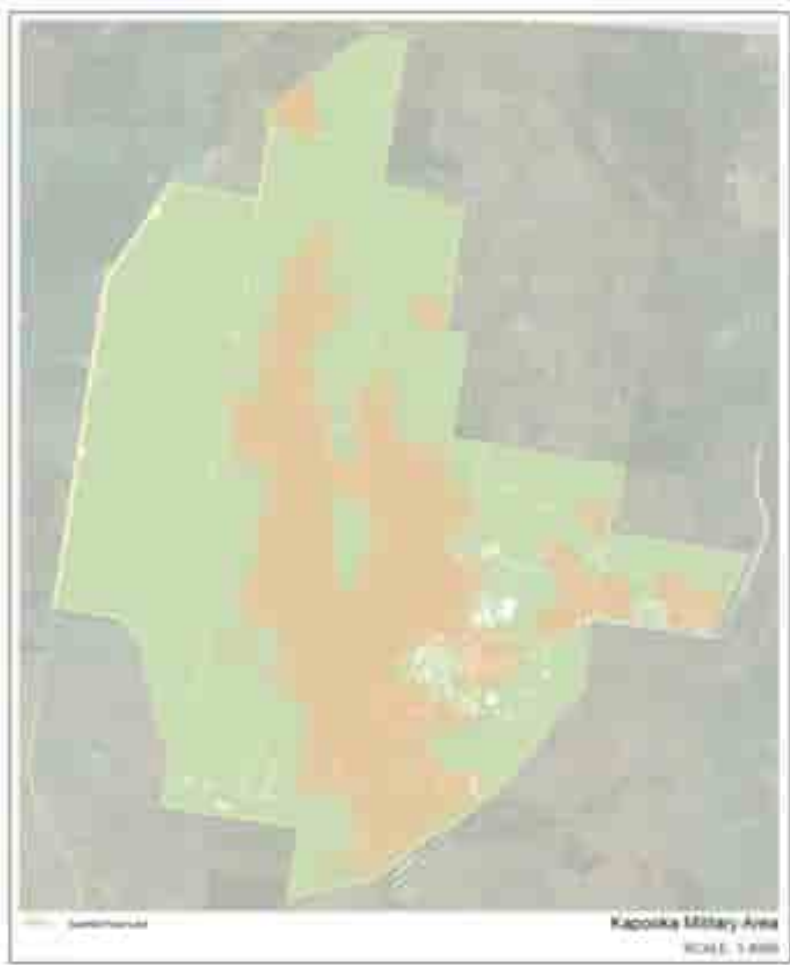


Figure 21:BBK Extent of Bushfire prone land

Category 2 bushfire prone land is mapped as occurring in the neighbouring community of San Isadore to the north-east of the Base. The western fringes of the cantonment area are mapped as a part of the category 1 bushfire prone land buffer zone, with the majority of the cantonment area not mapped as bushfire prone. The risk of bushfire to Base facilities and operation may present a constraint to development and has been considered during facility design.

The Bushfire Attack Level (BAL) is the basis for establishing the requirements for construction to improve protection of a building from potential attack by a bushfire. Asset Protection Zones (APZ) define building setbacks from unmanaged vegetation maps.”

As required by AS3959:2018, each interface area was divided and classified accordingly by vegetation type, slope class and associated distances in order to calculate the different BAL categories: Flame Zone, BAL 40, BAL 29, BAL 19 and BAL 12.5. Landscaping and Building compliance is in accordance with Defence MFPE requirements compliance and mitigation the Bushfire risk

Defence is currently developing the BBK Bushfire Management Plan, and it is expected to be released in 2024. The project will be compliant with all recommendations and mitigations.

This will be in accordance with BM and RFS assessments and requirements, provided at annual briefing and standards for asset protection zones

[https://www.rfs.nsw.gov.au/\\_data/assets/pdf\\_file/0010/13321/Standards-for-Asset-Protection-Zones.pdf](https://www.rfs.nsw.gov.au/_data/assets/pdf_file/0010/13321/Standards-for-Asset-Protection-Zones.pdf)

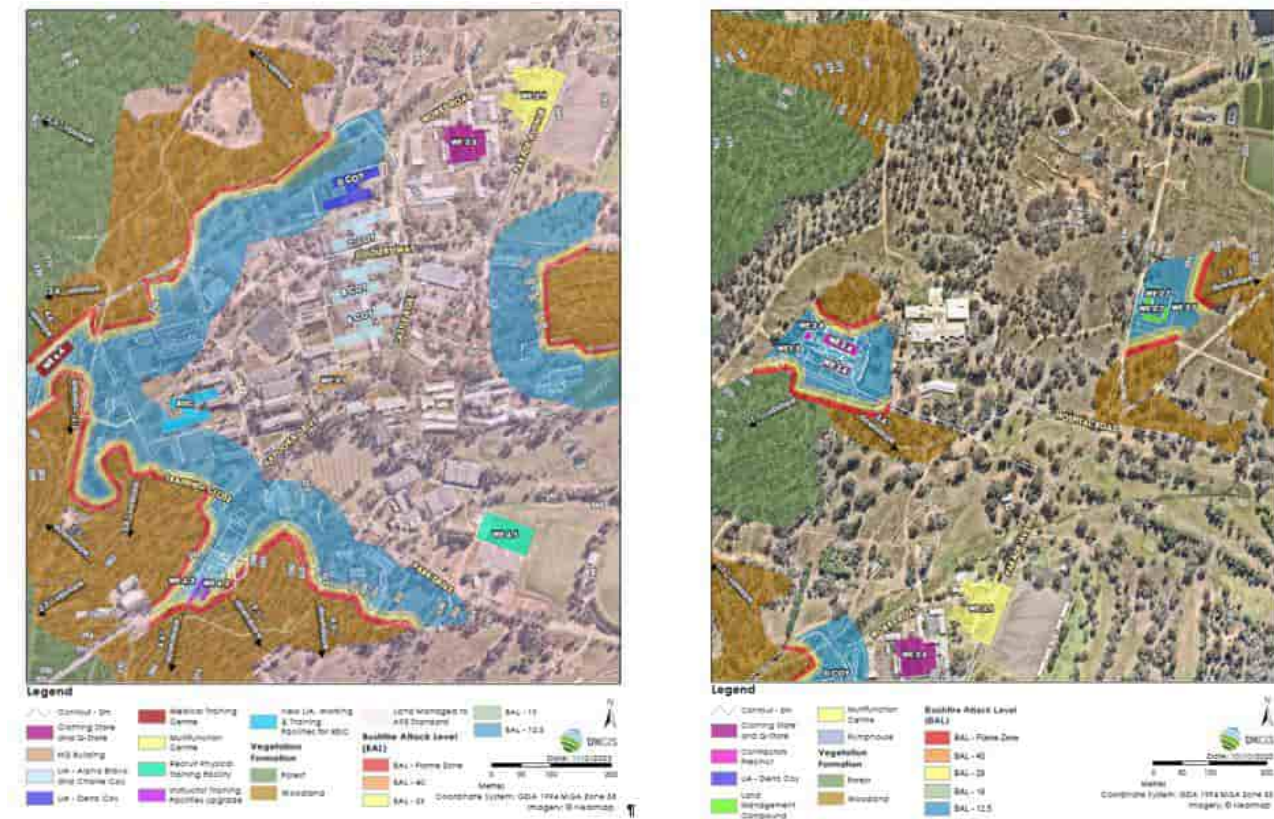


Figure 22: BBK Bushfire Attack (BAL) Ratings’

## D.5.2. Scope

This Sub-plan addresses Flora & Fauna management on the project and the management of potential impacts to the environment and/or community.

Substantial effort has been placed into refinement of the design to avoid and minimise impacts to the TEC, particularly impacts arising from fragmentation, resulting in a reduction of impacts to the TEC initially ~16 ha at CDR to 1.39 ha direct impact and 1.17 ha of indirect impacts.

This vegetation clearance will facilitate the construction of a new ring road, drainage swales, APZs, infrastructure services and Live in accommodation buildings.

The ring road and redevelopment vegetation removal will be closely monitored, and mitigations below will ensure compliance with EPBC Act Referral conditions of controlled action.

Activities conducted on the project that have the potential to impact flora and fauna are provided below.

**Table 36: Hazards and Impacts flora and fauna**

Hazard	Potential Environmental Impact
Machinery – Bulldozers chainsaws	Impacts to biodiversity values-Increasing fragmentation of existing native vegetation and fauna habitat. Increased noise vibration, dust resulting in disturbance of fauna species- and abandonment or changes in behavior.
Machinery – Bulldozers chainsaws	Impacts to retained vegetation due to inadvertent. Disturbance of retained habitats.
Vehicle and plant movements	Damage to existing trees outside of clearing areas Damage to existing trees required to be retained
Water quality surface water redirected during construction	Impact to retained vegetation due to altered sediment and hydrology
Poor biohazard controls on machinery	Introduction and degradation of retained vegetation due to weeds
Impact to Fauna during clearing	Increased risk of impacts to indigenous Fauna during clearing
Refueling/hazardous materials handling and storage	Loss of protected vegetation communities Loss of terrestrial fauna habitat Fauna mortality
Bushfire Ignition of vegetation/buildings	Loss of protected vegetation communities Loss of terrestrial fauna habitat Fauna mortality

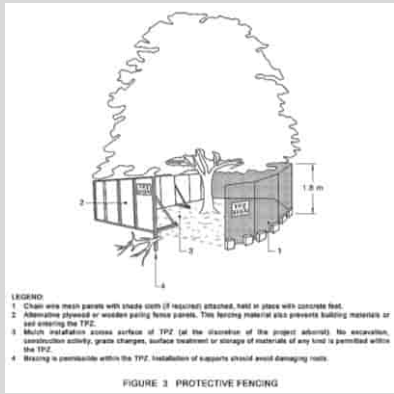
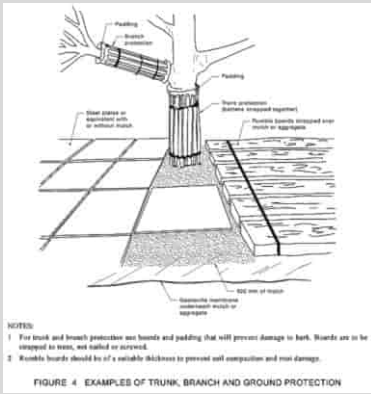
### D.5.2.1. Controls Used to Manage Flora & Fauna impacts

Controls that are adequate to manage flora & fauna impacts and to reduce risk to the lowest acceptable rating achievable are implemented before any relevant works commence. Elimination of the hazard is the first preference of control, followed by engineering, then administrative controls. Typical controls used on this project include:

**Table 37: Flora & Fauna controls**

Ref.	Control	Accountability
FF1	Ensure all risks to flora and fauna are considered as part of the development of Construction Area Plans and Work Packs	Project Engineer/ Site Supervisor Construction Manager

Ref.	Control	Accountability
	Ensure Clearing limits have been established which avoid and minimise impacts to the greatest extent practicable.	
FF2	<ul style="list-style-type: none"> <li>Ensure limits of work are located within the approved construction footprint, shown on design plans, Site Environmental Plans or another relevant site documentation.</li> <li>Marked onsite (e.g. flagged, fenced, sign-posted) and are visible to workers and plant operators prior to the commencement of works</li> <li>Discussed at pre-starts and/or toolbox talks.</li> <li>Conduct regular inspection and maintenance</li> </ul>	Project Engineer Environmental Manager Construction Manager
FF3	<p>Ensure that prior to any disturbance, clearing or grubbing activities the following occurs:</p> <ul style="list-style-type: none"> <li>onsite delineation of clearing limits</li> <li>a Permit to Clear approved by the Environmental Manager (or delegate) is issued.</li> <li>no-go Zones are established for flora or fauna protection areas.</li> <li>weed infested areas are delineated and weed management practices communicated to relevant site staff and sub-contractors.</li> <li>Pre-Clearing Inspection Checklist to be completed and approved by the Environment Manager</li> <li>Inspection to include significant habitat features – hollows nests other features.</li> </ul> <p>Ecologist will be present during clearing –</p> <ul style="list-style-type: none"> <li>staged approach- clearing nonsignificant habitat first and allow time for fauna to vacate the area, ideally 1-2 days.</li> <li>All trees to be inspected by the Ecologist to relocate any fauna and located to nearby vegetation Ecologist conduct a search for wildlife that may need to be removed and relocated to nearby retained vegetation.</li> <li><i>Any injured fauna</i> during clearing works to be taken to veterinarian.</li> </ul>	Project Engineer Site Supervisor Construction Manager Environmental Manager
FF4	All in/over waterway structures shall be designed and constructed in accordance with State/local environmental management guidelines and project obligations.	All
FF5	<p>Site Supervisor shall be notified of.</p> <ul style="list-style-type: none"> <li>damage to No-Go Zone fencing, APZ exclusion fencing or signage immediately.</li> <li>any unapproved land disturbance immediately</li> </ul>	Construction Manager Environmental Manager
FF6	A reduced site speed shall be implemented where necessary to reduce fauna / vehicle collisions.	Site Supervisor
FF7	All plant shall remain on haul roads to minimise damage to vegetation and fauna habitats.	All
FF8	<p>Cleared vegetation will be beneficially reused either where practical (e.g. for habitat enhancement works, chipped for mulch and reused)</p> <p>Note: do not spread PFAS contaminated vegetation mulch into clean sites (Cat 1 &amp; 2)</p>	Construction Manager Site Supervisor Environmental Manager
FF9	<p>If any threatened flora and fauna is evident onsite all site staff shall contact their Supervisor and Environmental Manager immediately.</p> <p>Works may need to cease if the animal is in danger or harmed until it has been relocated.</p>	Construction Manager Site Supervisor Environmental Manager
FF10	Noise mitigation to be implemented to protect sensitive fauna species. – Use water carts to control dust and minimise dust impacts to retained vegetation.	Site Supervisor Environmental Manager
FF11	Dust mitigation measures will be implemented, including use of water carts to control dust and minimise dust impacts to retained vegetation.	Site Supervisor Environmental Manager
FF12	Signage to be implanted on the access roads, to raise awareness of Parrots and Koalas may occur on site as approved by BM	Site Supervisor Environmental Manager

Ref.	Control	Accountability
FF13	The drainage of the road will be constructed, to ensure that increased hardstand does not result in increased surface water runoff and mobilise grits and oils flowing into adjacent areas of retained vegetation and ensure no TEC are impacted.	Construction Manager Site Supervisor Engineers Environmental Manager
FF14	<ul style="list-style-type: none"> <li>Tree Protection Zones (TPZ) are to be established around trees that are to be retained: AS 49702009  <math display="block">\text{TPZ radius} = (\text{diameter at breast height}) \times 12</math></li> <li>Damage to existing trees must be reported to site supervisor immediately.</li> <li>Roots discovered are to be treated with care and minor roots (&lt;40mm dia.) pruned with sharp clean handsaw. All significant roots (&gt;40mm dia.) to be recorded, photographed and reported to arborist.</li> </ul>  	Construction Manager Site Supervisor Engineers Environmental Manager
FF15	<ul style="list-style-type: none"> <li>Stockpiles will be located outside of the tree protection zone of trees or native vegetation identified for retention.</li> </ul>	Site Supervisor Project Engineers Environmental Manager
FF16	<ul style="list-style-type: none"> <li>Topsoil that is not contaminated by priority weeds will be kept in stockpiles for later use during landscaping works. Other stockpiled material will be kept separate from the topsoil stockpiles.</li> </ul>	Site Supervisor Engineers Environmental Manager
FF17	<ul style="list-style-type: none"> <li>Mulch stockpiles will be monitored and turned over as required to avoid spontaneous combustion and weed seed germination.</li> </ul>	Project Engineer Site Supervisor Environmental Manager
FF18	<ul style="list-style-type: none"> <li>All works involving a fire source will have a hot works permit in place with specific controls to prevent fire risk.</li> </ul>	Site Supervisor Engineers
FF19	<ul style="list-style-type: none"> <li>We will not undertake cutting, welding or grinding on total fire ban days, unless the works takes place in an area at least 50m away from an ignition source and appropriate fire controls are in place. Consultation with the local RFS is required</li> </ul>	Project Engineer Site Supervisor
FF20	<ul style="list-style-type: none"> <li>A supply of water will be available at all times for firefighting purposes and supply point will be communicated with local firefighting authorities.</li> </ul>	Site Supervisor Engineers Environmental Manager
FF21	<ul style="list-style-type: none"> <li>Fire extinguishers will be available on all plant and equipment.</li> </ul>	Project Engineer
FF22	<p>In Total Fire Ban (TOBAN) period:</p> <ul style="list-style-type: none"> <li>Check specific TOBAN notice to confirm whether the work can be carried out under standard exemptions (Govt Gazette No18 Feb 2018).</li> <li>If not, apply to RFS &amp; EMOS for specific exemption.</li> </ul>	Site Supervisor Project Engineers Environmental Manager
FF23	All construction works will comply with BBK BMP (2014 & 2024) bushfire treatments and mitigations.	Project Engineer Site Supervisor Environmental Manager



### D.5.3. Monitoring

Flora & Fauna monitoring is performed that complies with legal and contract requirements

**Table 38: Flora and Fauna impact monitoring**

Location	Parameter	Equipment Type	Frequency
BBK	Fauna Flora disturbance Works remain in approved project boundary	Visual inspection	Weekly monitoring Monthly Reporting subsequent non-conformances and remediation measures
BBK	Monitoring during vegetation clearance staged approach is compliant with Approvals and mitigation measures	Visual inspection	Daily monitoring during clearing Monthly Reporting subsequent non-conformances and remediation measures
BBK	Monitor construction monitor nonconformance's of any impact outside of approved zones. Vegetation clearance Injured/disturbed wildlife	Visual inspection Rescue injured wildlife	Monthly Reporting subsequent non-conformances and remediation measures
BBK	Monitor Decline in vegetation quality -Dust/weeds	Visual inspection and assessment	Quarterly Reporting subsequent and remediation measures

Where monitoring determines a non-conformance has occurred, a non-conformance report and/or incident report and corrective actions will be raised.

Monitoring and analysis of data will be carried out by a competent person. Evidence of competence will be retained.

It is the accountability of the Environmental Manager (or delegate) to ensure all monitoring is performed according to these requirements.

### D.5.4. Monitoring plan

Location plan for monitoring will be provide at staged intervals in work pack for each work element.

### D.5.5. References

- Biodiversity Assessment 2023
- Bushfire Assessment (Bushfire Attack Level BAL)
- Defence Regional Bushfire Management Plan (2014)
- Defence BBK Bushfire Management Plan (2024)
- Environment Report (2023)
- EPBC Act Referral Conditions of Approval is expected late March 2024.
- Weeds of National Significance or weeds listed as Priority weeds for Riverina Local Land Services Region in the Riverina Regional Strategic Weed Management Plan (LLS, 2017)
- Spotless Weed Management Strategy & Monitoring Plan 2018

## D.6 Nominated Site In Perpetuity Management Sub-Plan

Placeholder

## **D.7 Noise Management Sub-Plan**

### **D.7.1. Background / Context**

This EMP provides assessment of impacts and mitigation for the construction phase. The EMP will inform the work packs develop Area Work Plans providing guidance to minimise environmental impacts.

### **D.7.2. Construction Hours**

The recommended standard hours as defined by the Interim Construction Noise Guidelines are:

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- Sundays and public holidays: no work

The proposed works are likely to utilise a full working day on Saturday – 7am to 5pm. The assessment for construction activities has been assessed based on these hours, outside standard construction.

To provide justification for extended working hours where utilise high noise generating equipment, an Out of Hours Working (OOHW) Protocol will be prepared, consulted and approved by BBK Defence SEG prior to commencement of construction activities during these hours.

Some works will require extended/out of hours working in addition to the above, such as:

- Delivery of equipment
- Works affecting existing water channels
- Pipework connections
- Electrical connections
- Installation/replacement of major equipment
- Emergency response

Currently, no night-time activities are expected/proposed and in required permission will be requested from ESM and SEG Base Manager.

### **D.7.3. Construction Traffic Noise Levels**

Increase in traffic noise along Hospital Road on Base, via the construction entrance is predicted to be less than 2 dB (in accordance with the NSW Road Noise Policy, DECCW 2011) for the proposed construction traffic generation and no impacts are anticipated.

### **D.7.4. Construction equipment**

To generate a sound power level for each construction activity, a worst-case situation was used in which the two loudest pieces of equipment are operating simultaneously.

The noise levels for the construction equipment have been sourced from the following documents:

- AS2436 – Guide to Noise Control on Construction, Maintenance and Demolition Site (Australian Standards, 2010)
- Construction Noise and Vibration Strategy (CNVS) (TfNSW, 2019).

## D.7.5. Specific Conditions of Local, State and Commonwealth Legislation

Approval for the project is in accordance with the requirements of the PWC Act 1969 and the EPBC Act 1999. Works within BBK are governed by these Acts and the ECC Process administered by Defence.

Project works that occur outside of the Base boundary are subject the requirements of the Protection of The Environment Act 1997 (POEO Act). The POEO Act also provides information and relating to environmental pollution offences such as water, air, noise and land pollution as well as waste offences.

## D.7.6. Project Objectives

Based on the requirements defined above, the findings of risk management processes and the potential impacts to the community, the following targets have been set. Any deviance from the targets will result in RRJV management immediately implementing corrective actions:

**Table 39: Noise Quality Management Objectives**

Metric/Measure	Objective	Timeframe	Accountability
Number of non-compliant monitoring results	Zero	At all times	Construction Manager

## D.7.7. Scope

This Sub-plan addresses noise management on the project and the management of potential impacts to the environment and/or community.

Activities conducted on the project that have the potential to create noise issues are provided below.

**Table 40: Hazards and Impacts**

Hazard	Potential Environmental Impact
Site establishment (clearance, demolition etc.)	Noise disturbance to base occupants, from demolition plant and equipment (e.g. cutting equipment)
Operation of construction compounds	Minimal potential impact
Civil Construction machinery Excavators/Dozers/trucks works	Noise and vibration disturbance to residencies from the operation of plant and equipment (e.g. sheet piling impact)
Structures works	Noise disturbance to residencies from the operation of plant and equipment
Building works	Noise disturbance to residencies from the operation of plant and equipment
Road works	Noise disturbance to residencies from the operation of plant and equipment
Mechanical and Electrical	Minimal potential impact
Vehicle movement	All vehicles entering, leaving or used within the site shall be operated and maintained to ensure that the resulting noise levels are within the prescribed limits.
Defence members/Stakeholders impacted by noise	The Contractor shall inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details. Include point of contacts SEG-Web pages.

### D.7.7.1. Controls Used to Manage Noise

Controls to minimise noise are implemented before any relevant works commence.

Elimination of the hazard is the first preference of control, followed by engineering, then administrative controls. Typical controls used on this project include:

**Table 41: Noise controls**

Ref.	Control	Accountability
N01	Construction works to comply with: Construction Noise Guideline (Draft, 2021) Consider alternative construction methodologies and stakeholder consultation programs where predictive modelling indicates potential noise impacts will exceed contractual or approval obligations. The Contractor shall apply all feasible and reasonable work practices to meet the noise affected level.	Construction Manager
N02	Undertake consultation with affected receivers and other key stakeholders regarding construction activities that may cause disruption/ high noise impacts. Consultation shall comply with project specific contractual and legal requirements.	Community/stakeholder Manager
N03	Ensure all noise associated risks are considered as part of the development of Construction Area Plans.	Project Engineers
N04	Undertake construction activities within the nominated hours of work to comply with contractual and legal requirements.	Construction Manager and Site Supervisors
N05	Works that need to occur outside of standard construction hours will be approved by the <b>Construction Manager</b> and Environmental Manager via an Out of Hours Permit.	Project Engineers
N06	Notify the Supervisor and Environment Manager of unexpected / unplanned noise or vibration increases immediately.	All
N07	All equipment will be serviced and maintained according to manufacturer's recommendations.	Plant and Construction Managers
N08	Operate noise generating equipment in compliance approved noise ratings. <ul style="list-style-type: none"> <li>Jackhammers: Jackhammers, noise levels of around 120-130 dB.</li> <li>Pile Driving: Pile driving 110-120 dB.</li> <li>Bulldozers: Noise levels around 100-110 dB.</li> <li>Cement Mixers: Noise levels of around 85-90 dB.</li> <li>Generators: Noise levels of about 80-90 dB.</li> </ul> Noise Management Framework Guideline (NMFG) provides the recommended assigned construction noise levels at residences and for other effected land uses at normal working times and outside normal working times. The recommended level Laeq (15 min) for residences is: > +10 dB during normal working times. > +5 dB outside normal working times. All noise generating mobile and stationary plant, equipment and processes shall be controlled to minimise noise emissions in accordance with AS 2436 and the NMFG. Mitigation The fitting of effective exhaust silencers to all mobile plant. <ul style="list-style-type: none"> <li>The fitting of engine acoustic shielding.</li> <li>Using exhaust silencers on compressed air exhausts.</li> <li>The use of physical noise barriers such as earth mounds or mobile screens; and</li> <li>Review approved times of operation of plan</li> </ul>	Construction Manager Site Supervisors

Ref.	Control	Accountability
N09	Where reasonably practical minimise, or use alternatives to, audible & irritating reversing/ movement alarms.	Project Engineers and Site Supervisors
N10	Configure the construction site and haulage routes to minimise the need for reversing of heavy vehicles and mobile plant.	Project Engineers
N11	Construct and maintain noise barriers to shield high noise generating activities or plant in accordance with contractual and approval obligations.	Project Engineers and Site Supervisors
N12	Develop Traffic Management Plans to minimise noise impacts. .	Project Engineers
N13	Undertake monitoring to assess compliance in accordance with project requirements.	Environmental Manager
N13	Conduct task observations as per project schedule to ensure ongoing effectiveness of noise control measures.	All
N14	Construction lighting will be designed and installed to avoid community impacts, including intrusive noise from lighting equipment.	Construction Manager
N15	Noise Management Framework Guideline (NMFG) provides the recommended assigned construction noise levels at residences and for other effected land uses at normal working times and outside normal working times. The recommended level Laeq (15 min) for residences is: > +10 dB during normal working times. And > +5 dB outside normal working times.	Insert Accountability per additional control

### D.7.7.2. Monitoring

Noise monitoring is performed that complies with legal and contract requirements.

Where monitoring determines a non-conformance has occurred, a non-conformance report and/or incident report and corrective actions will be raised.

Monitoring and analysis of data will be carried out by a competent person. Evidence of competence will be retained.

The use of remote equipment using real time, cloud-based reporting is to be investigated and implemented where practicable and cost effective.

It is the accountability of the Environmental Manager (or delegate) to ensure all monitoring is performed according to these requirements.

### D.7.7.3. Construction Noise Monitoring

The following noise monitoring will be undertaken on the project:

**Table 42: Noise monitoring details**

Location	Parameter	Methodology	Frequency
Blamey Barracks work element	Noise level for a single source or activity exceeds the maximum predicted noise level.	The Contractor shall perform weekly inspections of all noise producing sources (including inspection of new items of plant before they commence work on the site)	Monthly Reporting subsequent non conformances and remediation measures
Blamey Barracks work element	Noise level for a single source or activity exceeds the maximum predicted noise level.	Complaints about noise are received, the Contractor shall investigate the complaint and implement appropriate mitigation measures if required.	Monthly Reporting subsequent non conformances and remediation measures

Location	Parameter	Methodology	Frequency
		In the event of a dispute, an independent party such as the Superintendent shall undertake noise monitoring	
Blamey Barracks work element	Non-conformance shall be documented by the Contractor and a corrective action request (CAR) issued.	All CAR"s shall be included in the Non-Conformance Register maintained by the Contractor. Copies of CARs shall be provided to the Superintendent upon request. The Contractor shall implement the corrective action as required within the agreed time frame noted on the CAR. The Contractor shall advise the Superintendent upon completion of the corrective action.	Within 7 Business days report non-conformance to Construction Manager. Update register Check timelines

#### D.7.7.4. Plan of Monitoring Locations

Location plan for monitoring will be provide at staged intervals in work pack for each work element.

#### D.7.8. References

- ANZECC guidelines – Technical basis for Building to Minimize Annoyance due to Blasting, Over Pressure and Ground Vibration (1990).
- Noise Assessment -Stantec 2024
- Noise Management Framework Guidance (NMFG).
- NSW Road Noise Policy (DECCW) 2011
- Traffic Management Plan

## D.8 Air Quality Management Sub-Plan

### D.8.1. Background / Context

This sub-plan addresses air quality management on the project and the management of impacts to the environment and/or community.

Air quality can have major impacts on human and environmental well-being. Management principles are designed to reduce and control the effects of air pollution generated from site activities on adjacent receptors, travelling public, workers and flora and fauna.

Activities conducted on the project that have the potential to impact air quality are provided below. These have been extracted from the project workflow, including activities and materials used.

**Table 43: Air Quality – Activities, Hazards and Risks**

Activity	Environmental Hazard	Environmental Risk
Excavation (Earthworks)	Dust	Reduction in local air quality
Remediation	Hazardous chemicals	Reduction in local air quality

A minor temporary decrease in air quality in the immediate vicinity of the site is likely to be experienced by Base personnel and construction workers during the works. This decrease would be caused by the following activities:

- Generation of dust from earthmoving activities, drilling, stockpiling activities.
- Generation of dust from wind erosion of stockpiles and unsealed ground.
- Generation of dust from vehicles traversing unsealed ground.
- Dust and/or spillage of soils from haul trucks.
- Emissions from vehicles and plant used during construction / operation

The most significant air quality impacts will be the particulate emissions during earthworks. The earthworks and stockpiling of materials may result in temporary generation of particulate emissions, particularly if there are dry conditions or construction occurs in windy times. Dust can create health impacts for those with respiratory problems, or skin or eye conditions. It can also cause an inconvenience if it enters dwellings.

Dust impacts would be temporary for the duration of the works and are unlikely to have a significant impact on the buildings nearby.

### D.8.2. Scope

This Sub-plan addresses air quality management and the avoidance of potential impacts to the environment and/or community. This refers to the emission of dust and particulate matter that can impact the workplace and neighbouring areas. Sources of emission may include:

- Vehicle emissions and transport on haul roads
- Drilling and blasting activities
- Land clearing and removal of topsoil and overburden
- Loading and unloading of materials
- Wind on stockpiles and exposed areas.



Activities conducted on the project that have the potential to impact air quality are provided below. These have been extracted from the project workflow, including activities and materials used.

**Table 44: Hazards and Impacts**

Hazard	Potential Environmental Impact
Mobilisation of dust from traffic movement	Visual impact- covering of nearby vegetation
Heavy Vehicle emissions	Dust control measures shall be implemented for all processes that generate dust to minimise Air quality decline
Odours from storage of chemicals	Reduced air quality offensive odour to stakeholders
Dust blowing from demolition and stockpiles	Impact air quality – residents and stakeholders risk dust contamination across the EPBC listed community
Dust impacting on staff adjoining residents	No decline in respiratory health of staff/adjoining residents, or decline in vegetation health, that can be attributed to the project
Demolition of buildings and other structures, including the management of demolition material	Negative impact on surrounding sensitive receivers and waterways Health effects of dust on persons with suppressed immune systems

### D.8.3. Specific Conditions of Local, State and Commonwealth Legislation

Approval for the project is in accordance with the requirements of the PWC Act 1969 and the EPBC Act 1999. Works within BBK are governed by these Acts and the ECC Process administered by Defence.

Project works that occur outside of the Base boundary are subject the requirements of the Protection of The Environment Act 1997 (POEO Act). The POEO Act also provides information and relating to environmental pollution offences such as water, air, noise and land pollution as well as waste offences.

**Table 45: Air Quality Management Objectives**

Metric/Measure	Objective	Timeframe	Accountability
Number of non-compliant monitoring results	Zero	At all times	Construction Manager

Activities conducted on the project that have the potential to impact air quality are provided below. These have been extracted from the project workflow, including activities and materials used.

#### D.8.3.1. Controls Used to Manage Air Quality

Controls that are adequate to minimise air quality issues are implemented before any relevant works commence.

Elimination of the hazard is the first preference of control, followed by engineering, then administrative controls. Typical controls used on this project include:

**Table 46: Air quality controls**

Ref	Control	Accountability
AQ1	Air quality management requirements shall be considered when developing Construction Area Plans and Work Packs.	Project Engineers
AQ2	Notify SEG and adjoining residents prior to works commencing	Environmental Manager
AQ3	Establish stabilised access, rumble grids, wash bays or similar for site exits to minimise mud on public roads.	Construction Manager

Ref	Control	Accountability
	Sweepers must be used periodically to clean public roads where mud has been deposited. No Dry Sweeping	
AQ4	Ensure site traffic speed limit(s) are determined and implemented to minimise dust generation	Construction Manager
AQ5	Vegetation and other soil disturbance will be minimised to reduce erosion hazards. Rehabilitation, seeding or grassing shall occur as soon as practical following excavation disturbance.	Construction Manager Project Engineers
AQ6	Disturbed areas and haul roads will be treated with dust suppressants (e.g. water trucks or chemical suppressants) especially in high-risk areas and/or on during high-risk days. All loads to be covered -	Site Supervisor
AQ7	All vehicles carrying loose or potentially dusty material to or from the site would be fully covered. Tail gates are to be checked that they are secured and any dirt removed from haul vehicles prior to entering the public roads.	Site Supervisor
AQ8	Report any occurrences of increased dust to your supervisor immediately	All
AQ9	All construction plant and equipment will be maintained so they do not emit visible smoke for any period greater than: <ul style="list-style-type: none"> <li>• 15 consecutive seconds for plant not being registered for use on public roads;</li> <li>• 10 consecutive seconds for plant registered for use on public roads.</li> <li>• Do not idle construction equipment</li> </ul>	Plant Manager/ sub-contractors
AQ10	Burning of any materials is prohibited onsite.	Construction Manager
AQ11	Minimisation and stabilisation of stockpile areas. Ensuring that angles of repose are not exceeded and, if necessary, by the placement of supporting structures to retain the stockpile within a designated area. If required, the surface of the stockpile be covered with either mulched vegetative matter, or an artificial cover, suitably weighted to prevent movement	Construction Manager
AQ12	Conduct task observations as per project schedule to ensure ongoing effectiveness of air quality management measures.	Construction Manager, SH&E Manager and/or Subcontractor Supervisor
AQ13	Stockpiles Provision of windbreaks and silt fences as required. Maintenance of stockpiles within designated areas and prevention of spread of stockpile material into adjacent areas; Creation of the minimum necessary stockpiles and removal of all stockpiles upon completion of works on site;	Construction Manager Environment Manager
AQ14	Deliveries Specific control measures include: Cleaning of vehicles and plant; Removal of soil from wheels of vehicles leaving the site. This includes the requirement for installation of a vibration grid. Insert additional project-specific controls i.e., monitoring	Construction Manager Site supervisor

## D.8.4. Monitoring

Air quality monitoring is performed that complies with legal and contract requirements and which is sufficient to identify potential non-compliances before they occur.

Where monitoring determines non-compliance to be a risk or to have occurred, an incident report and corrective actions are raised in Synergy.

Monitoring and analysis of data will be carried out by a competent person. Evidence of competence must be retained.

It is the accountability of the Environmental Manager to ensure all monitoring is performed according to these requirements.

#### **D.8.4.1. Air Quality Monitoring Tasks**

Visual inspection during dust generating works will be undertaken by the supervisory staff and mitigation measures implemented.

Dust gauges will not be required for routine monitoring as works that generate dust will occur at various locations over short time periods and therefore this would not be an effective measurement. However, in the event that a complaint is received, a dust gauge may be installed to determine the levels of dust being generated and assist with the implementation of preventative actions.

Real time monitoring (e.g. TSP or Particles as PM10) will be carried out in response to complaints for the purpose of refining construction methods / techniques aimed at minimising dust emissions. Results from the monitoring and analysis will be included in the monthly environmental report.

The Subcontractor shall keep a written record of all complaints and subsequent air quality monitoring and remediation measures.

The Subcontractor shall provide monthly reports to the RRJV for air quality/dust monitoring, control measures and corrective actions taken.

The Subcontractor shall implement the corrective action as required within the agreed time frame noted on the CAR. The Subcontractor shall advise the RRJV upon completion of the corrective action.

#### **D.8.5. Plan of Monitoring Locations**

As each work element is commence the locations for each monitoring will be provided in the Site location plans and the work packs

#### **D.8.6. References**

- PWC Act 1969
- EPBC Act 1999
- Environment Planning and Assessment Act 1979 No 203

## D.9 Vibration Sub-Plan

### D.9.1. Background / Context

Guidance for acceptable vibration levels for human comfort is based on Assessing Vibration: A Technical Guideline (AVTG) (DEC 2006) which references BS6472-1: Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz) (British Standards, 1992). AVTG provides three assessment methods, depending on whether the vibration source is continuous, impulsive or intermittent.

Construction vibration is intermittent and human comfort levels are assessed through Vibration Dose Value (VDV) which are shown in Table below.

**Table 47: Construction vibration is intermittent and human comfort levels**

Receiver	Assessment Period	x, y and z axes	
		Preferred values	Maximum values
Critical areas	Day or night	0.10 m/s <sup>1.75</sup>	0.20 m/s <sup>1.75</sup>
Residential	Day	0.20 m/s <sup>1.75</sup>	0.40 m/s <sup>1.75</sup>
	Night	0.13 m/s <sup>1.75</sup>	0.26 m/s <sup>1.75</sup>
Offices, schools, educational institutes and places of worship	When in use	0.40m/s <sup>1.75</sup>	0.8m/s <sup>1.75</sup>
Workshops	When in use	0.8m/s <sup>1.75</sup>	1.6m/s <sup>1.75</sup>

Construction activities such as rock-breaking, hammering and piling have the potential to cause dynamic loading in some structures. As such, a conservative vibration damage screening level is given below:

- Reinforced or framed structures: 25mm/s
- Unreinforced or light framed structures: 7.5mm/s.

### D.9.2. Heritage

Heritage buildings should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound. Structures are to be assessed as per the screening vibration levels for reinforced and unreinforced buildings.

Subsequent to an inspection, if a heritage building or structure is found to be structurally unsound a conservative cosmetic damage objective of 2.5mm/s peak particle velocity level would be considered (based on German Standard DIN 4150-3 Structural Vibration – Part 3: Effects of vibration on structure (German Standards, 1999)).

### D.9.3. Buried Pipework

BS7385 notes that structures below ground are known to sustain higher levels of vibration and are very resistant to damage unless in very poor condition. Guidance can also be taken from DIN 4150-3 which sets out guideline values for vibration in terms of PPV to be used when assessing the effects of vibration on buried pipework as shown in Table below.

**Table 48: Vibration guide values – buried pipework**

Pipe material	Guideline values for velocity measured on pipe in mm/s, PPV
Steel (including welded pipes)	100
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80

Pipe material	Guideline values for velocity measured on pipe in mm/s, PPV
Masonry, plastic	50

### D.9.4. Safe Working Distances

Within the vibration assessment, compliance for human comfort and the cosmetic damage criteria for safe working distances have been adopted from Construction Noise and Vibration Strategy (CNVS) () are shown in 40.

Plant and equipment associated with potential to produce vibration include:

- Vibratory rollers
- Tracked excavators
- Piling rigs
- Hydraulic hammers.

**Table 49: Vibratory plant and equipment**

Equipment	Rating/description	Human comfort (OH&E vibration guideline)	Cosmetic damage (BS 7385)
Piling rig	Bored <800 mm	N/A	2 m (nominal)
	Hammer (12 tonnes down force)	50 m	15 m
	Vibratory (sheet piles)	20 m	2 m to 20 m
Vibratory Roller	>18 tonnes	100 m	25 m
	13-18 tonnes	100 m	20 m
	7-13 tonnes	100 m	15m
	4-6 tonnes	40 m	12 m
	2-4 tonnes	20 m	6 m
	1-2 tonnes	15 m	5 m
Small hydraulic hammer	300 kg (5-12t excavator)	7 m	2 m
Medium hydraulic hammer	900 kg (12-18t excavator)	23 m	7 m
Large hydraulic hammer	1600 kg (18-34t excavator)	73 m	22 m
Jackhammer	Hand-held	Avoid contact with structure	1m (nominal)

With the nearest sensitive receptors approximately 650 meters away from the project location, impact from vibration is not anticipated.

### D.9.5. Scope

This Sub-plan addresses vibration management on the project and the management of potential impacts to the environment and/or community.

Activities conducted on the project that have the potential to create vibration issues are provided below.

**Table 50: Hazards and Impacts**

Hazard	Potential Environmental Impact
Vibratory Roller	Disturbance to nearby receptors (human factors)
Pilling Rig	Disturbance to nearby receptors (human factors)
Hydraulic hammer (excavator attachment)	Disturbance to nearby receptors (human factors)
Impact Armoury Alams during Demolition	Disturbance of security system receptors

## D.9.6. Controls Used to Manage Vibration

Controls that are adequate to minimise vibration are implemented before any relevant works commence.

Elimination of the hazard is the first preference of control, followed by engineering, then administrative controls. Typical controls used on this project include:

**Table 51: Vibration controls**

Ref.	Control	Accountability
V1	Consultation will be conducted with community stakeholders on the likely impacts of vibration for high-risk activities and applicable mitigation strategies.	Community Manager
V2	Ensure all vibration risks are considered as part of the development of Construction Area Plans.	Project Engineers
V3	Work practices predicted to generate non-compliant vibration will be amended prior to commencing works to avoid vibration impacts.	Project Engineers
V4	All equipment is serviced and maintained according to the Original Equipment Manufacturers (OEM) recommendations. Where the OEM requirements are not available, then industry best practice maintenance shall be applied.	Plant and Construction Managers
V5	Notify the Supervisor and/or Environment Manager/Representative of unexpected vibration increases immediately.	All
V6	Blasting activities are designed to avoid impacts relating to vibration.	Not applicable
V7	Dilapidation surveys will be completed for properties located where a potential impact has been identified.	Project Engineers
V8	Undertake monitoring to assess compliance in accordance with project requirements.	Environmental Manager
V9	Monitor vibration near Armoury to minimise risk of false alarms and disturbance to site personal	Project engineers

## D.9.7. Monitoring

Vibration monitoring is performed that complies with legal and contract requirements.

Where monitoring determines a non-conformance has occurred, a non-conformance report and/or incident report and corrective actions will be raised.

Monitoring and analysis of data will be carried out by a competent person. Evidence of competence will be retained.

It is the accountability of the Environmental Manager (or delegate) to ensure all monitoring is performed according to these requirements.

### D.9.7.1. Vibration Monitoring

The following vibration monitoring will be undertaken on the project:

**Table 52: Vibration monitoring details**

Location	Parameter	Methodology	Frequency
Blamey Barracks work element	Vibration level for a single source or activity exceeds the maximum predicted vibration level	The Contractor shall perform weekly inspections of all noise producing sources (including inspection of new items of plant before they commence work on the site)	The Contractor shall keep a written record of all complaints and subsequent noise monitoring and remediation measures.

Location	Parameter	Methodology	Frequency
Blamey Barracks work element	Non-conformance shall be documented by the Contractor and a corrective action request (CAR) issued.	All CAR"s shall be included in the Non-Conformance Register maintained by the Contractor. Copies of CARs shall be provided to the Superintendent upon request. The Contractor shall implement the corrective action as required within the agreed timeframe noted on the CAR. The Contractor shall advise the Superintendent upon completion of the corrective action.	Within 7 Business days report nonconformance to Construction Manager. Update register/Synergy Check timelines

### D.9.7.2. Plan of Monitoring Locations

Location plan for monitoring will be provide at staged intervals in work pack for each work element.

### D.9.8. References

- Construction Noise and Vibration Strategy (CNVS)(TfNS)
- Environment Report (2023)

## D.10 Waste Sub-Plan

### D.10.1. Background / Context

The objectives of this Waste Sub-Plan are to:

- maintain construction compounds in a neat and tidy state without build-up of litter and waste,
- recycle and re-use waste materials (where appropriate), and
- manage waste materials generated on site (including safe temporary storage prior to final disposal) in accordance with all relevant NSW guidelines and local council requirements.

The waste and recycling management objectives of the Project are:

- Minimise the amount of waste throughout the Project life-cycle;
- Waste management strategies will be implemented in accordance with the NSW Waste Avoidance and Resource Recovery Act 2001 (WARR Act 2001) and waste hierarchy (Figure 24) namely:
  - Avoidance of unnecessary resource consumption.
  - Resource recovery (including reuse, reprocessing, recycling and energy recovery)
  - Disposal



**Figure 23: Waste Hierarchy**

- Minimise potential impacts from waste during Construction.
- Achieve recycling and reuse targets for Construction waste (including from earthworks and excavation); and
- Ensure compliance with relevant Legislation, Conditions of Approval and Mitigation Measures.



## D.10.2. Scope

This Sub-plan addresses waste management on the project and the management of potential impacts to the environment and/or community. The project will support the Defence has waste and sustainable procurement approach that supports the Government’s National Waste Policy.

Activities conducted on the project that have the potential to create waste issues are provided below.

### D.10.2.1. Waste Streams

During the construction phase, key waste sources would include.

- green waste from pruning and tree removal.
- excess spoil from excavations.
- construction and general waste such as demolition waste.
- concrete waste.
- timber off cuts.
- liquid wastes such as oils and used chemicals.
- domestic waste from site personnel including food scraps, glass and plastic bottles, paper and plastic containers; and
- contaminated waste (Asbestos, contaminates spoil and groundwater).

Table 55 lists the waste generating aspects and identifies the range of solid, hazardous, Specific and liquid wastes that are likely to be generated by construction. Table 55 also outlines the proposed reuse, recycling or disposal method.

**Table 53: Construction Waste Streams**

Waste	Classification	Potential Recovery/Reuse	Disposal (all tracked)
Green waste from pruning and timber off cuts	General Solid Waste (Non-Putrescible)	Green waste would be reused as mulch on-site or provided to the Base for landscaping.	Green waste from pruning to be removed by subcontractor. Timber off cuts to be segregated and removed by licensed contractor to licensed waste facility.
Virgin Excavated Natural Material (VENM) – residual soil and shales	General Solid Waste (Non-Putrescible)	Where possible, all suitable fill materials would be used on-site.	Wherever possible, VENM would be used on the project and excess material would be transferred to appropriately approved sites requiring VENM.
Excavated Natural Material (ENM)	General Solid Waste (Non-Putrescible) – Resource Recovery Exemption	Where possible, all suitable fill materials would be used on-site.	Wherever possible, ENM would be used on the project and excess material would be transferred to appropriately approved sites requiring ENM.
Mixed Spoil	General Solid Waste (Non-Putrescible)	Where possible, all suitable fill materials would be used on-site.	Mixed unsuitable spoil would be transferred to appropriately approved waste facilities.
Mixed Spoil	Restricted waste	None identified	Spoil above the project reuse criteria would be transferred to appropriately approved waste facilities
Demolition concrete	General Solid Waste (Non-Putrescible)	Stockpiled and transported to recycling center and recycled for construction activities.	Nil. Valuable resource.

Waste	Classification	Potential Recovery/Reuse	Disposal (all tracked)
Building rubble and structural element demolition materials	General Solid Waste (Non-Putrescible)	Collected in designated collection areas and reused as much as practically possible.	Mixed unsuitable materials would be transferred to appropriately approved waste facilities.
Waste metals	General Solid Waste (Non-Putrescible)	Stockpiled and transported to recycling Centre.	Nil. Valuable resource.
Groundwater from excavation	Liquid Waste	Liquid waste would be clearly identified and stored separate from other waste materials for selective disposal.	Liquid waste would be stored so as to prevent accidental releases to air, soil, and water resources in the area. A licensed waste collection subcontractor would collect the liquid wastes generated on site and dispose to appropriately approved liquid waste facilities.
General office waste – paper, cardboard, used printer cartridges.	General Solid Waste (Non-Putrescible)	Office waste such as paper, cardboard boxes, comingled wastes (Cans, plastic bottles etc.) and used printer cartridges would be recycled.	Food wastes and non-recyclables will be sent to landfill.
Asbestos or Asbestos Containing Material	Specific Waste	None currently identified	A licensed waste collection subcontractor would collect the liquid wastes generated on-site and dispose to appropriately approved Specific waste facilities.

### D.10.3. Waste Management Objectives

Based on the findings of risk management processes and the potential impacts to the community, the following targets have been set for managing waste on the project. Any deviance from the targets will result in RRJV management immediately implementing corrective actions:

**Table 54: Project Objectives – Waste Management**

Metric/Measure	Objective	Timeframe	Accountability
% of waste quantified in waste management reports	100%	At all times	Environmental Manager
% of regulated/hazardous wastes for which transfer certificates are retained	100%	At all times	Environmental Manager
% of construction waste (excluding demolition waste) by weight reused or recycled	75%	Annually	Construction Manager
Number of enforcement notices and penalties received from regulators and/or client	Zero	At all times	Environmental Manager

### D.10.4. Compliance Requirements

#### D.10.4.1. Controls Used to Manage Waste

Controls that are adequate to ensure compliance and to reduce risk to the lowest acceptable rating achievable are planned before any relevant works commence. Elimination of the waste is the first preference of control, followed by reuse and recycling. Controls used on this project include:

**Table 55: Control Measures – Waste Management**

Control	Accountability
Identification of possible waste streams generated by the project and management opportunities (e.g. avoid / reduce / reuse / recycle).	Environment Manager Subcontractors

Control	Accountability
Regular inspections on all waste collection areas and the removal of wind-borne litter from the surrounding area	Environment Manager Subcontractors
Salvage and reuse of certain demolition materials (drainage structure, electrical cables, fences) and recycling wherever possible	Construction Manager Subcontractors
All wastes need to be classified, stored, tracked, transported and treated in accordance with contractual and regulatory requirements, including the use of licensed transporters and treatment facilities. The relevant license's of waste facilities utilised for the disposal or handling of waste will be obtained to ensure they are legally compliant.	Environment Manager Subcontractors
Storage containers (bins, skips, tanks, etc.) are provided at each work area in sufficient numbers to facilitate segregation of waste at the source of generation, wherever possible. The correct bin type must be used to avoid contamination. Containers are clearly sign posted to inform all project personnel of the correct material to be placed within each bin type. Containers are emptied at a frequency that is sufficient to ensure their correct use. If a bin needs to be collected contact your supervisor or Environment Manager.	Construction Manager / Environment Manager
Burial or burning of waste is not permitted.	Supervisory staff
Excess concrete and concrete washout is not to be discharged to land or stormwater; a concrete washout facility must always be used. An adequate number of fully maintained concrete washout pits will be maintained on the site at all times.	Supervisory staff
All waste data must be collated and tracked using Material Tracking Forms and reported in Synergy	Environment Manager
Waste concrete (blow-back or over-ordered concrete) will be returned to the concrete batching plant where it is recycled into road base.	Subcontractors

## D.10.5. Monitoring and Reporting

### D.10.5.1. Monitoring

Waste data is collected on the project to allow monthly reporting of the following:

- The quantity of each type of waste sent to landfill.
- The quantity of each type of waste recycled.
- The quantity of each type of waste reused.
- The quantity of each type of hazardous/regulated waste generated on the project and:
  - the method of treatment and disposal.
  - the location of treatment and disposal.
  - copies of records confirming the legal transport, treatment and disposal.
- Measurement of any reduction in waste generation that has been achieved.

The quantity of waste in each solid waste stream is measured by weight and liquid waste stream by volume, with records provided by the waste transport subcontractor. Alternative measures may only be used when an economical alternative is not available.

### D.10.5.2. Reporting

The following wastes are subject to specific monitoring and reporting requirements by OEHL under the waste tracking system (where these waste streams are generated, they will be tracked from as per the POEO Act requirements):

- Hazardous non-liquid waste (e.g. batteries);

- Industrial non-liquid waste; and
- Liquid wastes including non-recyclable oils, fuels, chemicals and paint.

All results of waste control inspections will be recorded on the Weekly Environmental Inspection Checklist.

Actions arising from the inspections will be recorded in Synergy and each action will be allocated to the site supervisor for the work area.

Details of waste removed off-site are to be recorded in Synergy and all relevant information is included in the environmental monthly report.

### **D.10.6. References**

- Environment Report (2023)
- Defence Waste Management Procurement policy 2010

# D.11 Energy Sub-Plan

## D.11.1. Background / Context

This sub-plan addresses the potential and actual use of energy sources and the emission of Greenhouse Gases (GHG) by project activities. In particular, it requires:

- The identification of sources
- Measurement and reporting of use and emissions
- Identification, assessment and implementation of opportunities to improve energy efficiency and reduce GHG emissions
- The sub-plan addresses the environmental reporting requirements and corporate governance requirements.

An assessment has defined the Riverina Redevelopment Joint Venture as having operational control of the facility and as such it is responsible for reporting energy emissions that occur as a result of project activities.

Activities conducted on the project that have the potential to use significant amounts of energy or emit significant quantities of GHG are:

- Demolition
- Concrete (In situ) \*\*\*Form/Reo/Place\*\*\*
- Structural Steel
- Metalwork (stairs/ handrails, etc.)
- Joinery
- Partition, Ceilings, Doors & Hardware
- Toilet Partitions
- Windows and Glazing
- External Cladding
- Louvers
- Roofing
- Floor Finishes
- FF&E/ Workstation/ Window Furnishings
- Hydraulics (Water Main & Fire Main)
- Storm water Drainage
- Sewer
- Gas
- Hydraulics
- Electrical HV/LV Works
- Mechanical Building Services
- Fire Alarm/ Telecoms/ Security
- Fire (Dry/ Internal)
- Lift Services
- Communications, AV/ MATV & Security (Internal)
- Landscaping
- Earthworks
- Piling
- Roadworks
- Construction transport equipment

### D.11.1.1. Objectives

Defence's energy requirements are significant and come with a responsibility to manage, procure and use energy so that it delivers value for money and lessens impacts on the environment.

Defence drives efficiency in energy management in order to maintain capability, reduce costs and increase energy security. The transition to cleaner and more sustainable energy sources adds security and resilience to the Defence estate.

Based on RRJV requirements, the following targets have been set for managing energy use and GHG emissions on the project. Any deviance from the targets will result in RRJV management immediately implementing corrective actions:

**Table 56 Energy Use Objectives**

Metric/Measure	Objective	Timeframe	Accountability
Identify, assess and implement energy efficiency initiative(s) every year to minimise energy use and reduce greenhouse gas emissions	Minimum of [1] initiative per year	Annually	Construction Manager
All zero/low-cost opportunities will be identified and implemented following the first assessment	No opportunities with a minimal to nil payback period <sup>d</sup> in 2nd assessment	Annually	Construction Manager
<ul style="list-style-type: none"> <li>• Environment Report</li> <li>• EMM Contamination Assessment – PSR DDR</li> <li>• EMM Contamination Strategy 2023</li> <li>• EMM PFAS Preliminary Risk Assessment</li> <li>• EMM PFAS Risk Assessment Tool</li> <li>• PFAS NEMP Version 2.</li> <li>• Defence PFAS Construction and Maintenance Framework V3.0 2021</li> <li>• Defence's Heavy Metals Risk Management Tool (HMRMT)</li> <li>• Defence (2021a) Blamey Barracks Kapooka PFAS Management Area Plan, Department of Defence, June 2021.</li> <li>• Defence PFAS Investigation and Management Branch</li> <li>• Defence Asbestos Management Plan (2023) V5.2</li> <li>• Department of Defence, Contamination Management Manual, Annex B, Investigations, Remediation and Management, March 2018, Amended June 2021a.</li> <li>• Department of Defence, Contamination Management Manual DCMM, Annex E <i>Fuel Facilities and Annex M, the Manual for the Management and Remediation of Petroleum Hydrocarbon Contaminated Soil and Sediments</i></li> <li>• EPA – NSW VENM Fact sheets</li> <li>• EPA- NSW Extracted Natural Material Fact sheet</li> </ul> <p>Set an annual quantity or intensity energy savings target.</p>	Target set at 5% saved against BAU	Annually	Construction Manager

## D.11.2. Scope

This Sub-plan addresses the potential and actual use of energy sources and the emission of greenhouse gases (GHG) by project activities. Conditions of local, State and Commonwealth legislation that impose specific requirements relating to the use of energy, energy efficiency, or controls on GHG emissions on the project include:

- The National Greenhouse and Energy Reporting Act 2007 (NGER 2007) reporting requirements

The following items will be documented:

- The identification of sources.
- Measurement and reporting of use and emissions.
- Identification, assessment and implementation of opportunities to improve energy efficiency and reduce GHG emissions.

Activities conducted on the project that have the potential to use significant amounts of energy or emit significant quantities of GHG are:

**Table 57: Activity and Fuel / Emission Type**

Activity	Type of Fuel/Emission
Excavation of cut materials	Diesel
On-site generation of power	Diesel
Lighting	Electricity

## D.11.3. Energy Reporting

'Operational Control' identifies which companies need to report in accordance with the National Greenhouse and Energy Reporting Act 2007 and is determined as part of the start-up process.

A copy of the operational control determination assessment is obtained by the Environmental Manager. The Environmental Manager will report on energy consumption monthly.

Subcontractor reporting is tracked by the Commercial Team.

### D.11.3.1. Energy Opportunity Tracking

All projects valued at over \$150 million will complete an energy efficiency assessment at start-up. The outcomes of this assessment are documented below.

The objective of this process is to:

- Provide a focus on energy efficiency opportunities available.
- Reduce the energy intensity of activities.
- Achieve quantifiable energy and cost savings wherever practicable.
- Support the achievement of sustainability objectives.

### D.11.3.2. Energy Efficiency Opportunities:

Energy opportunities, including their estimated costs and benefits, will be recorded in this Sub-plan. To assist in the identification of energy efficiency and greenhouse gas abatement opportunities, refer to the Energy Opportunities Calculator tool. This tool will be explored and expanded during the development of Work element construction plans.

**Table 58: Energy Efficiency Opportunities**

	Opportunity A	Opportunity B	Opportunity C	Opportunity D
<b>Title</b>	Civil construction	Energy efficient infrastructure	Reduce concrete as road base	Use electric machinery
<b>Description of opportunity</b>	Reduced fuel emissions GHG	Reduce energy use	Reduce natural resources - transport	Reduce energy use Greenhouse Gas emission
<b>Person Responsible (Position Title)</b>	Construction Manager Area Manager Project Engineers	Construction Manager Area Manager Project Engineers	Construction Manager Area Manager Project Engineers	Construction Manager Area Manager Project Engineers
Energy Type (Diesel; Electricity)	Diesel	Electricity	Movement of materials	
Estimated Savings (Litres; kWh)	TBA	TBA	TBA	TBA
Estimated reduction (GHG emissions – TCO2-e)	TBA	TBA	TBA	TBA
Estimated savings (\$)	TBA	TBA	TBA	TBA
Payback Period (years)	TBA	TBA	TBA	TBA
To Be Implemented? Y/N	TBA	TBA	TBA	TBA
Measurement of success (KPI) to be tracked	TBA	TBA	TBA	TBA

### D.11.3.3. Processes / Controls Used to Manage Energy

Processes adequate to ensure compliance with all requirements and to ensure energy is used efficiently and GHG emissions are minimised are implemented. Typical processes / controls used on this project include:

**Table 59: Energy and emissions controls**

Ref	Control	Accountability
E1	As part of the start-up process, complete the NGER Operational Control Determination Scorecard. Refer to Tool: NGER Operational Control Determination Scorecard Refer to Procedure: Report on Subcontractor Fuel Use	Environmental Manager
E2	Energy reduction and management requirements shall be considered when developing Construction Area Plans and Work Packs.	Engineers
E3	Energy efficiency principles will be communicated through toolbox talks and other site communication forums and tools. The workforce, including subcontractors, will be trained to minimise energy use, including switching off machines and equipment when not in use and purchasing energy efficient plant and equipment.	Environmental Manager
E4	An energy opportunities assessment will be undertaken to identify opportunities for energy efficiency in both construction and operation. As a minimum, this shall involve the use of the Energy Opportunities Calculator.	Environmental Manager
E5	Energy savings initiatives and outcomes will be reported to the BU Environmental Representative at least annually using the Tool 'Energy Case Study'.	Environmental Manager
E6	Subcontractor fuel reporting will be tracked by the RRJV commercial team, with reporting percentages included in the Monthly Environment Report in Synergy. Subcontractor fuel use shall be captured and entered into JDE by the 10th of each month.	Commercial Manager
E7	Procurement decisions will include energy efficiency and greenhouse gas considerations of the product or service.	Commercial Manager / Procurement Manager



#### **D.11.4. Monitoring**

Monitoring of energy use complies with legal and contractual requirements, and which is sufficient to identify sources of use and emissions, and opportunities for improved energy efficiency.

Energy and GHG monitoring is conducted in line with the reporting approach outlined above. It is the accountability of the Commercial Manager to ensure all data is captured and reported according to these requirements.

Monitoring and analysis of data will be carried out by a competent person.

#### **D.11.5. References**

- Defence 2007-09 Site Energy Management Plan – Kapooka
- Environment Report (2023)
- ESD Report Stantec (2023)

# Appendix A: CPB Contractors Environment Policy & ISO 14001 Certification

## Environment Policy

### Purpose

This Policy sets out our environmental management commitments for managing environmental risks, exceeding our environmental compliance obligations, and avoiding environmental impacts.

### Application

This Policy applies to all employees, and third parties controlled by the business, including alliances, joint ventures and consortia where the business exerts management control. It applies to all sections of the organisation.

### To achieve our environmental management objectives, we will:

- Demonstrate a visible commitment to our One HSE Cultural Framework and take all reasonably practicable measures to prevent pollution and protect the environment.
- Ensure adequate environmental management resources are assigned, and continually improve the CPB Management System and our environmental performance.
- Set environmental objectives, targets and key performance indicators that are monitored at least annually.
- Identify, document, control, and monitor our Significant Environmental Aspects.
- Procure goods and services to maximise sustainable opportunities and innovate to reduce greenhouse gas emissions and implement climate change mitigation
- Evaluate our environmental performance through regular inspections and audits.
- Measure, record and optimise energy & water re-use efficiencies, together with maximising circular economy opportunities.
- Report and investigate environmental incidents with the aim of preventing a recurrence.
- Implement contingency planning and emergency response strategies to avoid environmental damage.
- Communicate and educate our teams to enable a good understanding of their environmental legal obligations.

### Policy Information

Owner:	Group Manager, Environment, CPB Contractors
Approved By:	General Manager – SHEQS & Rail Safety, CPB Contractors
Effective date	31 August 2022

Certificate AU14/4487



The management system of

# CPB Contractors Pty Limited

Level 18, 177 Pacific Highway North Sydney, NSW 2060, Australia

has been assessed and certified as meeting the requirements of

## ISO 14001:2015

For the following activities

The provision of project management and related services including design, procurement, construction, traffic management at roadworks, completion, commissioning and maintenance of civil Infrastructure (including site preparation, road and bridge construction, non-building construction, plant hire and leasing), building, rail, water, utilities, tunnelling, energy, marine, mine infrastructure, structural, mechanical, piping and electrical engineering and related industries delivered under varying forms of contract including joint ventures and alliances. The scope of registration also includes the maintenance and repair of fixed and mobile plant and the manufacture of precast concrete units for major infrastructure works.

This certificate is valid from 26 December 2022 until 30 November 2025 and remains valid subject to satisfactory surveillance audits.

Issue 13. Certified since 06 December 1995

Certified activities performed by additional sites are listed on subsequent pages.

Last certificate expiry date 30 November 2022

Recertification audit date 21 October 2022

Authorised by  
Sham McAulley  
Authorised Officer

SGS Australia Pty. Ltd.  
10/585 Blackburn Road Notting Hill VIC 3168  
t (61-3) 9574 3200 - [www.au.sgs.com](http://www.au.sgs.com)



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# CPB Contractors Pty Limited



## ISO 14001:2015

Issue 13
<b>Sites</b>
<u>Business Unit Operation</u>
CPB Contractors Pty Limited Level 18, 177 Pacific Highway North Sydney, NSW 2060, Australia
CPB Contractors Pty Limited Level 2, 177 Pacific Highway, North Sydney, NSW 2060, Australia
CPB Contractors Pty Limited Level 6, 567 Collins Street, Melbourne, VIC 3000, Australia
CPB Contractors Pty Limited Level 6, HQ South Tower, 520 Wickham Street, Fortitude Valley, QLD 4006, Australia
CPB Contractors Pty Limited 202 Pier Street, Perth, WA 6000, Australia
CPB Contractors Pty Limited Level 1, 167 Denham Street, Townsville, QLD 4810, Australia
CPB Contractors Pty Limited 136 Frome Street, Adelaide, SA 5000, Australia
CPB Contractors Pty Limited Level 2, 19 Hargreaves Street, Auckland, 1011, New Zealand
CPB Contractors Pty Limited 14-64 Industrial Avenue, Bohle, QLD 4818, Australia
<u>Plant Facilities</u>
CPB Contractors Pty Limited 8a Hereford Street, Berkeley Vale, NSW 2261, Australia
CPB Contractors Pty Limited 67 Bernoulli Street, Darra, QLD 4076, Australia
CPB Contractors Pty Limited 158 Cherry Lane, Laverton North, VIC 3026, Australia



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Certificate AU14/4487, continued

# CPB Contractors Pty Limited



## ISO 14001:2015

CPB Contractors Pty Limited  
19-21 Casino Street, Welshpool, WA 6106, Australia

Pre-cast facility

CPB Contractors Pty Limited  
Corner Engineering & Industrial Drive, North Boambee, NSW 2450, Australia



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# Appendix B: Site Environment Plan (SEP) Checklist

**Purpose:**

The purpose of this SEP checklist is to ensure these minimum requirements are included in each SEP and that project specific information is captured in each revision.

Section	Element	Yes	No	N/A	Comment	Action	Complete (tick box)
Approvals	CHMP Area/area's						
	Other areas of heritage significance may be worth including? i.e. European						
	Vegetation removal						
	Sensitive Fauna areas? Native fauna (e.g. growling grass frog – TSA)						
Layers	Boundaries – work area, CHMP, No go Zones						
	Vegetation to be protected						
	Vegetation to be removed						
	Tracks & access						
	Fences- No go Zones						
	Ancillary areas, site compounds						
	Cultural Heritage Sites						
	Other heritage sites						
	Drainage						
	Creeks/water bodies						
	5, 10, 20 and 100 year flood level						
	Spill kits						
	Rumble grids						
	Stockpiles – soils						
	- vegetation						
	- lime						
	- Contaminated soil Cat A, B and C						
	Dewatering Areas / dewatering tanks						
	Tidal Info						
	Temporary erosion controls & sed controls						
	Sediment Pond						
	Seed collection area						
	Refuelling areas						
	Recycled Water Tank						
	Concrete washout areas						
	Vehicle Wash areas						
	Hydrocarbon storage areas						
Hydrocarbon waste areas (optional)							
Waste Storage areas							
Significant trees							

Section	Element	Yes	No	N/A	Comment	Action	Complete (tick box)
	Locations identified for ASS						
	Treatment areas for ASS						
	Fauna areas						
	Noise & Vibration sensitive receivers						
	Sensitive community members (i.e. notorious complainers! Dust, access, etc. Did this for Goodwood. Could tie in to the above line item)						
	Noise barriers						
	Groundwater bore locations						
	Wildlife corridor						
	Project design overlay (usually from dxf/dwg files from design team)						
	Project boundary						
	Client owned land (e.g. VicRoads title)						
	Site topography						
Monitoring location–	Air - dust						
	Noise						
	Water Quality						
	Soil sampling locations (optional)						
Environmental Programs- reverse side	SEP Scope and timeframe						
	Are all environmental programs up to date						
	Environmental contact, supervisor, SPE details relevant to Zone						
Cartography	North Arrow						
	Legend						
	Chainage						
	Map scale						
Administration	Revision & version number						
	Title						
	Sign off						
	Uploaded to Aconex						
	Printed copies distributed						
	Date						
	Project number						
	Company logos						

<b>Environmental Advisor / Officer</b>	
Name (print)	
Signature	
Date	

This checklist is to be completed each time a Site Environmental Plan (SEP) is completed or revised.



# Appendix C: Environmental Roles and Responsibilities

Listed project-specific roles, after responsibilities in Part B have been assigned

		Contractors Representative	Environmental Manager	Design Manager	Engineers	Construction Manager	Supervisors	Line Manager	HR Manager	Commercial Manager	Function Manager	H&S Manager	Other positions
<b>Element 1: Leadership, Accountability and Culture</b>													
1.1	Environmental leadership and commitment are demonstrated through participation in environmental management												
1.2	Environmental accountabilities, roles and responsibilities for managers, staff, employees and subcontractors are clearly defined, documented and communicated		C					C	R				
1.3	Environmental leadership and commitment are demonstrated through measurable participation in environmental management	R	C				C	C					
1.4	Environmental expectations are clearly defined with appropriate reward and disciplinary processes in place.	R	C					C					
<b>Element 2: Planning</b>													
2.1	Adequate resources are provided to effectively implement the EMP												
2.2	Business systems are defined and established		R										
2.3	Identify Significant Environmental Aspects		R										
2.4	Environmental Sub-plans are prepared and maintained												
<b>Element 3: Legal and Other Requirements</b>													
3.1	Relevant legal, contractual and other requirements are identified and maintained in a legal and other obligations register	C	R										
3.2	All necessary environmental approvals are obtained prior to commencing relevant works and surrendered on completion	C	R		C								
3.3	Work is planned and executed to ensure compliance		C	C	C	R	C						
3.4	Inspections, observations and monitoring are performed		C		C		R						
3.5	All non-compliances are recorded and corrective/preventative actions implemented.		R										
3.6	All energy and greenhouse data are collected and entered into JDE	C	R							C			
3.7	Personnel on the site have access to current versions of relevant legislation, standards and codes of practice		C										R
<b>Element 4: Risk and Opportunity Management</b>													
4.1	Systematic processes are implemented for identifying environmental risks and opportunities at all stages of the works	R	C	C	C		C						
4.2	Identified risks and opportunities are evaluated according to agreed criteria and recorded	R	C		C								C
4.3	Environmental risk controls appropriate to the level of risk are identified, documented and implemented	C	C		C								R
4.4	Feasible opportunities are implemented		R										C
4.5	Identified environmental risks and controls are communicated to all relevant personnel	R	C		C		C		C			C	
4.6	Environmental risks and controls are regularly reviewed.	C	R		C		C						
<b>Element 5: Change Management</b>													
5.1	Changes to planned operations that have potential environmental consequences are identified	R	C	C	C		C						
5.2	Risks associated with identified changes are assessed and controlled before changes are implemented	R	C				C						C
5.3	All changes with environmental consequences are authorised before they are implemented	R		C		C	C						
5.4	Controls associated with change are communicated to all affected personnel						C						R
<b>Element 6: Communication and Consultation</b>													
6.1	We will create a culture of collaboration across all functional disciplines		R										
6.2	External Environmental stakeholders are identified		R										
6.3	Relationships with external stakeholders are effectively managed	R	C									C	
6.4	Internal consultative forums are established with regular meetings scheduled, conducted, documented and communicated	C	R										

		Contractors Representative	Environmental Manager	Design Manager	Engineers	Construction Manager	Supervisors	Line Manager	HR Manager	Commercial Manager	Function Manager	H&S Manager	Other positions
6.5	Environmental complaints and enquiries are recorded and responded to appropriately	R	C									C	
6.6	The effectiveness of internal and external stakeholder engagement is evaluated and improved.												
6.7	Share knowledge from lessons learnt internally and consider the need for knowledge sharing with stakeholders and the construction industry												
<b>Element 7: Training and Competency</b>													
7.1	All personnel have completed an induction containing relevant environmental information before they are authorised to work		R						C				C
7.2	A training matrix is developed and documented		R						C				
7.3	Personnel are trained and assessed according to the training plan	R	C						C				
7.4	Training records are maintained and accessible to relevant personnel.		C						R				
<b>Element 8: Subcontractor Relationships</b>													
8.1	Selection processes ensure that subcontractors meet minimum environmental requirements		C		C					R			
8.2	Planning requirements of all subcontractor work scopes are completed and communicated prior to commencing work		C		R					C			
8.3	Compliance requirements for high-risk environmental activities are identified and enforced		C		R					C			
8.4	Subcontractor documentation is submitted and reviewed to meet project requirements		R		C					C			
8.5	Changes to the scope of work are managed as a project change				C					R			
8.6	Subcontractors actively participate in environmental management and training on the project		C		C					R			C
8.7	Subcontractors are reviewed to assess their performance and compliance with our minimum environmental requirements.		R		C		C						
<b>Element 9: Incident Management</b>													
9.1	All incidents are followed by appropriate response and notification	R	C		C		C						
9.2	All incidents are entered and managed in Synergy	C	R										
9.3	Incident investigations are conducted appropriate to the type of incident	R	C		C		C						
9.4	All personnel conducting incident investigations are trained to competently perform the task	R											
9.5	Corrective and preventive actions are taken after incidents and lessons are shared with other projects	R	C										
9.6	Repeat incidents are regularly reviewed by the RRJV management team	C	R										
<b>Element 10: Emergency Planning and Response</b>													
10.1	Potential emergencies are identified using a formal risk assessment process	R	C										
10.2	Emergency response plans and procedures are developed and regularly reviewed	R	C										C
10.3	Adequate resources are provided to effectively implement emergency response plans and procedures	R	C										C
10.4	Environmental emergency response drills are conducted	R	C										C
10.5	Employees, contractors and visitors are given appropriate emergency response training.		C						R				C
<b>Element 11: Document and Record Management</b>													
11.1	Current versions of all relevant documents and records are available and controlled.	C	R										
<b>Element 12: Auditing, Review and Improvement</b>													
12.1	Environmental performance trends are identified, and corrective actions are implemented as required	R	C										
12.2	A monthly environmental report is produced and distributed	C	R										
12.3	Regular management reviews are conducted to determine the continuing suitability, adequacy and effectiveness of the Environmental Management	R	C										C
12.4	Audits are undertaken to ensure compliance with the requirements of the EMP	R	C										C
12.5	All audits are undertaken by suitably qualified and experienced personnel												R

R = Responsible, C = Key Contributor

# Appendix D: MIRRA Schedule

Name	Detail	Frequency	By Whom	Resources
<b>MONITORING</b>				
Water Quality	Water quality parameters including pH, EC, temp, Turbidity	Prior to discharge	Environment Manager	Water discharge form
<b>INSPECTIONS</b>				
Site Inspection	Environmental site inspections	Monthly	Environment Manager	Environmental Inspection Checklist
<b>REPORTING</b>				
Environmental Report	Detail on Environmental achievements, monitoring results, incidents, audit outcomes	Monthly	Environment Manager	As part of Monthly Project Report
<b>REVIEW</b>				
EMP Review	Review of Sub-plans and Appendices	Annual (or where otherwise required)	Environment Manager	EMP
Risk Register Review	Review risks in relation to changes to work activity onsite	Monthly	Environment Manager	Risk Register
Site Env Plan	Review site environmental controls in relation to work activity onsite to ensure reflective of site conditions	Monthly	Environment Manager	Environmental Inspection Checklist
<b>AUDIT</b>				
Environmental Audit	Review of EMP compliance to EMS & ISO14001	Annual	Internal or external auditor	Audit Tool template

# Appendix E: Synergy Environmental Event (Incident) Classification Matrix

# Synergy Environmental Event (Incident) Classification Matrix

## ENVIRONMENT

This matrix is used to assign the Actual Consequence to an Environmental Incident in EVENTS and the Classification to an Environmental Impact in IMPACTS.

Event Classes				
Actual Consequence				
1A	2A	3A	No Impact	
Environmental discharges, environmental pollution or degradation which has high severity impacts on the community and/or environment or may have irreversible detrimental long-term impacts.	Environmental discharges, environmental pollution or degradation which has moderate severity impacts on the community and/or environment (1 to 3 months) but is fully reversible in the long term.	Environmental discharges, environmental pollution or degradation which has low severity impacts on the community and environment in the short term (<1 month) and is fully reversible with no residual impacts. Includes nuisance level impacts.	Negligible or sporadic discharges	
Potential Consequence				
1P	2P	3P	4P	5P
Long-term / irreversible damage to neighbouring or valued ecosystem. Long-term remediation required. Irreparable damage to highly valued items / locations of cultural significance.	Impacts extend off-site / external ecosystem. Considerable remediation required. Significant damage to structures / locations of cultural significance.	Medium term, contained impact; requiring significant remedial action. Moderate but permanent damage to structures / items / locations of cultural significance.	Short lived, well-contained environmental impact; minor remedial action required. Moderate damage that is largely repairable.	Small, contained localised impact. Low level repairable damage to commonplace structures.

## ENVIRONMENTAL HARM CLASSIFICATION GUIDANCE MATRIX

The following Guidance Matrix must be read in the context of the Incident Classification definitions above. It contains examples only and is not intended to be comprehensive. All examples do not have to be present for that Class or Category to apply. Classification should consider the intent rather than just the literal meaning of the example. Only one Environmental Category can be selected in Synergy. The Category selected should be the one that best represents the environmental impact of the incident, rather than the cause of incident. Classification of incidents must be done by persons with relevant environmental expertise. Expert advice may be required in some situations.

Environmental Harm Environmental Category	Class 1	Class 2	Class 3
<b>WAT - Discharges to Surface Water</b>	Major and/or multiple discharges of pollutant to surface water. High severity impact on values of water resource e.g. <ul style="list-style-type: none"> <li>Extensive contamination/pollution of waterways or water catchment areas e.g. tailings dam failure.</li> </ul>	Significant and/or persistent discharge to surface water, moderate impact on values of water resource e.g. <ul style="list-style-type: none"> <li>Spill escapes into offsite watercourse or storage with significant remediation required</li> <li>Uncontrolled discharge from sedimentation basin or site drainage system above allowable limits</li> <li>Significant release of sediment off-site into drains or receiving waters.</li> </ul>	Minor pollutant discharge to surface water, no permanent impact on values of water resource e.g. <ul style="list-style-type: none"> <li>Minor spill from a containment, including hydrocarbons, which may or may not escape into the non-controlled environment, but which is contained and doesn't result in persistent environmental harm</li> <li>Controlled discharge from sedimentation basin or site drainage system above allowable limits.</li> </ul>
<b>CON – Contamination of Land and Groundwater</b>	Major spill of environmentally hazardous materials (e.g. hydrocarbons, chemicals, effluent, contaminated materials) to land e.g. <ul style="list-style-type: none"> <li>Persistent and severe contamination of land</li> <li>Severe contamination of groundwater</li> <li>Extensive clean up and/or remediation required</li> <li>Uncontrolled spill of regulated material.</li> </ul>	Significant spill of environmentally hazardous materials (e.g. hydrocarbons, chemicals, effluent, contaminated materials) to land e.g. <ul style="list-style-type: none"> <li>Moderate contamination of groundwater</li> <li>with the consequence reversible</li> <li>Spill confined to defined area(s) within or outside site or workplace</li> <li>Significant clean up required over and above removal of contaminated material to land farm or approved waste area</li> <li>Spill of a type and/or volume that must be reported to a regulatory body.</li> </ul>	Minor leak or spill (greater than 20 litres) of environmentally hazardous materials (e.g. hydrocarbons, chemicals, effluent, contaminated materials) to land e.g. <ul style="list-style-type: none"> <li>No residual contamination of land</li> <li>Minor contamination of groundwater, with minimal consequence</li> <li>Spill confined to managed area(s) within site or workplace</li> <li>No significant clean up required other than removal of contaminated material to land farm or approved waste area.</li> </ul> <p><b>Note: for Spills/Leaks &lt;20 litres see definition for Near Hit Environmental Event No Impact Hydrocarbon Spill</b></p>
<b>AIR – Dust, odour and emissions to atmosphere</b>	Severe or persistent discharge of hazardous pollutant to atmosphere e.g. <ul style="list-style-type: none"> <li>Explosion or leak of hazardous gas or particulates;</li> <li>Evacuation of local vicinity;</li> <li>Continuous/frequent exceedance of air quality health criteria</li> <li>Severe eco-toxic effects on listed habitats or communities.</li> </ul>	Moderate or persistent discharge of pollutant to atmosphere e.g. <ul style="list-style-type: none"> <li>Multiple occurrences or complaints of obnoxious odours or dust/ air quality criteria exceedances outside the premises</li> <li>Nuisance dust levels requiring significant offsite clean-up</li> <li>Odour issues requiring relocation of material or significant changes to waste, earthworks of stockpile management</li> <li>Significant quantities of Greenhouse or ozone depleting gases released to the atmosphere.</li> </ul>	Minor discharge of pollutant to atmosphere that is in breach of a documented obligation or legal condition, but which doesn't result in significant impacts e.g. <ul style="list-style-type: none"> <li>Overfill of cement silo, cement dust release</li> <li>Nuisance dust requiring minimal or no offsite clean-up</li> <li>Small quantities of greenhouse or ozone depleting gases released to the atmosphere</li> <li>Failure to maintain plant in an efficient condition.</li> <li>Air quality complaints received or exceedance of relevant air quality criteria (e.g., daily average) occurs.</li> </ul> <p>Note: isolated exceedance events, exceedances of hourly averages or exceedances of applied trigger warning criteria may be raised as Near Hits.</p>

Environmental Harm Environmental Category	Class 1	Class 2	Class 3
<b>NVL – Noise, Vibration and Light (including overpressure)</b>	<p>Generation of noise, vibration, or light causing severe damage to property outside site or workplace, or the environment, or severe and / or persistent disruption to the community e.g.</p> <ul style="list-style-type: none"> <li>Major and persistent loss of amenity or nuisance</li> <li>Extreme levels or persistent excessive noise resulting in severe community impacts</li> <li>Confirmed substantial damage to property from vibration.</li> </ul>	<p>Generation of noise, vibration, or light causing sustained periods of inconvenience or disruption to community and the environment e.g.</p> <ul style="list-style-type: none"> <li>Significant loss of amenity or nuisance</li> <li>Wilful disregard of limits</li> <li>Noise, vibration or light levels regularly in excess of set criteria</li> <li>Vibration causes confirmed minor damage to property.</li> </ul>	<p>Unplanned generation of noise, vibration, or light exceeding documented limits or controls and causing occasional inconvenience or disruption to community and the environment e.g.</p> <ul style="list-style-type: none"> <li>Minor loss of amenity or nuisance</li> <li>Occasional unplanned breach of noise, vibration or light criteria at sensitive receivers.</li> <li>Substantiated public complaint satisfactorily resolved at project level.</li> </ul>
<p><b>WAS – Solid and Other Wastes</b></p> <p>NOTE: This category only applies to the unauthorised storage and handling of wastes. Once an incident occurs, use other categories to classify incident.</p>	<ul style="list-style-type: none"> <li>Unauthorised storage, transport, treatment or disposal of a significant quantity (refer to legislation) of regulated waste (e.g. classified, prescribed, hazardous) in contravention of waste management legislation</li> <li>Unauthorised storage, transport, treatment or disposal of a significant quantity (e.g. =&gt; 10,000 litres, 10 tonnes or 10.0 m<sup>3</sup>) of non-regulated waste, in contravention of regulations or project waste management requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Unauthorised storage, transport, treatment or disposal of a minor quantity (refer to legislation) of regulated waste (e.g. classified, prescribed, hazardous) in contravention of waste management legislation</li> <li>Unauthorised storage, transport, treatment or disposal of a moderate quantity (e.g. up to 10,000 litres, 10 tonnes or 10.0 m<sup>3</sup>) of non-regulated waste, in contravention of regulations or project waste management requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Placement or storage of waste or contaminated materials in a manner or place where environmental harm could reasonably be expected to occur</li> <li>Unauthorised storage, transport, treatment or disposal of a minor quantity (e.g. up to 1000 litres, 1000 kg or 1.0 m<sup>3</sup>) of non-regulated waste in contravention of regulations or project waste management requirements.</li> </ul>
<b>FLFA – Flora and Fauna</b>	<p>Major loss or impact on land or water-based flora or fauna. Destruction of ecologically significant habitat that is of national significance. Endangering viability of species, habitat or ecosystem. Damage that cannot be remediated, or only remediated with risk of long-term loss e.g.</p> <ul style="list-style-type: none"> <li>Unapproved destruction of habitat in a national park or similar;</li> <li>Unplanned harm to scheduled flora and fauna species and habitats that may threaten the regional survival of the species or community</li> <li>Long term or permanent disruption of protected fauna breeding cycle</li> <li>Introduction or spread of weeds and pathogens that pose a high risk of ecological or economic damage.</li> </ul>	<p>Medium impact on land or water-based flora, fauna or habitat. Short-term impact on ecosystem that is of regional significance. Damage that can be remediated e.g.</p> <ul style="list-style-type: none"> <li>Partial destruction of native habitat leading to impact on local species numbers or disruption to breeding cycles;</li> <li>Short-term disruption of protected fauna breeding cycle</li> <li>Unplanned harm to scheduled flora or fauna species that may threaten the local survival of the species</li> <li>Unapproved clearing of an area of remnant native vegetation, Declared Threatened or Rare flora</li> <li>Introduction or spread of weeds and pathogens that will require extensive resources to contain.</li> </ul>	<p>Minor loss or impact on land or water-based flora, fauna or habitat, but no long term negative effect on the ecosystem or habitat. Limited damage to an area of land of minor local ecological significance e.g.</p> <ul style="list-style-type: none"> <li>Death of a native animal, that is not identified as a pest, but not from a scheduled species</li> <li>Damage to vegetation in breach of clearing permits and approvals</li> <li>Localised spread of weeds or pathogenic material within site.</li> </ul>
<b>HER –Archaeological, Heritage and Cultural Issues</b>	<p>Destruction or irreparable damage to listed structures/items/locations of cultural or heritage significance e.g.</p> <ul style="list-style-type: none"> <li>Wilful damage to a structure, place, item, or artefact.</li> <li>Blatant disregard of widely held cultural values.</li> </ul>	<p>Significant damage to listed structures/items/locations of cultural or heritage significance e.g.</p> <ul style="list-style-type: none"> <li>Knowingly disturbing an archaeological site or place without the appropriate permits or in breach of a permit</li> <li>Entering of protected site, with a breach of cultural 'laws'. Minor disregard of cultural values.</li> </ul>	<p>Minor accidental and repairable damage to listed structures or places, or minor infringement of cultural values e.g.</p> <ul style="list-style-type: none"> <li>Unintentionally disturbing an archaeological site or place without the appropriate permits</li> <li>Entering of protected sites, but not in breach of cultural 'laws'.</li> </ul>
<b>RES – Use of land, water, fuels and energy, and other natural resources</b>	<p>Operations cause either short term severe or persistent unplanned disruption to the availability of resources to the community or the environment. Exhaustion or serious degradation of natural resources for future use e.g.</p> <ul style="list-style-type: none"> <li>Operations cause loss of flow in natural watercourses or irreversible depletion of aquifers</li> <li>Continuous loss of supply water volume from non-licensed discharge point, with evidence of supply water contamination.</li> </ul>	<p>Operations cause substantial unplanned disruption to the availability of resources to the community or the environment. Significant impact on other energy / natural resource users or the environment outside site or workplace e.g.</p> <ul style="list-style-type: none"> <li>Water usage/de-watering by operations causes loss of pressure or flow to local/adjacent water bores</li> <li>Unrecoverable loss of in situ or stockpiled growth medium (e.g. buried)</li> <li>Loss of minor water supply volume off-site.</li> </ul>	<p>Operations cause temporary unplanned disruption to the availability of resources to the community or the environment. Minor impact on other energy / natural resource users or the environment outside site or workplace e.g.</p> <ul style="list-style-type: none"> <li>Rehabilitation area disturbed.</li> <li>Minor land-use change without approval from Client or Regulator</li> <li>Loss of water supply volume to localised environment due to continuous moderate leakage; e.g. reservoirs, pipelines, tanks.</li> </ul>
<b>ASS - Acid Sulphate Soils</b>	<p>Mismanagement of acid sulphate soils results in high level or catastrophic persistent impacts e.g.</p> <ul style="list-style-type: none"> <li>Significant damage to infrastructure</li> <li>Major acid drainage event</li> </ul>	<p>Significant exposure, lack of containment or poor management of acid sulphate soils.</p>	<p>Minor exposure of acid sulphate soils e.g.</p> <ul style="list-style-type: none"> <li>Exposure of previously unidentified ASS during works</li> <li>Failure of protective bunds but with no runoff leaving contaminated area.</li> </ul>
<b>ESC- Erosion &amp; Sediment Control</b>	<ul style="list-style-type: none"> <li>Erosion causing major irreversible impacts to the surrounding environment.</li> <li>Major clean up works requiring significant resources</li> <li>Placement of high toxicity materials in a drainage line or adjacent to a waterway resulting in prosecution.</li> </ul>	<ul style="list-style-type: none"> <li>Disruptions to freshwater or marine activities Placement of contaminated wastes or medium toxicity materials in a location where it could potentially result in pollution</li> <li>Moderate erosion to a landscape, including flow lines that can be remediated in the medium term.</li> <li>Critical E&amp;S controls not installed.</li> </ul>	<ul style="list-style-type: none"> <li>Minor reversible alteration in landscape or topography</li> <li>Erosion causing minor impacts that are reversible.</li> <li>Placement of excavated soil or low toxicity materials in a location where it could potentially result in pollution.</li> <li>E&amp;S Controls not maintained.</li> </ul>
<b>DMR -Dirt &amp; Mud on Public Roads</b>	<p>Tracking or depositing of soil onto roads resulting in major clean-up works and major delays to arterial traffic.</p>	<ul style="list-style-type: none"> <li>Tracking of soil material onto local roads requiring significant resources for clean-up works.</li> <li>Exit controls and / or clean-up regime required but not in place</li> <li>Repeated failure by trucks to cover loads in accordance with project requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Unplanned tracking of soil onto local roads requiring minor clean up:</li> <li>Controls are in place but ineffective (e.g. exit rumble grids, wheel washes), clean up (street sweepers)</li> <li>Occasional failure by trucks to cover loads in accordance with project requirements.</li> </ul>

# Appendix F: Water Quality Monitoring Strategy

## Water Quality Management

Controls that are adequate to minimise water use and potential water quality impacts, to ensure compliance, and to reduce risk are implemented before any relevant works commence. Elimination of the hazard is the first preference of control, followed by engineering, then administrative controls. Typical controls and guidance material to be inform this project include:

- Pollution Prevention Manual – Annex 11
- Principals of Erosion and Sediment Control
- Construction Guide for Erosion and Control Structure
- Principles of Stormwater Management

The indicative Erosion and Sediment Control Strategy for the project includes the following measures and techniques:

- Clean water approaching the site from external catchments beyond the construction worksites will be managed via clean water drains and diversion berms to minimise run-on into the site. Impacts on adjacent land users will be considered to ensure that localized flooding or excessive run-on does not occur.
- Where sediment basins or sediment sumps cannot reasonably be constructed to the SMP (BLUE BOOK) requirements, undersized structures or alternatives (e.g. sediment fence) will be used, but with an enhanced focus on erosion control.
- Where possible, vegetation removed as part of the works will be mulched and reused on site for erosion and/or sediment control purposes.
- Stormwater flow velocities through work areas will be controlled using temporary berms or other suitable devices and water will be directed to appropriate locations.
- The spatial extent of exposed soils will be minimised, with no-go (exclusion) areas clearly marked on ESCPs, delineated and signposted.
- Temporary ground cover (e.g. geo-fabric, soil binder/stabiliser, hydro-mulch, other suitable products) will be used to lock down high risk areas whenever significant rain is imminent.
- Rainfall forecasts will be actively monitored and used to trigger inspection and, where required, implementation of additional measures such as the application of soil binder or polymer.
- All channels along the premises boundaries carrying clean water away from site are to drain either onto surrounding lands, into culverts or into existing drainage i.e. natural creeks or existing road drainage in accordance with the natural, pre-development drainage patterns.
- All exposed stockpiles will have sediment controls around their perimeter and are to be provided with adequate temporary cover if they remain for more than 10 days. Stockpiles will be located outside the 10% AEP flood extent (short term) or 5% AEP flood extent if longer than 10 days).
- At vehicle egress points from the BBK work areas, washdown bays, rumble grids and/or stabilised laybacks or other solutions will be used to minimise the risk of sediment tracking onto public roads. Any tracked material will be cleaned from site egress points as soon as possible.

- All erosion and sediment controls will be inspected at least weekly, before a site closure of two days or more, prior to forecast heavy rain (greater than 20 mm predicted) and after rainfall exceeding 20mm in 24 hours (if safe to do so).
- Maintenance will be carried out as soon as practical and prior to the next forecast rainfall event.
- Concrete washout will be confined to designated washout bays.
- Sediment collected from sediment basins or other traps will be transported to nominated stockpile sites or removed offsite as required.
- Dust generation will be minimised using water carts, soil stabilisers, reduced traffic speeds and application of temporary ground covers as required.
- Any discharge points will include appropriate scour protection/dissipation.
- Any relevant guidance in the SMP (BLUE BOOK) must be considered when implementing erosion and sediment controls.
- Stockpile management in accordance with the ESCP.

## Water Reuse

Various water sources will be used for the project, which may include, but are not limited to the following:

- Water retained in sediment basins/traps. following PFAS testing
- Water sourced from Murrumbidgee River
- Potable water from hydrants along the Defence hydrant road network'

Where possible water captured in sediment basins and other detention areas will be reused for dust suppression, compaction, or other construction activities, following PFAS testing for contamination. In preference to sourcing from potable supplies.

## Rehabilitation/site stabilisation

Vegetate stockpiles, stockpile sites and other areas nominated by Defence ESM to control erosion and weed invasion with the following cover crop species:

- Sterile Rye/Corn (during the months of April to August) at a rate of 35 kg per hectare
- Sterile Japanese Millet (during the months of September to March) at a rate of 35 kg per hectare.

Revegetation and stabilising site must include native seed mix for zones that will not be disturbed.

## Dewatering Management

Dewatering is any activity that involves the removal of ponded stormwater or infiltrated groundwater from any location within the project area (including from sediment basins and dams) and the subsequent reuse or discharge of that water. We plan to avoid and minimise discharges as much as practicable and undertake dewatering activities in a manner to minimise erosion and pollution of the environment.

## Approach

The approach to dewatering will generally follow the below hierarchy:

- Investigate opportunities for reuse. Onsite reuse may include applications such as dust suppression, earthworks compaction, vegetation establishment/rehabilitation, and plant/vehicle wash-down.



- Investigate opportunities of discharging water to land (within the site boundary) to allow the water to infiltrate into the ground, thus avoiding direct discharge to, or pollution of, waters.

## Discharge offsite

Onsite reuse or land discharge may be limited by climatic or site conditions (i.e. saturated ground) and water may need to be discharged to meet the sediment basins requirements (i.e. reinstating capacity) identified in the SMP (BLUE BOOK) (Landcom, 2004).

If groundwater inflows are observed, the groundwater quality is to be sampled to determine representative water quality. Any groundwater will be utilised on site for dust suppression or construction activities (e.g. compaction).

# Appendix G: EPA- NSW Extracted Natural Material Fact Sheet

# Fact sheet



## Definition

Excavated Natural Material (ENM) is naturally occurring rock and soil (including materials such as sandstone, shale, clay and soil) that has:

- been excavated from the ground
- contains at least 98 per cent (by weight) natural material
- does not meet the definition of Virgin Excavated Natural Material (VENM)

ENM does not include material that has been processed or contains acid sulphate soils or potential acid sulphate soils.

**An example of the difference between VENM and ENM:** A noise mound that was originally formed using VENM and is demolished many years later is now considered ENM. The reason is that in the intervening period there is a risk that the noise mound may have been contaminated with other materials such as oils, asbestos, herbicides, etc. and needs to be tested before re-use.

## Waste classification

ENM is classified as General Solid Waste (non-putrescible).

## Beneficial re-use

ENM by its nature can be re-used easily. Weed-free topsoil may be stockpiled and reused on batters or in landscaping and revegetation works.

ENM may be sent offsite to a place that can legally accept this material for reuse or reprocessing. Off-site reuse must be undertaken in compliance with all conditions of the EPA's [Excavated natural material order 2014](#) (ENM order) and [Excavated natural material exemption 2014](#) (ENM exemption). ENM can be beneficially re-used off-site as engineering fill or for use in earthworks.

Prior to supplying ENM off-site, the generator must certify that the ENM complies with the relevant conditions of the ENM order and provides the off-site consumer with:

- A written statement of compliance, certifying that the ENM complies with the conditions of the ENM order.
- Copies of all test results (see below).
- A copy of the ENM exemption, or a link to the EPA website where the ENM exemption can be found.

The generator must keep a written record of the quantity of ENM supplied, and the name and address of each person to whom the processor supplied the ENM. Records must be kept for six years.

Receiving ENM from an off-site source requires that you ensure the ENM:

- Complies with the relevant conditions of the ENM exemption.
- Meets all chemical and other material requirements as per the excavated natural material order.
- Is only applied to land as engineering fill or for use in earthworks.
- Is applied to land within a reasonable period of time after its receipt.

A consumer must keep records of the quantity of ENM received and the supplier's name and address. These records must be kept for six years.

ENM must not be mixed with any other types of waste to maximise future re-use opportunities.

## Testing requirements

ENM must be sampled, tested and contain contaminant levels less than the criteria listed in the ENM order before the material is transported to the receiving site. Sample collection and testing methodology is detailed in the ENM order.

Additional testing (beyond the ENM criteria) is only required if there is evidence that potentially-contaminating activities previously took place on the excavation site (for example, former service station site, cattle tick dip site, banana plantation, asbestos or lead-painted infrastructure). If this is the case, specialist advice should be obtained from Environment and Sustainability on additional test requirements.

Written records of all test reports must be kept for six years.

## Transporting requirements

It is a Transport requirement that records must be kept for six years and include as a minimum:

- [Notice under section 143](#)
- amount of ENM generated, stored, treated or disposed of
- amount of ENM transported
- name of transporter and transporter's vehicle registration number
- date of transportation
- name and location of the facility that is receiving the ENM.

## Disposal requirements

Transport for NSW has a target of 100% beneficial re-use of ENM.

Every effort must be made to re-use ENM on- or off-site before considering disposal. If disposal is the only option, justification of disposal must be documented and the material taken to a licenced waste facility, licenced to accept General Solid Waste (non-putrescible).

## Contact and further information

**Internal:** [Environment and Sustainability Management Framework - Waste](#)

**All users:** [environmentandsustainability@transport.nsw.gov.au](mailto:environmentandsustainability@transport.nsw.gov.au)

# Appendix H: Unexpected Finds Protocol: Valuable, Archaeological or Special Interest items

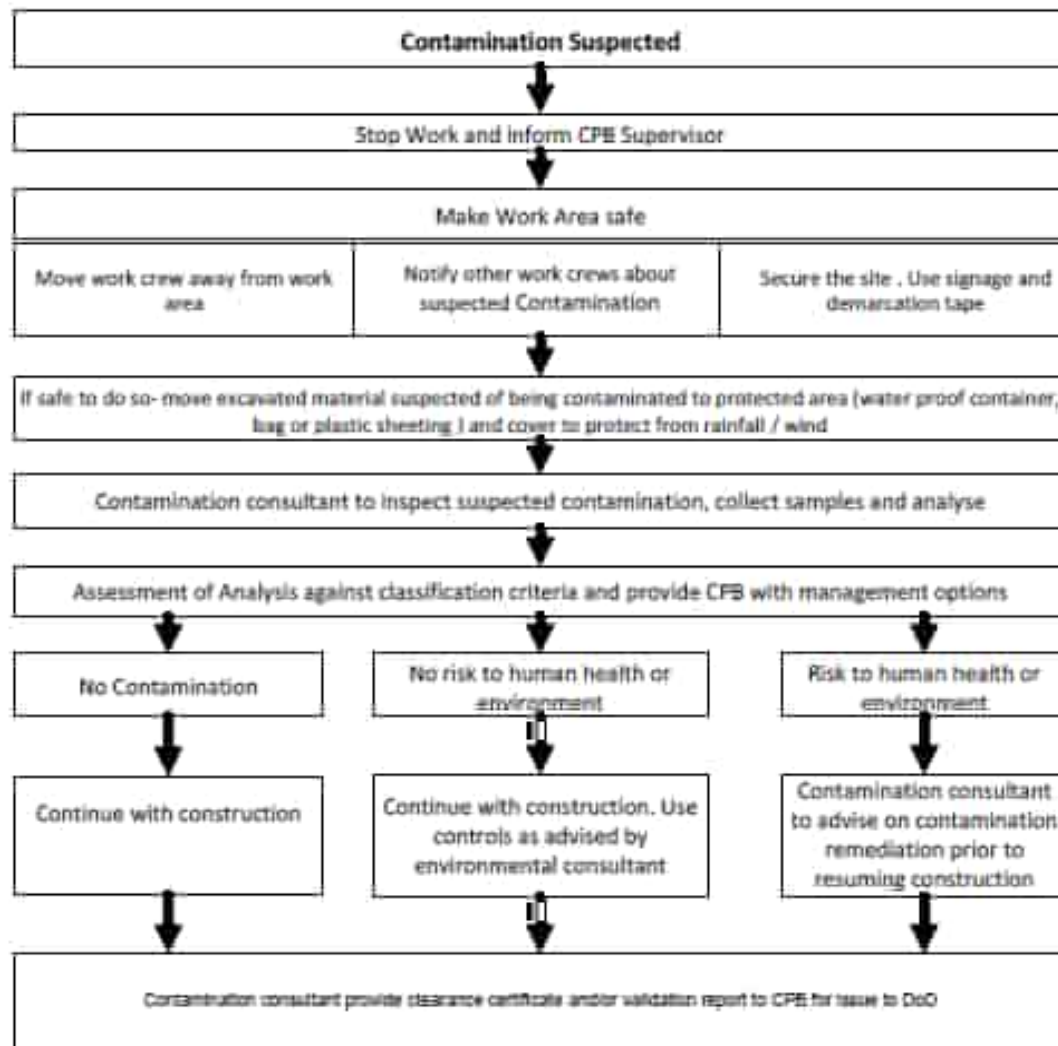
**Table 60: Unexpected Finds Protocol: Valuable, Archaeological or Special Interest items**

Action	Requirement	Responsibility	Timing
Stop Work	If an object is found, then the worker will stop work. Do not move or handle the object. Notify Environment Manager	All Site supervisor	When an object is found
Protect	Install flagging or other barrier to prevent works impacting on the area	Site supervisor	When an object is found
Notify	Archaeologist and registered stakeholders notified to attend site Contract Administrator	Environmental Manager ESM PMCA	ASAP
Assess	Archaeologists and stakeholders investigate and assess the find. Note. If human remains suspected, then contact Police	Archaeologist and/or Registered stakeholders Environmental Manager	ASAP (within 24 Hours)
Record	Archaeologist and stakeholders will consult with CPB regarding recording and salvage requirements. Completion of NSW OEH "Sites Card Basic" Form	Archaeologist and/or Registered stakeholders	ASAP
Storage	Consultation with Defence to agree on 'appropriate keeping place'	Site supervisor	After assessment and recording is completed
Potential Reburial	If reburial of an artefact is required, the minimum OEH requirements as specified in Requirement 26 of the Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW 2010 are to be followed	Site supervisor	After assessment and recording is completed
Restart work	Archaeologist and registered stakeholders to advise when works can recommence or where alternative work method may be required	Environmental Manager Archaeologist and Registered stakeholders	After assessment and recording is completed

**Continuous monitoring of all excavations for signs of contamination**

Signs of contamination include:

- Foreign objects, military objects, waste, construction material, asbestos
- Unusual odour e.g. fuel, sewage or rotten egg smell
- Change in colour of material e.g. dark staining , yellow or bright orange material
- Change in consistency of material e.g. ash or aggregate
- Pockets of ash or tar
- Oily sheen or staining to water
- Anything else unusual or different

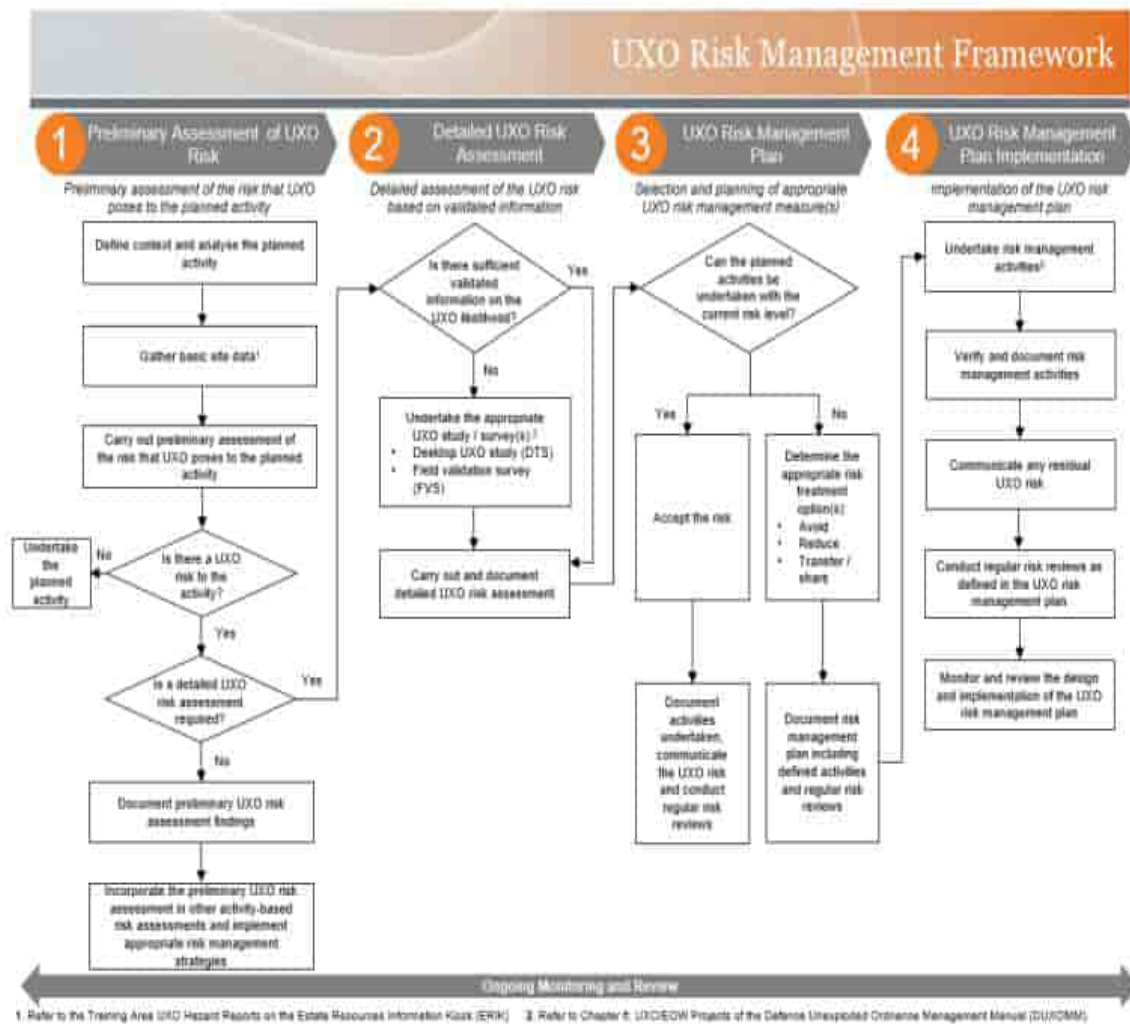


**Figure 24 : Contamination Unexpected Finds Protocol**

# UXO RISK MANAGEMENT FRAMEWORK PROCESS MAP

The process map for the UXO Risk Management Framework is provided in **Figure 4A-1**.

**Figure 4A-1: UXO Risk Management Framework Process Map**



**Figure 25: Unexploded Ordnance Unexpected Finds**

Reference: Defence Unexploded Ordnance Management Manual 2022

<https://uxo.defence.gov.au/>

# Appendix I: Environmental Method Statement

## Grubbing and clearing

ENVIRONMENTAL WORK METHOD STATEMENT (EWMS)			
<b>Site Location</b>	Blamey Barracks Kapooka NSW	<b>Date August 2024</b>	2/08/2024
<b>Title</b>	Clearing and Grubbing	<b>Site Environment Plan (SEP) / Environmental Control Map (ECM) Reference</b>	RRJV EMP Flora and Fauna Management Plan Sub Plan and all associated appendices
<b>Area Supervisor</b>	Phillip Miles	<b>EWMS Ref No.</b>	2024.001
<b>Work Pack Reference</b>	TBA	<b>Commencement Date</b>	Aug 2024
<b>Relevant ENV Legislation</b>	<i>Environment Protection and Biodiversity Conservation Act (EPBC) 1999</i> <i>Environmental Planning and Assessment Act 1979</i> <i>Protection of Environment Operations Act 1997</i> <i>Biodiversity Conservation Act 2016</i> <i>Heritage Act 1977</i> <i>National Parks and Wildlife Act 1974</i> <i>Environment Protection and Biodiversity Conservation Act 1999</i>	<b>Proposed completion date</b>	June 2034
INTRODUCTION			
<b>Purpose/ Objectives</b>	This EWMS details work activities involved in clearing and grubbing, throughout the project		
<b>Hazards</b>	The key potential environmental hazards/impacts relate to: <ul style="list-style-type: none"> <li>• Non-compliance with project approvals/conditions, licenses, permits, EMP and sub-plans.</li> <li>• Impact to sensitive areas i.e. loss of habitat due to over clearing</li> <li>• Introduction/ spread of pathogens and noxious weeds</li> <li>• Sediment laden water entering waterways during rainfall</li> <li>• Unexpected contamination/ heritage when grubbing</li> </ul>		
GENERAL WORK DETAILS			
<b>Description of the activity (overview)</b>	1. Delineate vegetation to be cleared and exclusion zones for sensitive areas. <ul style="list-style-type: none"> <li>• Clearing limits set out by a member of the survey team and checked against the limits of the approved project boundary.</li> <li>• Sensitive areas shown on the Sensitive Area Plans in proximity to designated works are to be clearly delineated and signposted before the commencement of works as per the Flagging Guide for Clearing (Appendix A).</li> </ul> 2. Pre-clearing <ul style="list-style-type: none"> <li>• Ecologist to conduct pre clearing surveys which includes the marking of Habitat trees, weed infestations and threatened species. Findings to be included in Pre clearing ecology survey report</li> <li>• If soil disturbance is to occur create an Erosion and Sediment Control Plan (ESCP) Where the vegetation and terrain permits install the controls. Where it doesn't permit, all of the controls need to be installed immediately following clearing.</li> </ul>		



	<ul style="list-style-type: none"> <li>• Before clearing and grubbing commences undertake a joint inspection with ESM &amp; EWS representative and RRJV Environmental site representative to inspect clearing limits, temporary exclusion fencing and opportunity to reuse timber for habitat compensation.</li> <li>• Check ECC requirements Ensure before proceeding to clear vegetation.</li> <li>• Known fauna present will be captured and relocated into pre-determined habitat areas.</li> </ul> <p>3. Undertake clearing and grubbing activities:</p> <ul style="list-style-type: none"> <li>• Only clear to the clearing limits.</li> <li>• Where 'Habitat Trees' exist, implement 2 stage clearing process: <ul style="list-style-type: none"> <li>– Clear vegetation area within the vegetation permit with the exception of habitat trees and any other fauna habitat by the Ecologist.</li> <li>– Clear habitat trees (at least 24 hours after the removal of non-habitat trees) and complete works.</li> </ul> </li> <li>• Where reasonable and feasible as determined by the Environmental Manager, set aside hollow logs and other large woody material for reuse Materials identified for reuse will be captured in the inventory.</li> </ul> <p>4. Undertake mulching activities</p> <ul style="list-style-type: none"> <li>• Following clearing, native vegetation can be mulched and stockpiled for later reuse on the project or disposal offsite.</li> <li>• Transport mulch to locally distributed stockpile locations for later reuse in landscaping or reuse in same area as mulch bund sediment control. Stockpile locations will be in accordance with stockpile protocol.</li> <li>• Mulched vegetation to be stockpiled and used in accordance EMP.</li> <li>• Identify PFAS contaminated sites- i.e. Category 2 – mulch to be separated and reused only on known contaminated sites.</li> </ul>
<b>Location (s) of Activity</b>	The works will occur along the entire work element building footprint of the project where clearing and grubbing of vegetation is required.
<b>Timing of works/Expected duration</b>	The bulk of clearing and grubbing work is expected to be at each work element stage- from 2024 to 2032.
<b>Approvals Required</b>	<ul style="list-style-type: none"> <li>• Engineer responsible for clearing works to obtain Clearing Permit, signed off ECC, prior to clearing.</li> <li>• All works will be undertaken in accordance with all applicable key environmental documents including the EPBC Conditions of Approval, licenses, permits, EMP and sub-plans.</li> </ul>
<b>Consultation</b>	This EWMS has been developed in consultation with relevant site management personnel (site Supervisor, Project Engineers, environment team, Defence ESM) to ensure that listed actions are practical, and all personnel are aware of their commitments, obligations and responsibilities.
<b>Complaints</b>	<p>Complaints and community consultation will be managed by the Environmental Manager. For this project, this includes:</p> <p>Relevant corrective actions are to be agreed and implemented, with accountabilities and time frames assigned.</p> <ul style="list-style-type: none"> <li>• The complainant or enquirer is notified of the response.</li> <li>• The complaint will be managed in accordance with the requirements of the EMP.</li> <li>• The 24 hr BCC EMOS Hotline</li> </ul> <p>RRJV – Website <a href="http://rrjv.com.au/">http://rrjv.com.au/</a></p>
<b>Incident Response:</b>	<ul style="list-style-type: none"> <li>• Make the area safe and undertake measures to prevent environmental impacts.</li> <li>• Consult with the Environmental Manager as soon as practical to ensure that incident response measures will not result in further impacts.</li> </ul>

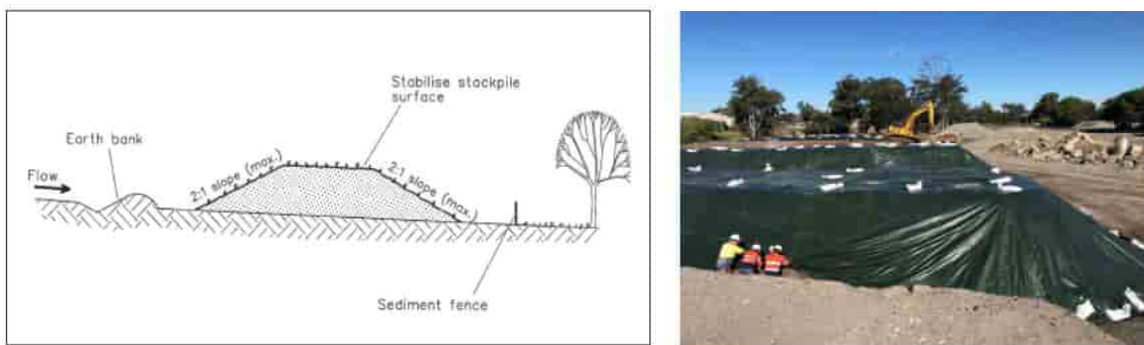
<p><b>Monitoring and Reporting:</b></p>	<ul style="list-style-type: none"> <li>• Monitor the site for generation of tannins during inspections of mulched areas or mulch stockpiles.</li> <li>• Damage to property or vegetation outside of the project footprint must be reported to the Environmental Manager immediately</li> <li>• Report all spills to the Environmental Manager and supervisor and clean up immediately.</li> </ul>
<p><b>Equipment Required</b></p>	<p>Plant and machinery:</p> <ul style="list-style-type: none"> <li>• Bulldozers</li> <li>• Skid steers</li> <li>• Mulchers</li> <li>• Excavators</li> <li>• Chainsaws</li> <li>• Bobcat</li> <li>• Trucks</li> <li>• EWP</li> </ul>

# Appendix J: Stockpile Management Strategy

## Stockpile Management

The type of environmental controls required for stockpile management will depend on the location, surrounding environment and material being stored at the stockpile site. The environmental controls for a particular stockpile site may change during construction depending on the type of material being stored at any particular time. The mitigation measures will be implemented prior to establishment of stockpiles by the Construction Manager in consultation with the Environmental Manager. Any change in use will be reflected where required in the ESCP.

Site-specific mitigation measures, where they are necessary to further reduce impacts, will be detailed in the ESCP.



**Figure 26: Stockpile designed and cover to reduce sediment runoff**

Mitigation measures for each stockpile site will include as a minimum an Erosion and Sediment control Plan (ESCP) including:

- Delineation of the perimeter of the stockpile with a bund, fencing or barrier.
- Erosion and sedimentation controls to be erected between the stockpile site and any drainage lines or down-slope areas.
- Temporary sediment basins.
- Covers, or other erosion protections for stockpiles that will be in place for more than 20 days as well as any temporary stockpiles that are susceptible to wind or water erosion, within five days of forming each stockpile.
- Diversion of stockpile run-off through sediment traps and controls.
- Keep stockpile
- Dust management measures (including for vehicle movements associated with stockpiling activities) will be implemented in accordance with the requirements of the Construction Air Quality Management Plan.
- Monitoring of odours and odour control measures.
- Exit points from stockpile areas will be stabilised and include washdown points and rumble pads to prevent mud tracking.
- Progressively rehabilitate stockpile sites.

- Avoid locating stockpile weed contaminated topsoil or other contaminated materials adjacent to areas of native vegetation.

## Mulch Stockpiles

Mulch will be stockpiled and composted prior to use to reduce the effects of nitrogen drawdown and to leach tannins. Minimum stockpiling times vary depending on species from which the mulch is derived (typically six months). Mulch stockpiles will be monitored and turned over as required to avoid spontaneous combustion.

Mulch stockpiles will not be located close to creeks or tributaries and will be bunded or positioned to drain into a sediment basin. Mulch stockpiles in high tannin generating vegetation will:

- Be established on elevated ground where possible.
- Be located 50m from waterways, for mulch stockpiles that will be in place for duration of more than one month.
- Be located 20m from waterways, for mulch stockpiles that will be in place for duration of less than one month.
- Bunded to ensure up-gradient water is prevented from entering the stockpile site, and to capture tannin impacted water. Bunds will be impervious and 300mm high at a minimum.
- Be managed in accordance with all other requirements specified in the Defence Environmental management plan – Stockpiles
- Known PFAS contaminated vegetation (Cat. 2) is to be reused on source site to reduce risk of spread of PFAS contamination.

## Topsoil Stockpiles

We will comply with the following measures regarding topsoil stockpiles:

- Prior to stockpiling topsoil, a survey to determine the surface levels at each stockpile area will be conducted.
- Stripped topsoil will be sieved, and any lumps of clay, weeds and other deleterious material will be removed prior to adding to any stockpile.
- Topsoil that is not contaminated by noxious weeds or other contaminants i.e. asbestos will be kept in stockpiles for later spreading on fill batters and other areas. Other material may also be stockpiled but kept separated from the topsoil stockpiles.

### Topsoil stockpiles will:

- Be free from weeds, subsoil, other excavated materials, contaminated materials (including asbestos), refuse, clay lumps and stones, timber or other rubbish.
- Be managed to ensure no growth of weeds.
- Be trimmed to a regular shape to facilitate measuring with a height not exceeding 2m, unless agreed and batter slopes not steeper than 2:1.
- Batters will be track rolled or stabilised by other means.
- Seeded (using native grass or sterile grass seed) to encourage vegetation cover and minimise erosion.

We will carry out tests on the stockpiled topsoil using a NATA accredited testing laboratory to ascertain its suitability for use in revegetation works and to determine soil chemistry revegetation constraints, soil amelioration, PFAS contamination levels and spreading requirements. We will use only stockpiled topsoil

suitable for use in revegetation works as topsoil. Topsoil handling and stockpile contamination risk will be managed to ensure the success of the vegetation.

## Sand Stockpiles

If sand is required to be imported and stockpiled in the corridor for construction purposes, the following will be implemented:

- It will be located 50m from waterways on high ground.
- Divert surface water runoff away from sand stockpile.
- Erosion and sedimentation controls will be erected between the stockpile site and any drainage lines or down-slope areas.

## Other Material Stockpiles

If stockpiling of materials, such as imported quarry materials, quarried rock or DGB, that may be susceptible to wind and water erosion, they will be stockpiled in the catchment of erosion and sediment controls and shown on the ESCPs.

We may also be required to temporarily stockpile contaminated material. To manage this we will comply with the following measures:

- All stockpiles containing contaminated (or suspected contaminated) materials will be covered (with geotextile or plastic as required).
- Additional downslope controls (such as bund/sandbags and/or sump depending on location of stockpile) will be installed as required.
- Stockpiles will be sign posted as a warning for potential contamination present.
- Contaminated material stockpiles will be located only in areas which are explicitly approved by BM/ESM for the storage of contaminated materials.

## Decommissioning of stockpile sites

Decommissioning of stockpile sites after use will be conducted to reinstate the stockpile site to its previous natural condition. Stockpile sites will be progressively rehabilitated in accordance with the Landscape Plan. Decommissioning and rehabilitation of stockpile sites will involve the following activities:

- Clearing all stockpile material from the site and recycling or disposing of it at a licensed facility
- Stabilising the site by planting and/or landscaping the site
- Removing control measures such as erosion and sedimentation devices once the stabilisation has occurred.
- Undertaking an inspection of the site.
- Notifying the ESM & BM (or delegate) that the stockpile site has been removed.
- Updating ESCP.

### Procedures for disposal of contaminated soils in the Riverina.

Beneficial reuse is defined in the PFAS NEMP Version 2.0. Examples include where there is an existing need for soil for purposes such as landscaping, construction works, roadworks etc. Waste disposal is not supported on the Defence Estate, except under exceptional circumstances, and is subject to approval by the BSM/ESM with supporting documentation. Consultation and planning for reuse will occur in the early

planning phases of the project to ensure budget allocation and prevent delays. Where reuse is not possible, and disposal is required the following actions will be completed:

Waste classification letters must accompany all soil or groundwater proposed to be disposed of offsite.

All soil that is excavated and temporarily stockpiled is to be tracked and documented. The following information will be recorded:

- Soil quality information – based on sampling results and visual observations.
- GPS coordinates – where soil has been removed from and where the soil is placed. Soil volumes – to be provided by excavation contractors.
- All containers will be managed as contaminated materials, until appropriately cleaned prior to transporting non-contaminated materials.

Utilise the single waste code established under the NEMP for the transport of PFAS contaminated material in all States, what specific requirements need to be managed within the relevant jurisdiction All soil that is removed and temporarily stockpiled as part of the construction program will be tracked and documented.

**The following information will be recorded:**

- Soil quality information – based on sampling results and visual observations.
- GPS coordinates – where soil has been removed from and where the soil is placed. Soil volumes – to be provided by Civil engineers and confirmed by excavation contractors.
- Wherever possible any spoil material should be retained on site, if deemed suitable via risk assessment and approved by Defence. Disposal will only occur if unsuitable for reuse and disposed of to an approved waste management facility.
- Material segregation will be maintained at all times with respect to classification and or source material (stop butt, PFAS category, presence of other contaminants asbestos, inert waste and acid sulphate soil).

RRJV will continue to Liaise and consult with the Directorate of Contamination Assessment & Remediation & Management (DCARM). And will supply data and update Defence system including ESDAT, GEMS, and NSIMS.

**Local facilities include**

- Bowser Landfill: 5 Coleman Rd, North Wangaratta VIC 3678
- Benalla Landfill and Resource Recovery Centre: 96 Old Farnley Rd, Benalla VIC 3672
- Swan Hill Landfill: 6859 Sea Lake-Swan Hill Rd, Swan Hill VIC 3585
- Cleanaway Wodonga Industrial Waste Service: 2/9 Romet Rd, West Wodonga VIC 3690
- Ganmain Landfill: Grave St, Ganmain NSW 2702
- Leeton Landfill & Recycling Centre: 732 Corbie Hill Rd, Corbie Hill NSW 2705 Gregadoo

## References

- Australian Standard 5667:1998 Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS/NZS 5667.1:1998)
- Australian Standard 5667:1998 Water Quality – Sampling, Part 6: Guidance on sampling of rivers and streams (AS/NZS 5667.6:1998) Hydrology Report WSP 2023
- Construction Guide for Erosion and Control Structure

- Defence Materials Management Protocol (DMMP)
- Defence Contamination Management Manual (DCMM)
- Defence Landscape Management Manual (DLMM) 2021)
- Defence PFAS Construction and Maintenance Framework (DPCMF) 2021
- Defence PFAS Area Management Plan (PMAP)
- Environment Report (2023)
- PFAS Risk Assessment & Tool 2023
- Contamination Strategy 2023
- PFAS National Environmental Management Plan (PNEMP) 2021
- Principles of Stormwater Management
- Pollution Prevention Manual – Annex 1I
- Principals of Erosion and Sediment Control
- NSW Managing Urban Stormwater and construction (Blue Book)

# Riverina Redevelopment Program

## Pre-construction Contamination Assessment Report

Project: EST02036 Blamey Barracks Kapooka Redevelopment

Document issue:	50% SDR Final Issue	20 Jul 2023
Document no.:	RRP-BBK-GLO-EMM-CNT-RPT-0001	



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Riverina Redevelopment Joint Venture



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## Acronyms and Abbreviations

Reference	Definition
AAFC	Australian Air Force Cadets
ACM	Asbestos Containing material
ADF	Australian Defence Force
ALARP	As Low As Reasonably Practical
ALTC	Army Logistics Training Centre
AMO	Automatic Meteorology Observations
AoPC	Areas of potential contamination
ASC	Assessment of Site Contamination
ASEME	Army School of Mechanical Engineering
ASH	Army School of Health
ASL	Above Mean Sea Level
ASLP	Australian Standard Leaching Procedure
ASLP	Australian Standard Leaching Procedure
BGL	Below Ground Level
BTEXN	Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene
CDR	Concept Design Report
CHMP	Cultural Heritage Management Plan
CoC	Chain of Custody
CSM	Conceptual Site Model
CSR	Contaminated Sites Register
CTA	Close Training Area
DAWE	Department of Agriculture, Water and the Environment
DCMM	Defence Contamination Management Manual
DCR	Desktop Contamination Review
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEHPD	Directorate of Environment and Heritage Policy Development
DELWP	Department of Environment, Land, Water and Planning
DEPAC	Directorate of Environmental Planning Assessment & Compliance
DNAPL	Dense Non-aqueous Phase Liquid
DoE	Department of the Environment

Reference	Definition
DQI	Data Quality Indicators
DQO	Data Quality Objectives
EO	Explosive Ordnance
EPA	Environment Protection Authority
EPBC Act	<i>Environmental Protection and Environmental Conservation Act 1974</i>
GEMS	Garrison Estate Management System
HIL	Health Investigation Level
HMP	Heritage Management Plan
HQ	Headquarters
ICT	Information and Communications Technology
JLU(V)	Joint Logistics Unit (Victoria)
JNCO	Junior Non-Commissioned Officer
KMA	Kapooka Military Area
LEP	Local Environmental Plan
LIA	Live in accommodation
LNAPL	Light Non-aqueous Phase Liquid
MLOC	Minimum Level of Operational Capability
MPFR	Master Plan Feasibility Review
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measures
NSIMS	National Spatial Information Management Systems
NSW	New South Wales
OCP	Organochlorine Pesticides
OPP	Organophosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCA	Pre-construction Contamination Assessment
PCBs	Polychlorinated Biphenyls
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
PID	Photoionisation Detector
PMAP	PFAS Management Action Plan
PMST	Protected Matters Search Tool
RAAF	Royal Australian Air Force
RBW	RAAF Base Wagga

Reference	Definition
RRJV	Riverina Redevelopment Joint Venture
RRP	Riverina Redevelopment Project
SAC	Site Assessment Criteria
SAQP	Sampling, Analysis and Quality Plan
SGT	Sergeant
SSB	Site Selection Board
TCLP	Toxicity Characteristic Leaching Procedure
TRH	Total Recoverable Hydrocarbons
VOC	Volatile Organic Compounds

## A. EXECUTIVE SUMMARY

1. The Riverina Redevelopment Joint Venture (RRJV) was formed by CPB Contractors and Downer to undertake the Riverina Redevelopment Project (RRP) at three Defence establishments:
  - a East and South Bandiana within the Albury Wodonga Military Area (AWMA)
  - b Blamey Barracks Kapooka (BBK)
  - c RAAF Base Wagga (RBW).
2. This report details the findings of the pre-construction contamination assessment (PCA) which presents the preferred development options selected following the Site Selection Board (SSB) workshop. The SSB workshop evaluated the potential work elements (WEs) identified at the 5% Master Planning and Feasibility Review (MPFR) stage and have consolidated these elements into the preferred options. The areas for the following options were assessed by site investigations during the 30% Concept Design Review (CDR):
  - a WE 2.11 Entry Precinct Upgrades
  - b WE 4.1 Recruit Development Company Live-in Accommodation (LIA)
  - c WE 4.1 New/Refurb 'Lines' (A, B, C and D Companies)
  - d WE 5.2 New Transit LIA
  - e WE 2.4 Working Accommodation in Contractors Precinct
  - f WE 3.1 & 3.2 Headquarters (HQ) Facilities
  - g WE 6.4 Medical Training Facilities
  - h WE 7.1 New Weapons Ranges (300m Range)
  - i WE 2.1 New Multi-Function Centre
  - j WE 2.2 Explosive Ordnance (EO) Storage and Distribution
  - k WE 2.5 Quartermaster Store (Q Store) and Warehousing
  - l WE 6.1 Gym and Fitness Training Expansion.
3. The works were divided into two phases:
  - a Stage 1A: contamination sampling co-located with geotechnical investigations undertaken by Aitken Rowe Testing Laboratories (ARTL)
  - b Stage 1B: the main contamination investigation addressing building siting areas.

The findings of Stages 1A and 1B are presented in this report.
4. The objectives of the Stage 1A sampling were to:
  - a provide a preliminary assessment of the contamination status of the various building siting areas
  - b assess existing groundwater monitoring wells for serviceability for sampling during Stage 1B investigations.

5. The objectives of the Stage 1B sampling were to:
  - a supplement the data generated during Stage 1A investigations to address data gaps identified during the 5% MPFR in the Desktop Contamination Review (DCR), specifically those in relation to the siting options for buildings presented in the RRJV's 5% MPFR deliverable
  - b refine the understanding and assessment of contamination risk at each siting location, utilising both existing data and data generated by the site investigation program
  - c enable the preparation of a PCA report.
6. The following conclusions with respect to the project objectives are made:
  - a No soil contaminant concentrations above the SAC protective of human health were identified.
  - b PFAS was detected in all areas investigated except for the working accommodation in the proposed Contractor's precinct (WE 2.4).
  - c The highest PFAS concentrations were from samples collected from the New Multi-Function Centre (WE 2.1). This is consistent with the historical data set. This area intersects a high risk contaminated site record (CSR) and was formerly used as the transport yard and fire station. Activities included mechanical workshops, vehicle garaging, chemical storage, and historical testing of aqueous film-forming foam (AFFF) on to adjacent grassy areas.
  - d Widespread detections of PFOS above the SAC protective of ecological health were detected across the New Multi-Function Centre (WE 2.1).
  - e Isolated detections of PFOS above the SAC protective of ecological health were detected at the Medical Training Facility (WE 6.4), the Q Store and Warehousing (WE 2.5) and the Gym and Fitness Training areas (WE 6.1).
  - f Soil within the Entry Precinct (WE 2.11), Recruit Development Company LIA (WE 4.1), New/Refurb 'Lines' (A, B, C and D Companies) (WE 4.1), New Transit LIA (WE 5.2), HQ Facilities (WE 3.1 & 3.2) and the New Weapons Range (WE 7.1) would be classified based on the preliminary soil sampling conducted as **Category 4** in accordance with Defence PFAS Framework (2021).
  - g Soil within the Medical Training Facilities (WE 6.4), EO Storage and Distribution (WE 2.2), Q Store and Warehousing (WE 2.5) and the Gym and Fitness Training Expansion (WE 6.1) would be classified based on the preliminary soil sampling conducted as **Category 3 and Category 4** in accordance with Defence PFAS Framework (2021).
  - h Soil within the New Multi-Function Centre (WE2.1) would be classified based on the preliminary soil sampling conducted as **Category 2, Category 3 and Category 4** in accordance with Defence PFAS Framework (2021).
  - i Leachability results indicated the highest leachable concentrations were reported in samples from the Q Store and Warehousing (WE 2.5) and the New Multi-Function Centre (WE 2.1). In both areas, the leachable concentrations were higher in samples at depth than surface samples indicating source material is present at depth.

- j The following locations require further assessment, based on data gaps identified:
- i Vertical extent of PFAS impacts at the Q Store and Warehousing (WE 2.5), the Gym and Fitness Training Expansion (WE 6.1) and the New Multi-Function Centre (WE 2.1).
  - ii Due to changes in the layout of the Medical Training Facilities (WE 6.4) and the Q Store and Warehousing (WE 2.5) after sampling was completed, some sampled locations are now outside the current proposed footprint.
- k Groundwater was not encountered during drilling. A limited number of existing groundwater monitoring wells exist in the vicinity of the work areas, which were investigated. These monitoring wells were gauged, and the standing water levels were either >5 metres below ground level (m bgl) or the monitoring well was dry. It is considered unlikely that shallow groundwater (<2 m bgl) will be encountered during construction, however contingency measures should be made for construction works in the event that shallow perched groundwater is encountered.
7. The following recommendations are made:
- a Identified Category 2, 3 and 4 soil should be managed in accordance with Defence PFAS Framework (2021), including management of leachable PFAS. It is understood that the preferred management approach for excess material will be reuse on Site subject to consultation with Defence and assessment of risk.
  - a If any soil requires removal from BBK, this material will need to be classified at an appropriate sample density (subject to the volume of material) in accordance with the NSW EPA (2014) Waste Classification Guidelines and the PFAS NEMP (2020) for material characterisation purposes. The initial leachability results indicate some material may require disposal to clay/single composite lined and double composite lined landfills or require treatment at a specialised facility prior to disposal in accordance with the Landfill Acceptance Criteria detailed in the PFAS NEMP (2020).
  - b Due to the variability in soil waste classifications and the Base-wide work element footprint, it is recommended that a stockpile management procedure is documented in the CEMP and implemented during Delivery Phase to provide appropriate segregation and tracking of soil following excavation.
  - c If soil is intended to be retained, completion of a soil reuse risk assessment in accordance with the PFAS NEMP (2020) will be required. This would include further assessment of the source material and the proposed reuse location (if not already assessed). Suitable reuse purposes and siting locations will need to be identified.
  - d Further investigation/sampling is recommended for:
    - i Infrastructure services routes and associated features (where intrusive activities will occur). This will enable preliminary characterisation of soil and fill material at the locations sampled to:
      - support decision making on contaminated material management
      - evaluate whether these materials pose an unacceptable risk to workers human health and the environment
    - ii development of appropriate construction environmental management controls where risk is unacceptable.
    - ii Demolition areas (where intrusive subsurface activities will occur) and contamination risks could be present, where pre-demolition access is feasible.
    - iii Assessment of the extent of PFAS impacts in the Medical Training Facilities, Q Store and Warehousing, the Gym and Fitness Training Expansion and the New Multi-Function Centre.
    - iv Any scope item which may be introduced or modified in the design.
    - v Potential siting options for reuse of construction spoil impacted by PFAS, should the material balance indicate that spoil is to be relocated to other areas within the project footprint, and/or a nett surplus of spoil will likely be generated requiring siting outside of the project footprint.
  - e Where spoil is proposed to be disposed of off-site, waste classification will be required in accordance with the relevant regulatory requirements.
  - f Update the Conceptual Site Model (CSM) if and as required.
  - g Liaise and consult with the Directorate of Contamination Assessment, Remediation and Management (DCARM) at a frequency determined by Defence, and supply data if and as required to facilitate the update of Defence's systems including ESdat, GEMS and NSIMS.

## B. INTRODUCTION

### B.1 Background

8. The Riverina Redevelopment Joint Venture (RRJV) was formed by CPB Contractors and Downer to undertake the Riverina Redevelopment Project (RRP) at three Defence establishments:
  - a East and South Bandiana within the Albury Wodonga Military Area (AWMA)
  - b Blamey Barracks within the Blamey Barracks Kapooka (BBK)
  - c RAAF Base Wagga (RBW).
9. The scope of the Riverina Redevelopment Project (RRP) comprises major upgrades and/or replacement of existing infrastructure and facilities at each of these sites. EMM Consulting Pty Limited (EMM) has been engaged by RRJV, to provide a range of services in support of the RRP, including contamination.
10. During 5% Master Plan and Feasibility Review (MPFR), EMM completed a desktop review of existing documentation and data relevant to contamination at all three establishments. This review was documented in separate Desktop Contamination Review (DCR) reports which were submitted within the broader MPFR deliverables.
11. This Pre-construction Contamination Assessment (PCA) presents the outcomes of site investigations conducted during 30% CDR in the preferred siting options selected following the Site Selection Board (SSB) workshop. Investigations were conducted in two stages – Stage 1A and Stage 1B.

### B.2 Objectives

12. The objectives of the Stage 1A sampling were to:
  - a provide a preliminary assessment of the contamination status of the various building siting areas
  - b assess existing groundwater monitoring wells for serviceability for sampling during Stage 1B investigations.
13. The objectives of the Stage 1B sampling were to:
  - a supplement the data generated during Stage 1A investigations to address data gaps identified in the DCR, specifically those in relation to the siting options for buildings presented in the RRJV's 5% MPFR deliverable
  - b refine the understanding and assessment of contamination risk at each siting location, utilising both existing data and data generated by the site investigation program
  - c enable the preparation of a Pre-construction Contamination Assessment (PCA) report.

### B.3 Existing Information

14. During 5% MPFR, EMM completed a desktop review of existing documentation and data relevant to contamination. This review was documented in a Desktop Contamination Review (DCR).
15. Previous investigations indicate that the predominant contaminant of concern at BBK is PFAS in soil, groundwater and surface water. Potential issues and project risks include the following:
  - a Due to their chemical properties and dispersive behaviour in the environment, PFAS compounds may be detected in soil and laterally widespread remotely from primary PFAS sources (e.g. fire training areas). Works such as the proposed redevelopment at BBK can produce large volumes of spoil which may be impacted by low concentrations of PFAS which requires careful management.
  - b The presence of PFAS narrows the options for re-use or disposal of such spoil. Beneficial re-use on-site may be permissible subject to siting options, a rigorous risk assessment process in accordance with Defence guidance and approval by the relevant Defence technical authorities.
  - c Options of the management of high concentrations of PFAS in spoil (such as disposal or treatment/remediation) are limited and costly.
  - d Low concentrations of PFAS may also occur in other areas where data gaps exist, and spoil may be produced during construction which will require management (e.g. beneficial re-use on-site). These data gaps should be assessed during project-specific site investigations.

### B.4 Scope of Work

16. Several redevelopment scope options were developed during MPFR and CDR, with the following four options being carried through the CDR milestone:
  - a Option 1: Prioritised in Budget.
  - b Option 2: High Priority (Initial Business Case [IBC] Option 3).
  - c Option 3: Full Scope (IBC Option 4).
  - d Option 4: Minimum Level of Operational Capability (MLOC).
17. The MLOC option was developed, in consultation with Service Headquarters, to address fundamental sustainment and capability risks and define the minimum level of scope delivery required to meet the business need. As MLOC was considered by RRJV to be the scope option most likely to proceed, the Stage 1A and 1B site investigations were designed to address this option.
18. Table 1 below presents a summary of the work elements for BBK, including User Requirement Brief (URB) reference numbers.

**Table 1: Summary of proposed activities**

Stage	Description	WE	URB#	Comment
Site wide infrastructure	Site Wide Infrastructure (Electrical, Water, ICT, Wastewater, Stormwater, Fuels and Gas)	1.1-1.7	1-4, 6, 7	Partial BEAP scope At the request of the RRJV, linear works were excluded from the PCA. Existing data (where available) will be used to inform the site utility assessment when alignments are finalised.
Base wide and security	Upgrade of Base Entry Precinct and associated Security	2.11	32	WE excluded from forward scope. No investigations required
	Security Layering to meet Base Security Requirements	2.12	33	WE excluded from forward scope No investigations required
	Footpaths and Internal Access	1.9	27	Partial scope included. 5km new, 5km repair At the request of the RRJV, linear works are excluded from the PCA. Existing data (where available) will be used to inform the site utility assessment when the utility alignments are finalised
	Internal Roads	1.10	34	Partial scope included. 2km new, 5km repair At the request of the RRJV, linear works are excluded from the PCA. Existing data (where available) will be used to inform the site utility assessment when alignments are finalised.
	Demolition of Aged Buildings 0037,0071, 0072, 0073, 0074, 0075, 0076, 0077, 0078, 0091, 0101, 0102, 0103, 0104, 0105, 0106, 0107, 0108, 0112, 0114, 0115, 0116, 0117, 0118, 0119, 0121, 0122, 0139,	1.8	8	Partial scope included Will be informed by Building Inspection Reports and current historical register

Stage	Description	WE	URB#	Comment
	0144, 0148, 0158, 0163, 0164, 0165, 0167, 0168, 0182, 0196, 0302, 0303, 0311, 0312, 0313, 0314, 0318, 0332,0343, 0344, 0345, 0346, 0347, 0372, 0373, 0374, 0375, 0377, 0378, 0381, 0402			
	Demolition of Aged Buildings 0051, 0251, 0252, 0253, 0254, 0320, 0321, 0380	1.8	31	Partial scope included Will be informed by Building Inspection Reports and current historical register
LIA	Recruit Development Company LIA (The Lines)	4.1	13	MLOC
	A, B, C, and D Company LIA (The Lines)	4.2	13	In budget & MLOC
	Refurbish Transition/Rehab LIA (A0057, Digger James Platoon)	6.2	14	Excluded from forward scope No investigations required
	New Transit LIA (JNCO)	5.1	17	Excluded from forward scope No investigations required
	New Transit LIA	5.1	18	Excluded from forward scope No investigations required
Messing	New Combined OFF/SNCO Mess	5.2	19	Excluded from forward scope No investigations required
Training and working accommodation	Working Accommodation Joint Military Police Unit (JMPU)	2.3	20	

Stage	Description	WE	URB#	Comment
	Working Accommodation in the Contractors Precinct	2.4	21	
	HQ Facilities (Support HQ 1 RTB & Battalion HQ)	3.1, 3.2	10, 35	
	SEG and Enablers Service Connect Hub	2.10	40	
	Upgrade Recruit Training Facilities (Broughton Centre)	3.3	39	
	Instructor Training Facilities	6.3	24	MLOC
	Medical Training Facilities	6.4	28	MLOC
	New Weapons Ranges	7.1	11	MLOC
	Range Control Facilities	7.3	25	MLOC
	Refurb Camp Blue ablutions & new septic	7.4	38	not progressed - exclude
	Ablutions Northern Training Area	7.2	37	not progressed - exclude
Support Facilities	New Multi-Function Centre	2.1, 2.8, 2.9	9, 30, 36	In budget & MLOC
	E&IG and Enablers Service Connect Hub	2.10	40	
	EO Storage and Distribution	2.2	12	MLOC
	Q Store and Warehousing	2.5	22	MLOC

Stage	Description	WE	URB#	Comment
	Upgrade to Religious Facilities	2.6	23	MLOC
	Base Waste and Recycling Operations	2.7	26	In budget & MLOC
	Refurbish and Extend Gym	6.1	16	

19. Stage 1A sampling was conducted at BBK from 13 to 15 of September 2022 by a suitably qualified environmental consultant from EMM. Stage 1A was primarily a geotechnical investigation (undertaken and led by Aitken Rowe Testing Laboratories, ARTL), with limited soil sampling at the geotechnical bore locations and targeted surface soil sampling to inform the project's 30% Concept Design Review (CDR). The scope of work included the following:
- Appropriate field planning (site access, logistics and preparation of safety documentation). It is noted that the works were conducted under the approved project-specific Environmental Management Plan (EMP). As such, an Environmental Clearance Certificate (ECC) was not required.
  - Advancement of 8 geotechnical boreholes with collection of soil samples taken at the surface, 0.5 m below ground level (bgl), 1 m bgl and at a rate of 1 sample per meter beyond this, until termination of the borehole.
  - Collection of 15 surface soil samples.
  - Field screening of soil samples using a photoionisation detector (PID) to assess for the presence of volatile organic compounds (VOCs) in the soil samples.
  - Laboratory analysis for per- and poly-fluoroalkyl substances (PFAS), total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAHs), polychlorinated benzenes (PCB) organochlorine pesticides (OCP), heavy metals and asbestos.
  - Screening of results against the relevant guidelines.
20. Stage 1B sampling was conducted at BBK from 18 to 26 October by a suitably qualified environmental consultant from EMM. The scope of work included the following:
- Appropriate field planning (site access, logistics, update of safety documentation, site inductions and completion of the work pack). It is noted that the works were conducted under the approved project-specific EMP.
  - Separate mobilisation to site to undertake service clearance works. Clearance of all borehole locations for underground services using GIFS plans and a licensed service locator contractor.
  - Advancement of 42 boreholes with collection of soil samples taken at the surface, 0.5 m bgl, 1 m bgl and at a rate of 1 sample per meter beyond this, until termination of the borehole.



- d Collection of 32 surface soil samples.
- e Field screening of soil samples using a PID to assess for the presence of VOCs in the soil samples.
- f Laboratory analysis for PFAS, TRH, BTEXN, PAHs, PCB, OCPs, heavy metals and asbestos.
- g On receipt of the results from the analytical laboratory, leachability analysis was undertaken on selected samples to assist with preliminary waste classification and spoil management options assessment.
- h Screening of results against the relevant guidelines.

## B.5 Methodology

- 21. Environmental data was collected through the intrusive investigation. The sample collection methodology adopted for this PCA report is outlined in Section E.

## B.6 Sources of Information

- 22. The types and sources of information utilised in this PCA report are summarised in Table 2 below.

**Table 2: Source of information**

Information Type	Details
Estate planning	EMM was provided with the following: <ul style="list-style-type: none"> <li>• The Estate Base Plan (EBP), July 2019. The EBP outlines the strategic intent of the Base, the preferred layout of facilities, and potential issues, risks and opportunities for future develop. The EBP informs the extent and timing of investment at the Base.</li> <li>• Site Plan – Blamey Barracks Kapooka (cantonment only), dated May 2014.</li> </ul>
Project background and requirements	Project background: <ul style="list-style-type: none"> <li>• User Requirements Brief (URB, revision F), October 2021 for project EST02035 Kapooka Military Area Redevelopment.</li> <li>• Rapid Environmental Assessment (REA, revision D), October 2021 which includes project EST02035.</li> </ul>
Property Environmental Information	EMM was provided with the following: <ul style="list-style-type: none"> <li>• Property Environmental Profile Factsheet – Blamey Barracks, from GEMS.</li> </ul> This fed into scoping up the field programs as outlined in Section E.
Contamination Records	EMM was provided with the following: <ul style="list-style-type: none"> <li>• Contaminated Site Records (CSRs), from GEMS.</li> </ul> This fed into scoping up the field programs as outlined in Section E.
Contamination data (analytical results)	All existing data available in Defence's ESdat database were accessed and downloaded at the commencement of the desktop review (DCR phase). The existing data from Defence's Esdat database is presented in the analytical tables provided in Attachment 4.

Information Type	Details
Contamination data (spatial)	Spatial data for each CSR available in Defence's National Spatial Information Management System (NSIMS) database were accessed and downloaded at the commencement of the desktop contamination review (DCR) phase.
Existing contamination reports	EMM was provided with approximately 60 documents relating to contamination at BBK. The following were assessed as the most recent and relevant and reports for the purpose of this PCA: <ul style="list-style-type: none"> <li>• Golder (2017). Preliminary Site Investigation for PFAS Blamey Barracks, 29 September 2017.</li> <li>• AECOM (2019). Stage 1 Preliminary Site Investigation – Kapooka Military Area (0315), 20 March 2019.</li> <li>• Jacobs (2019). Blamey Barracks Comprehensive PFAS Investigation – Detailed Site Investigation, 20 September 2019.</li> <li>• AECOM (2020) Stage 2 Detailed Site Investigation Report, Blamey Barracks, Kapooka (0315), 9 April 2020.</li> </ul>

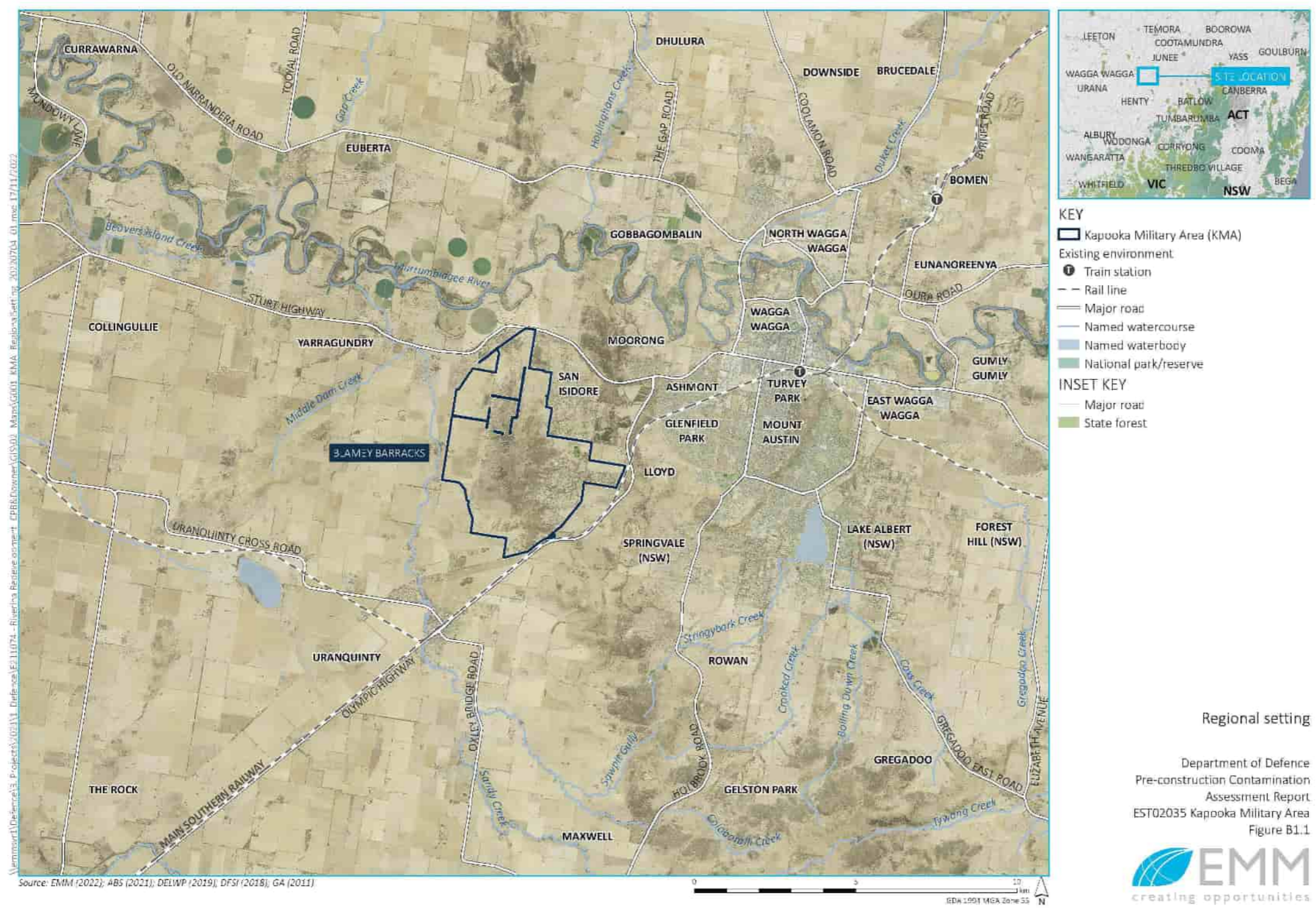
## B.7 Data Quality Objectives

- 23. To ensure that data of adequate type and reliability are collected and assessed for the Stage 1B program, the seven-step Data Quality Objective (DQO) approach, endorsed in the NSW EPA Guidelines for the NSW Site Auditor Scheme 3rd Edition (2017), was adopted. The DQOs have set quality assurance and quality control (QA/QC) parameters for the field and laboratory programs to ensure data of appropriate reliability will be used to assess the environmental conditions of the Site. The DQOs are outlined in Attachment 6.

## **C. SITE INFORMATION**

### **C.1 Site location**

24. BBK is a basic military training area encompassing an area of approximately 310 hectares (ha) situated in a rural/agricultural setting 10 km east of Wagga Wagga central business district (CBD). The Site location is shown on Figure 1 and the layout of the Site is shown on Figure 2 and an overview of the Siting Options is shown on Figure 3.






Regional setting

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 Pre-construction Contamination  
 Assessment Report  
 EST02035 Kapooka Military Area  
 Figure B1.1



Figure 1: Site location



- KEY**
-  Kapooka Military Area (KMA)
  -  Cadastral boundary
  -  Building
  -  Rail line
  -  Major road
  -  Minor road
  -  Watercourse/drainage line
  -  Waterbody

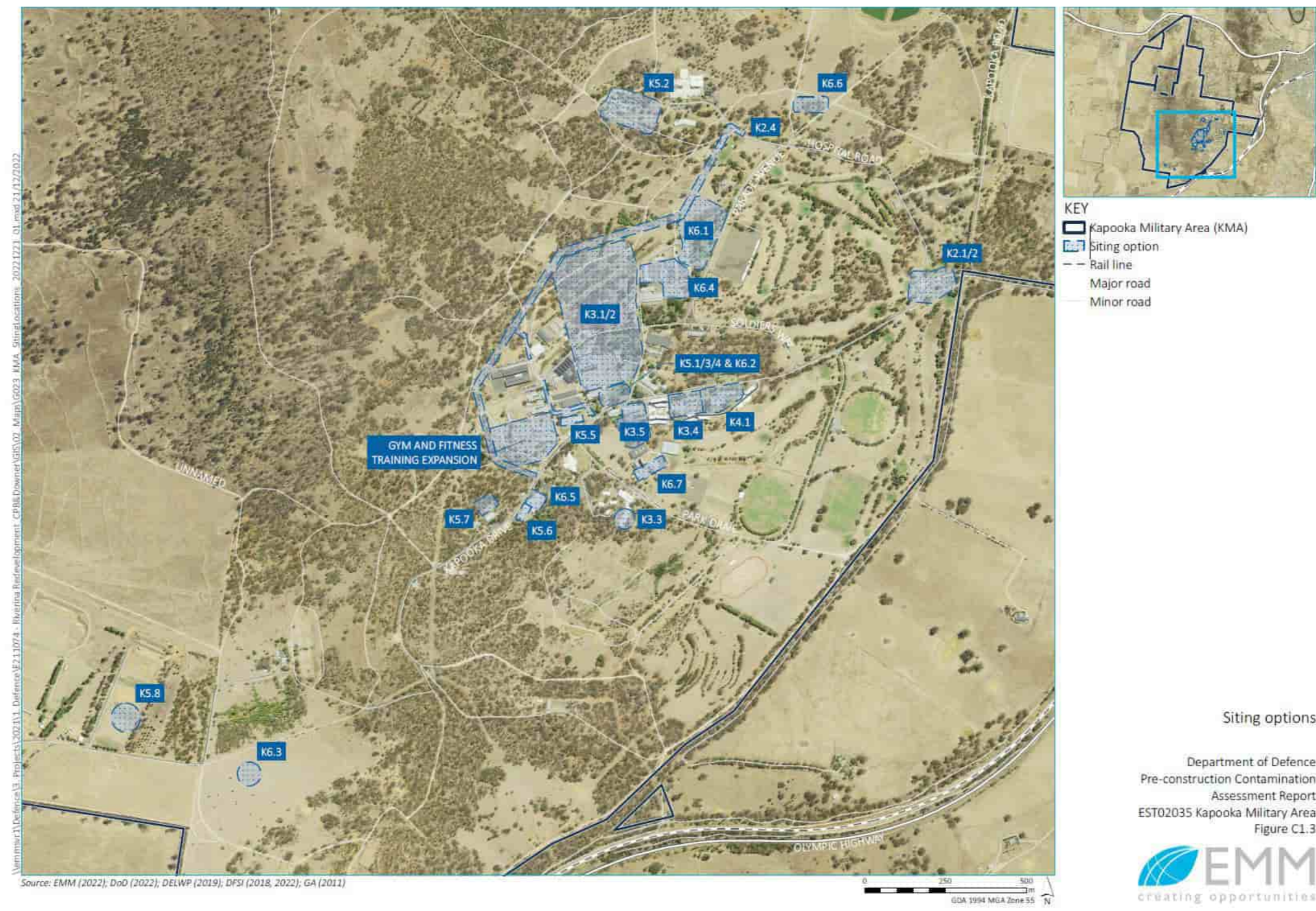
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Local setting

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 Figure C1.2



Figure 2: Site layout



Siting options

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 EST02035 Kapooka Military Area  
 Figure C1.3



Figure 3: Siting options

## C.2 Environmental settings

25. The environmental setting is summarised in Table 3.

**Table 3: Environmental setting summary – BBK (AECOM, 2020)**

Aspect	Summary
Topography	There is a north-south oriented ridgeline immediately west of the main operational area of the Property which peaks at approximately 370 metres Australian Height Datum (m AHD). The land east of the ridgeline slopes down to the east toward an un-named creek at approximately 230 m AHD and the land west of the ridgeline slopes down toward Sandy Creek, approximately 1 km west of the Property, at approximately 200 m AHD.
Geology	The 1:250,000 Wagga Wagga geological sheet (S1 55-15) shows the Property is predominantly underlain by the Palaeozoic Wagga Marginal Basin which consists of Shale, sub-Greywacke, quartzite, impure sandstone, black (carbonaceous) slate and siltstone. The western portion of the Property is underlain by Palaeozoic Granite and Cainozoic Quaternary alluvium consisting of gravel, sand, silt and clay. A portion in the south west is underlain by the Collingullie Granite which consists of unfractionated granite.
Soils	The Wagga Wagga 1:100,000 soil landscape series sheet (8327) indicates the Property includes the following soil landscape groups: Belfrayden, East Bowmen, Currawarna, Kurrajong Plain, Livingstone, Lloyd, Pulletop, Yarragundry, Becks Lane, Becks Lane variant a, Benloch variant a, Glenmornon. The soil types at the Property predominantly comprise chromosol, kandosol and sodosol soils. No naturally occurring asbestos, acid sulfate soils (ASS) or occurrences of mining subsidence is indicated within the Property.
Hydrology	<p>The Murrumbidgee River is located approximately 2.5 km north of the Property and Sandy Creek is approximately 1 km to the west. There are several ephemeral watercourses at the Property running from the ridgeline to the east and west.</p> <p>Water courses on the Property are typically mildly incised and moderately to sparsely grassed, accepting run-off from roadways and verges and from buildings. The majority of kerb and gutter stormwater infrastructure is east of the ridgeline with the western (and some southern portions) serviced by earthen swales.</p> <p>The sporting fields at the Property are irrigated with grey-water from the sewage treatment plant (STP). Grey water is pumped to a holding tank at the top of the ridgeline and gravity fed to the fields. Approximately 20 dams are present at the Property, excluding seven holding ponds (reportedly clay-lined) servicing the STP.</p> <p>Contour banks are present at portions of the Property, for erosion and sediment control.</p> <p>The Hydrogeology Map of Australia identified two aquifers at and within 2,000 m of the Property:</p> <ul style="list-style-type: none"> <li>• fractured or fissured, extensive aquifers of low to moderate productivity; and</li> <li>• porous, extensive highly productive aquifers.</li> </ul>
Hydrogeology	Groundwater is likely to be restricted to fractures within the metasediments and granite, with some groundwater also likely to occur in the weathered material and colluvium in the lower slope areas, above the fractured rock. Perched groundwater is likely to be present in the vicinity of the STP. Perched and shallow groundwater flow is expected to be consistent with the topography of the Property.
Climate	Based on the information available from the Bureau of Meteorology (BOM) (Wagga Wagga Station ID 074272), the region experiences hot, dry summers and cold winters, with an average maximum temperature in the summer (January) of 33.1°C and an average minimum temperature in winter (July) of 2.3°C. The region experiences an annual average rainfall of 558.3 millimetres (mm). On average, June experiences the highest rainfall of 58.9 mm, whereas December experiences the lowest of 37.5 mm.
Historical Activities	The 1st Recruit Training Battalion (1RTB) was established at Kapooka in November 1951. Prior to this, the land was used for agricultural purposes comprising wheat growing and sheep farming (AECOM, 2019).

Aspect	Summary
Historical Data	All existing data available in Defence's ESdat database were accessed and downloaded at the commencement of the desktop contamination review (DCR) phase.
Surrounding Land Use	<p>North: Residential suburb of San Isidore</p> <p>East: Farmland and Kapooka Village</p> <p>South: Farmland and residential area of Uranquinty</p> <p>West: Farmland</p>

## D. REGULATORY AND POLICY FRAMEWORK

### D.1 Defence environmental management framework

#### D.1.1 Environmental policy and strategic aims

26. The Defence Environmental Vision is provided in the Environmental Policy and states that: *“Defence will be a leader in sustainable environmental management to support the ADF capability to defend Australia and its national interests”*.
27. The Vision is underpinned by five strategic aims, including Strategic Aim 3 which states that *“Defence will minimise future pollution risks and manage existing contamination risks”*, as detailed in the Defence Environmental Strategy 2016-2036 (Defence 2016). The priorities of Strategic Aim 3 are to:
- minimise future pollution and contamination risks both in Australia and overseas operations
  - understand emerging contamination risks and advances in remediation and management approaches
  - apply a risk-based approach to managing contaminated sites, including unexploded ordnance, to reduce impacts on human health and the natural environment and maintain public access to key information about these risks
  - manage contaminated sites and potential pollutants in accordance with relevant legislative obligations and standards.
28. The actions, accountabilities and timeframes to achieve these priorities are provided in the Defence Environmental Plan.

#### D.1.2 Contamination guidelines

##### D.1.2.1 Defence Contamination Management Manual (Defence 2021a)

29. The Defence Contamination Management Manual (DCMM, Defence 2021a) provides the framework for both Defence personnel and contractors where Defence activities (e.g. redevelopment works) may interface with contamination present on the Defence estate. The DCMM includes several technical guidance documents in a series of annexures (A to L) which relate to specific Defence activities and contamination management issues (e.g. Fire Training Grounds and Data Management).
30. The DCMM sits beneath the Defence Environment and Heritage Manual (EHM) and supports compliance with broader Defence policies and regulatory obligations.

##### D.1.2.2 Defence Pfas Construction and Maintenance Framework (Defence 2021b)

31. Defence has developed a guidance document to inform the management of PFAS-impacted soils encountered during construction and maintenance activities (Defence 2021b). The guidance provides four soil classes with management options based on the potential risk of PFAS concentrations, and the soil management category definitions are listed in Table 4.

Table 4: Defence PFAS soil contamination categories

Category	Guideline	Risk and management options
Category 4	Excavated soils with PFOS + PFHxS concentrations less than 0.01 mg/kg.	<b>Acceptable risk → reuse on site or on base without assessment or mitigation</b> unless a previous site assessment suggests otherwise.
Category 3	Excavated soils with PFOS + PFHxS concentrations less than 1 mg/kg but greater than 0.01 mg/1.	<b>Moderate risk → reuse with assessment and mitigation.</b> Category 3 soil can be reused within the works site with no additional mitigation procedures or on-Base (subject to Base approvals) if the risk to human health or the environment is not increased or otherwise results in unacceptable risk. Some mitigation may be required if potential pathways exist and there are potential high sensitivity receptors.
Category 2	Excavated soils with PFOS + PFHxS concentrations less than 20 mg/kg but greater than 1 mg/kg <sup>2</sup> .	<b>High risk → contain and manage.</b> Category 2 soil can be reused within the works site provided that exposure to receptors, and water more generally is minimised. If reuse is not appropriate on the works site, then an assessment of risk should be undertaken to evaluate the following options: off-base disposal to landfill, or on-base encapsulation, containment, treatment and/or destruction. Mitigation will be required if receptors are potentially to be exposed to contaminants.
Category 1	Excavated soils with PFOS + PFHxS concentrations of 20 mg/kg <sup>3</sup> or more.	<b>Unacceptable risk → destroy.</b> Category 1 soil is to be excavated and treated or temporarily stockpiled for later treatment in accordance with the PFAS Engineered Stockpile Facility Performance Specification. The stockpile should be designed for whole of life cycle and constructed to limit infiltration of precipitation, surface water and groundwater into the PFAS contaminated materials.

### D.2 Commonwealth legislation

32. The key legislation relevant to this PCA is the National Environment Protection (Assessment of Contamination) Measure (ASC NEPM, 1999 as amended 2013).
33. NEPMs are developed by the National Environment Protection Council (NEPC) to protect or manage particular factors of the environment. NEPMs are made under the Commonwealth *National Environment Protection Council Act (1994)* (NEPC Act) and the *National Environmental Protection Measures (Implementation) Act 1998* (the Implementation Act), which gives the Commonwealth the ability to implement NEPMs on its own land and for its own activities.
34. NEPMs establish a nationally consistent approach to environmental management. Specifically, the ASC NEPM provides a national, risk-based approach to the investigation, risk assessment, remediation and management of contamination.

### D.3 Technical guidance documents

35. The PCA has been completed in general accordance with the relevant requirements of:
- a ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.
  - b Heads of EPAs Australia and New Zealand (HEPA), 2020, PFAS National Environmental Management Plan (NEMP v2.0), January 2020.
  - c Guidelines for the NSW Site Auditor Scheme (3<sup>rd</sup> edition, 2017).
  - d NSW EPA Waste Classification Guidelines (2014). National Health and Medical Research Council & Agriculture and Resource Management Council of Australia and New Zealand, Australian Drinking Water Guidelines, 2022.
  - e National Health and Medical Research Council, Guidelines for Managing Risks in Recreational Waters, 2008.
  - f AS4482.1:2005 Guide to the Investigation and Sampling of sites with Potentially Contaminated Soil. Part 1: Non-volatile and Semi-Volatile Compounds.
  - g AS4482.2:1999 Guide to the sampling and investigation of potentially contaminated soil. Part 2: Volatile substances.



## E. FIELD INVESTIGATION

### E.1 Soil Investigation

#### E.1.1 Rationale

36. The soil investigation program was developed to characterise CoPC within the proposed building footprints to:
- a refine the understanding and assessment of contamination risk at each siting location
  - b provide initial waste classification of soils where off-Base disposal or other management actions of contaminated material may be required.
37. A Sample and Analysis Quality Plan (SAQP) was prepared (EMM, 2022) which details the soil investigation rationale for all investigation locations.
38. Soil investigation locations are illustrated on Figures 1.1 to 1.10 (Attachment 1).

#### E.1.2 Deviations from the SAQP

39. Table 5 describes deviations if present, from the Sampling and Analysis Quality Plan (SAQP) (EMM, 2022).

**Table 5: Deviations from the SAQP**

Work Element	Deviation
4.1 and 4.2: A, B, C, and D Company LIA (The Lines)	BH24 location was divided into two surface soil locations due to the inability locate the previous cleared and marked out area. The two locations are identified as BH24_A_0.1 and BH24_B_0.1.
7.1 New MTR Range	BH84 was moved 2 m south to avoid potential water services.
7.1 New MTR Range	BH83 was moved 2 m north to avoid potential communications services.
7.1 New MTR Range	BH72, BH74, BH76 and BH82 were all moved 2 m east to avoid potential communications services

#### E.1.3 Service location and clearance

40. All borehole locations were cleared for subsurface utilities as follows:
- a Plans of underground utilities were compared against the current supplied Geographical Forecasting Information System (GFIS) spatial data, requested from the Dial Before You Dig (DBYD) service and relevant utility representatives were contacted to confirm proposed sample points were clear of subsurface utilities. All plans were reviewed by EMM prior to the commencement of service location clearance. Any borehole locations potentially located in the vicinity of identified underground services were changed at this time.
  - b All sampling points were located following consultation with Base personnel and previously obtained GFIS utility maps. All sample locations were marked on the ground with spray paint. All locations were measured from nearby building reference points.

- c Each sampling location was cleared using an accredited underground services location contractor.
- d Each location was cleared using non-destructive drilling (NDD) techniques (hand auger) to a target depth of up to 1.5 m bgl prior to mechanical drilling by a competent subcontractor (Star Drilling and Matrix Drilling).

#### E.1.4 Intrusive work

##### E.1.4.1 Excavation and sampling methods

41. Star Drilling and Matrix Drilling were engaged to carry out the mechanical drilling scope. Drilling techniques consisted of push tube methods. Soil was collected in disposable plastic liners and representative soil samples were transferred from liners into laboratory supplied sampling containers by nitrile-gloved hand. Samples were collected based on their location, distribution within the soil/fill profile and the target depth for each specific work element.
42. Borehole locations were reinstated with soil cuttings that had been drilled out from that location. All boreholes were reinstated to original surface level and condition.
43. All soil samples were placed in laboratory prepared sampling containers using single use disposable nitrile gloves. Field duplicate (intra laboratory) and triplicate (inter laboratory) samples were prepared in the field by splitting soil samples.
44. To minimise the loss of volatiles, samples were not mixed or homogenised during collection or splitting and jars were filled to minimise the amount of headspace where sample recovery allowed.
45. Samples for asbestos analysis were also collected in a plastic zip-lock bag. No re-usable sampling equipment was used between locations.

##### E.1.4.2 Field screening

46. At each sample depth, additional soil was screened for head space vapours and the presence of VOCs, using a calibrated PID. The headspace reading was taken at ambient temperature and was recorded on the borelogs provided in Attachment 2.
47. The PID was calibrated with isobutylene gas at 100 parts per million (ppm) at the commencement of each day of sampling and, if necessary, during the day in accordance with the procedure provided by the supplier. Calibration records are provided in Attachment 3.

##### E.1.4.3 Field logging

48. Lithology descriptions were recorded on EMM's electronic field sheets for uniformity in descriptions, presentation and to aid in any future interpretations based on lithological data. Borelogs are provided in Attachment 2.
49. Observations of contamination (if any) were recorded on the borelogs at the depth intervals encountered. The field identification of contamination consisted primarily of visual and olfactory indicators (e.g. inclusions of demolition waste, materials potentially containing asbestos, staining and odour). Additionally, a PID was used to screen for the presence of VOCs (see above) and these readings are recorded on the borelogs.

50. Any unusually coloured or textured material, residues or staining was recorded on the borehole logs for each investigation location, if present. Likewise, any unusual odours were recorded and the character of the odour (e.g. sweet, solvent-like, hydrocarbon-like).

### E.1.5 Soil sample analysis

51. Analysis of the samples collected during the investigation works was conducted by Envirolab Service Pty Ltd (Envirolab) and secondary analysis of duplicate samples by ALS Environmental Pty Ltd (ALS). The laboratories were National Association of Testing Authorities (NATA) accredited and registered for the analyses proposed. Laboratory reports are presented in Attachment 5.
52. Generally, two samples from each location were selected for analysis. Soil analytical tables are presented in Attachment 4 and summarised in Section G.
53. Based on field observations, soil samples were analysed for the following in accordance with the SAQP (EMM, 2022):
- a PFAS (75 to 100% of samples, depending on the siting option).
  - b heavy metals (30 to 50% of samples, depending on the siting option).
  - c TRH (30 to 50% of samples, depending on the siting option).
  - d BTEXN (30 to 50% of samples, depending on the siting option).
  - e PAHs (30 to 50% of samples, depending on the siting option).
  - f PCBs (10% to 20% of sample, depending on the siting option).
  - g OCP (10% to 20% of samples, depending on the siting option).
  - h asbestos (presence/absences) (30% of samples).
54. In addition, 20 samples from were analysed for PFAS leachability to assist in informing the potential constraints in relation to soil management during development.

## E.2 Groundwater Investigation

55. The groundwater investigation program was developed to characterise groundwater CoPC where groundwater may be intersected in areas requiring deeper excavations.
56. The SAQP (EMM, 2022) detail the groundwater investigation rationale for all investigation locations.
57. In accordance with the SAQP (EMM, 2022), groundwater samples were only collected if the standing water level (SWL) was measured to be <5 m bgl.

### E.2.1 Groundwater monitoring wells standing water level measurement

58. The measurement of SWL in all groundwater monitoring bores was conducted using an oil-water interface probe prior to sampling of the groundwater monitoring wells to assess the presence/absence of light non-aqueous phase liquid (LNAPL).
59. All measuring instruments (probe and surface of the tape) were decontaminated between groundwater monitoring wells as outlined in Section E.3.3.
60. All measurements were taken from the top of the inner uPVC casing, at the same point.

### E.2.2 Groundwater sample collection

61. Due to the absence of shallow groundwater, groundwater sampling was not required.

## E.3 Field quality protocols

### E.3.1 Sample labelling, preservation, storage and transport

62. All samples were clearly labelled with unique sample identification numbers consisting of the date, sample location, depth of sample and samplers' initials, in accordance with the Defence Contaminant Management Manual (DCMM) – Annex L Data Management (2019).
63. In the case of field duplicates and triplicates, sample containers were labelled to not reveal their purpose or sample location to the laboratory. All samples were kept chilled in an ice-filled esky prior to dispatch to the NATA accredited laboratory under chain of custody (CoC) procedures.

### E.3.2 Chain of custody protocols

64. Samples collected in the field were traceable from the time of collection until the analytical laboratory receives them. To maintain and document sample possession, chain of custody (CoC) procedures were followed. CoC documentation can be found in Attachment 5.
65. CoC records accompanied samples at all times once the samples were collected by the receiving laboratory. When transferring possession of the samples, the individuals relinquishing and receiving the samples signed, dated and noted the time of transfer on the CoC record.
66. The field staff, prior to dispatch to the laboratory, reviewed all CoC. The laboratory was contacted to return (by email) appropriately signed CoC records to confirm sample delivery.

### E.3.3 Decontamination of field equipment

67. Decontamination of field equipment was performed to eliminate the possibility of cross-contamination from previous jobs or between sampling locations. In general, decontamination consisted of a non-phosphate detergent solution (Liquinox) wash followed by a deionised/potable/demineralised water rinse.
68. The decontamination procedures were performed before initial use of any equipment at a location and after each subsequent use.
69. Decontamination procedures utilised during drilling, sampling and using monitoring equipment are as follows:
- a the hand auger was decontaminated between each sampling location
  - b a new pair of nitrile gloves were used to collect each soil sample which was place into laboratory supplied sample containers.

## F. ASSESSMENT CRITERIA

### F.1 Site context

70. In accordance with the data quality objectives (DQOs) outlined in Attachment 6, assessment criteria have been selected based on the following PCA objectives:
- a refine the understanding and assessment of contamination risk at each building siting
  - b to inform any potential remediation and/or management strategies, if required.
71. In the context of the current and proposed redevelopment works at the sites, the land-uses are:
- a commercial/industrial
  - b recreational/open space
  - c low density residential.

### F.2 Soil investigation criteria

72. The proposed work elements at the sites have mixed current and proposed future land uses. The adopted screening criteria for each work element are therefore derived based on the proposed redevelopment works and the potential human health and ecological exposure scenarios. The adopted land uses are described below and are listed in Table 6 for all adopted soil assessment criteria (SAC).
- a K2.1 Entry Precinct Upgrades: has a current and proposed land use which meets the commercial/industrial and public open space definition.
  - b K3.1 Recruit Development Company LIA: has a current and proposed land use which meets the low density residential and public open space definition.
  - c K3.2 New/Refurb 'Lines' (A, B, C and D Companies): has a current and proposed land use which meets the low density residential and public open space definition.
  - d K3.5 New Transit LIA: has a current and proposed land use which meets the low density residential and public open space definition.
  - e K5.2 Working Accommodation in Contractors Precinct: has a current and proposed land use which meets the low density residential and public open space definition.
  - f K5.3 HQ Facilities: has a current and proposed land use which meets the commercial/industrial definition.
  - g K5.7 Medical Training Facilities: has a current and proposed land use which meets the commercial/industrial definition.
  - h K5.8 New Weapons Ranges (300m Range): has a current and proposed land use which meets the commercial/industrial definition.
  - i K6.1 New Multi-Function Centre: has a current and proposed land use which meets the commercial/industrial definition.
  - j K6.3 EO Storage and Distribution: has a current and proposed land use which meets the commercial/industrial definition.
  - k K6.4 Q Store and Warehousing: has a current and proposed land use which meets the commercial/industrial definition.

- l Gym and Fitness Training Expansion has a current and proposed land use which meets the public open space and commercial/industrial definition.

**Table 6: Soil assessment criteria**

Guideline	Level adopted	CoPC
<b>Ecological and human health SAC</b>		
ASC NEPM	Dependent on the proposed land use of each siting option: Health investigation level (HIL) A (low density residential) HIL C (public open space) HIL D (commercial/industrial)	Metals, PAHs, phenols, OCPs, PCBs
ASC NEPM	Dependent on the proposed land use of each siting option: Health Screening Level (HSL) A and B (low-high density residential) HSL C (recreation/open space) HSL D (commercial/industrial)	TRH, BTEXN
Friebel, E. and Nadebaum, P. (2011)	Intrusive Maintenance Worker HSL 0 to 2 m	TRH, BTEX, naphthalene
ASC NEPM	Dependent on the proposed land use of each siting option: Ecological investigation level (EIL) – 'urban residential and public open space' EIL - 'commercial and industrial'	Arsenic, naphthalene
ASC NEPM	Dependent on the proposed land use of each siting option: Ecological screening level (ESL) – 'urban residential and public open space' ESL – 'commercial and industrial'	TRH, BTEX and B(a)P
ASC NEPM	Dependent on the proposed land use of each siting option: Management Limits – residential, parkland and public open space– coarse textured soils Management Limits – commercial and industrial– coarse textured soils	TRH
PFAS NEMP (2020)	Dependent on proposed land use of each siting option: HIL A (residential with accessible soil) HIL C (public open space) HIL D (commercial/industrial)	PFAS
PFAS NEMP (2020)	Ecological indirect exposure	PFAS

Guideline	Level adopted	CoPC
<b>Material/ waste classification SAC</b>		
Defence PFAS Construction and Maintenance Framework (2021)	Provides screening levels for PFAS compounds that categorise a material's suitability for reuse on site.	PFAS
PFAS NEMP (2020)	Landfill Acceptance Criteria	PFAS
NSW EPA (2014) Waste Classification Guidelines	To inform off-site disposal options for any excess spoil generated as required	All

## G. FIELD OBSERVATIONS AND ANALYTICAL RESULTS

73. The observations made in the field and the analytical results for the soil and groundwater sampling conducted in each of the proposed siting options are presented in Sections G.1 to G.12.
74. Stage 1A and Stage 1B soil analytical results for all work elements combined are provided in Table 4.1 and the soil leachate results are provided in Table 4.2 (refer to Attachment 4). Figures showing soil and groundwater sampling locations are shown in Figures 1.1 to 1.10 (refer to Attachment 1). Field sheets are provided in Attachment 8 and location photographs are provided in Attachment 9.

### G.1 WE 2.11 Entry Precinct upgrades

75. It is noted that sampling was undertaken in this area during Stage 1A only, as it was removed from Stage 1B scope prior to field program.

#### G.1.1 Field observations

76. One geotechnical soil bore (0315\_BH-01) was advanced to 5 m bgl.
77. Three surface soil samples (0315\_SS01, 0315\_SS02 and 0315\_SS03) were collected from the top 0.1 m of exposed soil.
78. No ACM, staining or odours were reported for any location.
79. PID measurements of VOCs ranged from 0.1 to 6.0 ppm (0315\_SS02).
80. No anthropogenic inclusions were observed.
81. A general description of the soil encountered is provided below in Table 7.

**Table 7: WE 2.11 Entry precinct upgrades: general soil descriptions**

Depth (m bgl)	PID Measurement (ppm)	Description
0-0.1	3.0 - 6.0	Sandy SILT (FILL); low to medium plasticity, brown, fine to medium grain sand, trace organics (roots), dry to moist, soft, no odour or staining.
0.1 - 5	0.1 - 4.2	Silty CLAY; medium plasticity, brown with orange mottling, dry to wet, soft to firm, no odour or staining.

82. Detailed descriptions of the soil profile at each location are provided in the bore logs provided in Attachment 2.
83. Groundwater field sheets are provided in Attachment 8 and summarised below.

**Table 8: WE 2.11 Entry precinct upgrades: groundwater monitoring well gauging**

Well ID	Flush Mounted /Stick up	Total well depth (m bgl)	Stabilised water depth (m bgl)	Monitoring well comments
0315_MW002	Stick up	9.64	7.94	Monitoring well in good condition. PID reading at well head was 0.0 ppm. The stick up monitoring well was measured to be 0.75 m. The total well depth and stabilised water depth have been converted to m bgl.
0315_MW003	-	-	-	Monitoring well cap damaged and could not be opened. Monitoring well not gauged.

84. As no shallow groundwater conditions (<5 m bgl) were encountered, groundwater samples were not collected.

#### G.1.2 Soil analytical results

85. Soil analytical results are presented in Table 4.1 and Table 4.2 (refer to Attachment 4) and are summarised below:
- Five primary samples were collected and analysed.
  - PFAS was detected in three of the four soil samples analysed (75%).
  - Total PFAS concentrations have a range of < LOR to 0.0053 mg/kg; The PFAS concentrations are within the same order of magnitude as historical data collected within this area.
  - No sample exceeded the PFAS concentrations outlined in the Defence PFAS Construction and Maintenance Framework (2021 for Category 4 soil criteria (0%).
  - Exceedances of the adopted SAC were not reported.
  - BTEXN, PAHs, asbestos, OCPs and PCBs were not detected above the laboratory limit of reporting (LOR).
  - TRH and metals were reported above the LOR but below the SAC.
86. With respect to the relevant waste classification assessment criteria:
- All sample concentrations were reported below the NSW EPA Waste Classification guidelines contaminant threshold criteria. All locations reported concentrations below the CT1 criteria, indicating **general solid waste**, this being the lowest level of waste classification.
  - All PFAS concentrations are below PFAS NEMP (2020) **unlined landfill** criteria.
87. Given the low contaminant concentrations reported in soils (i.e. general solid waste) and the overall suitability of the soils sampled for on-site re-use, leachate analysis was not undertaken.

## G.2 WE 4.1 Recruit Development Company LIA

88. It is noted that sampling was undertaken in this area during Stage 1A only as it was removed from Stage 1B scope prior to field program.

### G.2.1 Field observations

89. Two surface soil samples (0315\_SS04 and 0315\_SS05) were collected from the top 0.1 m of exposed soil.

90. No ACM, staining or odours were reported for any location.

91. PID measurements of VOCs ranged from 1.3 to 3.4 ppm (0315\_SS05).

92. No anthropogenic inclusions were observed.

93. A general description of the soil encountered in the proposed disturbance area is provided below in Table 9.

**Table 9: WE 4.1 Recruit Development Company LIA: general soil descriptions**

Depth (m bgl)	PID Measurement (ppm)	Description
0.0 – 0.1	1.3 - 3.4	FILL: sandy SILT, low plasticity, brown, fine to medium grained sand, trace gravel (<5mm), moist, soft, no odour or staining

94. Detailed descriptions of the soil profile at each location are provided in the bore logs provided in Attachment 2.

95. No groundwater monitoring was mapped or observed in this area.

### G.2.2 Soil analytical results

96. Soil analytical results are presented in Table 4.1 and Table 4.2 (refer to Attachment 4) and are summarised below:

- a Two primary samples were collected. No existing analytical data from this area were available for review.
- b PFAS was detected in two of the two soil samples analysed (100%).
- c Total PFAS concentrations have a range of 0.0006 mg/kg to 0.001 mg/kg.
- d No sample exceeded the PFAS concentrations outlined in the Defence PFAS Construction and Maintenance Framework (2021 for Category 4 soil criteria (0%).
- e Exceedances of the adopted SAC were not reported.
- f TRH, BTEXN, PAHs, asbestos, OCPs and PCBs were not detected above the LOR.
- g Metals were reported above the LOR but below the SAC.

97. With respect to the relevant waste classification assessment criteria:

- a All sample concentrations were reported below the NSW EPA Waste Classification guidelines contaminant threshold criteria. All locations reported concentrations below

the CT1 criteria, indicating **general solid waste**, this being the lowest level of waste classification.

- b All PFAS concentrations are below PFAS NEMP (2020) **unlined landfill** criteria.

98. Given the low contaminant concentrations reported in soils (ie general solid waste) and the overall suitability of the soils sampled for on-site re-use, leachate analysis was not undertaken.

## G.3 WE 4.1 Recruit ‘Lines’ (A, B, C and D Companies)

### G.3.1 Field observations

99. Two geotechnical bores (0315\_BH-07 and 0315\_BH-08) were advanced to between 3.5 and 6.5 m bgl.

100. Twenty soil bores (0315\_BH01 – 0315\_BH11, 0315\_BH13, 0315\_BH16 – 0315\_BH21, 0315\_BH23, 0315\_BH25) were advanced to between 0.5 and 2.0 m bgl.

101. Nine surface soil samples (0315\_SS06 – 0315\_SS09, 0315\_BH24A, 0315\_BH24B, 0315\_SS30 and 0315\_SS31) were collected from the top 0.1 m of exposed soil.

102. No ACM, staining or odours were reported for any location.

103. PID measurements of VOCs ranged from 0.3 to 5.9 ppm (0315\_BH11).

104. No anthropogenic inclusions were observed.

105. A general description of the soil encountered in the proposed disturbance area for the is provided below in Table 10.

**Table 10: WE 4.1 New/Refurb ‘Lines’ (A, B, C and D Companies): general soil descriptions**

Depth (m bgl)	PID Measurement (ppm)	Description
0.0 – 0.1	0.5 – 5.9	Silty SAND, fine to medium, brown, trace gravel (<5mm), dry to moist, loose to medium dense, no odour or staining
0.1 – 5.0	0.2 – 5.9	Sandy SILT, low plasticity, brown to red-brown, fine to medium sand, dry to moist, soft to firm, no odour or staining
5.0 – 6.0	0.2	Clayey SILT, low plasticity, brown, dry to moist, soft to firm, no odour or staining

106. Detailed descriptions of the soil profile at each location are provided in the bore logs provided in Attachment 2.

107. No existing groundwater monitoring was mapped or observed in this area.

### G.3.2 Soil analytical results

108. Soil analytical results are presented in Table 4.1 and Table 4.2 (refer to Attachment 4) and are summarised below:

- a 83 primary samples were collected. No existing analytical data from this siting was available for review.

- b PFAS was detected in 24 of the 60 soil samples analysed (40%).
  - c Total PFAS concentrations have a range of 0.0006 mg/kg to 0.0045 mg/kg.
  - d No sample exceeded the PFAS concentrations outlined in the Defence PFAS Construction and Maintenance Framework (2021 for Category 4 soil criteria (0%).
  - e Exceedances of the adopted SAC were not reported. It is noted that one surface soil sample (0315\_SS31) exceeded the ecological SAC for TRH fraction >C16-C34. Silica gel clean-up was conducted on this sample which is a laboratory technique that removes non petroleum based hydrocarbons from the sample. The silica gel clean results were <LOR and therefore <SAC.
  - f Exceedances of the adopted SAC are detailed in Attachment 4.
  - g Asbestos, BTEXN, PCBs and OCP were not detected above the LOR in all samples.
  - h Metals were reported above the LOR but below the SAC.
109. With respect to the relevant waste classification assessment criteria:
- a All sample concentrations were reported below the NSW EPA Waste Classification guidelines contaminant threshold criteria. All locations reported concentrations below the CT1 criteria, indicating **general solid waste**, this being the lowest level of waste classification.
  - b All PFAS concentrations are below PFAS NEMP (2020) **unlined landfill** criteria.
110. Given the low contaminant concentrations reported in soils (i.e. general solid waste) and the overall suitability of the soils sampled for on-site re-use, leachate analysis was not undertaken.

## G.4 WE 5.2 New Transit LIA

111. It is noted that sampling was undertaken at this siting option during Stage 1A only. This Siting Option removed from Stage 1B scope prior to field program.

### G.4.1 Field observations

112. One geotechnical soil bore (0315\_BH-02) was advanced to 0.6 m bgl.
113. Three surface soil samples (0315\_SS14 – 0315\_SS16) were collected from the top 0.1 m of exposed soil.
114. No ACM, staining or odours were reported for any location.
115. PID measurements of VOCs ranged from 1.7 to 5.4 ppm (BH-02).
116. No anthropogenic inclusions were observed.
117. A general description of the soil encountered in the proposed disturbance area is provided below in Table 11.

**Table 11: WE 5.2 New Transit LIA: general soil descriptions**

Depth (m bgl)	PID Measurement (ppm)	Description
0.0 – 0.5	2.6 – 5.4	FILL: silty SAND, yellow to brown, orange mottling, trace gravel (<5mm), moist, loose to medium dense, no odour or staining

118. Detailed descriptions of the soil profile at each location are provided in the bore logs provided in Attachment 2.
119. No groundwater monitoring was mapped or observed in this area.

### G.4.2 Soil analytical results

120. Soil analytical results are presented in Table 4.1 and Table 4.2 (refer to Attachment 4) and are summarised below:
- a Five primary samples were collected. No existing analytical data from this siting was available for review.
  - b PFAS was detected in two of the three soil samples analysed (~67%).
  - c Total PFAS concentrations have a range of <0.0001 mg/kg to 0.0011 mg/kg.
  - d No sample exceeded the PFAS concentrations outlined in the Defence PFAS Construction and Maintenance Framework (2021 for Category 4 soil criteria (0%).
  - e Exceedances of the adopted SAC were not reported.
  - f Asbestos, TRH, BTEXN, PCBs and OCP were not detected above the LOR in all samples.
  - g Metals were reported above the LOR but below the SAC.
121. With respect to the relevant waste classification assessment criteria:
- a All sample concentrations were reported below the NSW EPA Waste Classification guidelines contaminant threshold criteria. All locations reported concentrations below the CT1 criteria, indicating **general solid waste**, this being the lowest level of waste classification.
  - b All PFAS concentrations are below PFAS NEMP (2020) **unlined landfill** criteria.
122. Given the low contaminant concentrations reported in soils (i.e. general solid waste) and the overall suitability of the soils sampled for on-site re-use, leachate analysis was not undertaken.
- ## G.5 WE 2.4 Working Accommodation in Contractors Precinct
123. It is noted that sampling was undertaken at this siting option during Stage 1A only. This Siting Option removed from Stage 1B scope prior to field program.

### G.5.1 Field observations

- 124. One geotechnical soil bore (BH-05) was advanced to 3.9 m bgl.
- 125. No ACM, staining or odours were reported for any location.
- 126. PID measurements of VOCs ranged from 0.3 to 6.4 ppm (BH-05).
- 127. No anthropogenic inclusions were observed.
- 128. A general description of the soil encountered in the proposed disturbance area is provided below in Table 12.

**Table 12: WE 2.4 Working Accommodation in Contractors Precinct: general soil descriptions**

Depth (m bgl)	PID Measurement (ppm)	Description
0.0 – 3.9	0.3 – 6.4	FILL: silty SAND, fine to coarse, brown to orange-brown, minor gravel (<10mm), dry, loose to medium dense, no odour or staining

- 129. Detailed descriptions of the soil profile at each location are provided in the bore logs provided in Attachment 2.
- 130. No groundwater monitoring was mapped or observed in this area.

### G.5.2 Soil analytical results

- 131. Soil analytical results are presented in Table 4.1 and Table 4.2 (refer to Attachment 4) and are summarised below:
  - a Four primary samples were collected. No existing analytical data from this siting was available for review.
  - b PFAS was not detected in the four soil samples analysed (0%).
  - c Exceedances of the adopted SAC were not reported.
  - d Asbestos, TRH, BTEXN, PCBs and OCP were not detected above the LOR in all samples.
  - e Metals were reported above the LOR but below the SAC.
- 132. With respect to the relevant waste classification assessment criteria:
  - a All sample concentrations were reported below the NSW EPA Waste Classification guidelines contaminant threshold criteria. All locations reported concentrations below the CT1 criteria, indicating **general solid waste**, this being the lowest level of waste classification.
  - b All PFAS concentrations are below PFAS NEMP (2020) **unlined landfill** criteria.
- 133. Given the low contaminant concentrations reported in soils (ie general solid waste) and the overall suitability of the soils sampled for on-site re-use, leachate analysis was not undertaken.

### G.6 WE 3.1 & 3.2 HQ Facilities

- 134. It is noted that sampling was undertaken at this siting option during Stage 1A only. This Siting Option removed from Stage 1B scope prior to field program.

#### G.6.1 Field observations

- 135. One geotechnical bore (0315\_BH-09) was advanced to 0.8 m bgl.
- 136. Three surface soil samples (SS11 – SS13) were collected from the top 0.1 m of exposed soil.
- 137. No ACM, staining or odours were reported for any location.
- 138. PID measurements of VOCs ranged from 2.5 to 4.8 ppm (0315\_SS13).
- 139. No anthropogenic inclusions were observed.
- 140. A general description of the soil encountered in the proposed disturbance area is provided below in Table 13.

**Table 13: WE 3.1 & WE 3.2 HQ Facilities: general soil descriptions**

Depth (m bgl)	PID Measurement (ppm)	Description
0.0 – 0.1	2.5 – 4.8	FILL: silty SAND, fine to coarse, brown, trace organics (roots), dry to moist, loose to medium dense, no odour or staining

- 141. Detailed descriptions of the soil profile at each location are provided in the bore logs provided in Attachment 2.
- 142. No groundwater monitoring was mapped or observed in this area.

#### G.6.2 Soil analytical results

- 143. Soil analytical results are presented in Table 4.1 and Table 4.2 (refer to Attachment 4) and are summarised below:
  - a Three primary samples were collected. No existing analytical data from this siting was available for review.
  - b PFAS was detected in four of the five soil samples analysed (80%).
  - c Total PFAS concentrations have a range of .0001 mg/kg to 0.0015 mg/kg.
  - d Sum of PFHxS and PFOS concentrations exceeded the lower threshold (namely, the LOR) for Defence PFAS Construction and Maintenance Framework (2019) Category 4 soil criteria in four samples (100%).
  - e Exceedances of the adopted SAC were not reported.
  - f Asbestos, TRH, BTEXN, PCBs and OCP were not detected above the LOR in all samples.
  - g Metals were reported above the LOR but below the SAC.



144. With respect to the relevant waste classification assessment criteria:
- a All sample concentrations were reported below the NSW EPA Waste Classification guidelines contaminant threshold criteria. All locations reported concentrations below the CT1 criteria, indicating **general solid waste**, this being the lowest level of waste classification.
  - b All PFAS concentrations are below PFAS NEMP (2020) **unlined landfill** criteria.
145. Given the low contaminant concentrations reported in soils (i.e. general solid waste) and the overall suitability of the soils sampled for on-site re-use, leachate analysis was not undertaken.

## G.7 WE 6.4 Medical Training Facilities

### G.7.1 Field observations

146. One geotechnical bore (0315\_BH-04) was advanced to 2.9 m bgl.
147. Four soil bores (0315\_BH26 – 0315\_BH29) were advanced to 2.5 m bgl.
148. No ACM, staining or odours were reported for any location.
149. PID measurements of VOCs ranged from 1.5 to 4.8 ppm (0315\_BH28).
150. No anthropogenic inclusions were observed.
151. A general description of the soil encountered in the proposed disturbance area is provided below in Table 14.

**Table 14: WE 6.4 Medical Training Facilities: general soil descriptions**

Depth (m bgl)	PID Measurement (ppm)	Description
0.0 – 2.9	1.5 – 4.8	SILT, low plasticity, brown to orange to light brown, minor gravel (<15 mm), dry, soft, no odour or staining

152. Detailed descriptions of the soil profile at each location are provided in the bore logs provided in Attachment 2.
153. No groundwater monitoring was mapped or observed in this area.

### G.7.2 Soil analytical results

154. Soil analytical results are presented in Table 4.1 and Table 4.2 (refer to Attachment 4) and are summarised below:
- a 18 primary samples were collected. No existing analytical data from this siting was available for review.
  - b PFAS was detected in six of the eighteen soil samples analysed (33%).
  - c Total PFAS concentrations have a range of <0.0001 mg/kg to 0.39 mg/kg.
  - d One sample exceeded the PFAS concentrations outlined in the Defence PFAS Construction and Maintenance Framework (2021) for Category 3 soil criteria (~6%).
  - e Exceedances of the adopted SAC are detailed in Table 15.

- f Asbestos, BTEXN, PCBs and OCP were not detected above the LOR in all samples.
- g PAHs, TRH and metals were reported above the LOR but below the SAC.

**Table 15: WE 6.4 Medical Training Facilities: summary of soil criteria exceedances**

CoPC	SAC	Criteria value (mg/kg)	Sample location	Concentration (mg/kg)
Sum of PFHxS and PFOS	Defence CMF 2021 Table 2 Soil Category 3	>0.01 and <1.0	BH28_0.5	0.39
PFOS	Ecological Guideline – Indirect Exposure	0.01	BH28_0.5	0.35

155. With respect to the relevant waste classification assessment criteria, all sample concentrations were reported below the NSW EPA Waste Classification guidelines contaminant threshold criteria. All locations reported concentrations below the CT1 criteria, indicating **general solid waste**, this being the lowest level of waste classification.
156. For PFAS, Australian Standard Leaching Procedure (ASLP) and Toxicity Characteristic Leaching Procedure (TCLP) analysis was undertaken to assist in informing the potential constraints in relation to soil management during development. The soil leachate data is presented in Table 4.2 (refer to Attachment 4) and summarised below:
- a The ASLP results indicate that there is the potential for PFAS to leach through the soil profile.
  - b Exceedances of the PFAS NEMP (2020) Landfill Acceptance Criteria are detailed in Table 16.
  - c Based on the ASLP results, PFOS+PFHxS concentrations are above the PFAS NEMP (2020) landfill Acceptance Criteria (Unlined Landfills). As such, areas of the Medical Training Facility development area where higher concentrations of PFAS are present in soil may require disposal at a **clay/single composite lined landfill**. This material should be segregated from general solid waste.

**Table 16: WE 6.4 Medical Training Facilities: summary of soil leachate (ASLP) criteria exceedances**

CoPC	SAC	Criteria value (mg/kg)	Sample location	Concentration (mg/kg)
Sum of PFHxS and PFOS	PFAS NEMP – Landfill Acceptance Criteria (unlined landfill)	0.07	BH28_05	0.1

## G.8 WE 7.1 New Weapons Range (300 m Range)

157. 16 soil bores (0315\_BH69 – 0315\_BH84) were advanced to 2.5 m bgl.
158. No ACM, staining or odours were reported for any location.
159. PID measurements of VOCs ranged from 1.2 to 7.0 ppm (0315\_BH79).

160. No anthropogenic inclusions were observed.
161. A general description of the soil encountered in the proposed disturbance area is provided below in Table 17.

**Table 17: WE 7.1 New Weapons Ranges (300m Range): general soil descriptions**

Depth (m bgl)	PID Measurement (ppm)	Description
0.0 – 0.1	1.2 – 3.2	SILT, low plasticity, brown, dry, soft, no odour or staining
0.1 – 1.5	0.4 – 7.0	SILTSTONE, low plasticity, dry, firm, no odour or staining

162. Detailed descriptions of the soil profile at each location are provided in the bore logs provided in Attachment 2.
163. No groundwater monitoring was mapped or observed in this area.

### G.8.1 Soil analytical results

164. Soil analytical results are presented in Table 4.1 and Table 4.2 (refer to Attachment 4) and are summarised below:
- 58 primary samples were collected. One sediment sample (0315\_SD186\_190702) collected in 2019 was also reviewed.
  - PFAS was detected in 16 of the 45 soil samples analysed (~35%).
  - Total PFAS concentrations have a range of <0.0001 mg/kg to 0.0067 mg/kg.
  - Exceedances of the adopted SAC were not reported.
  - Asbestos, TRH, BTEXN, PAHs, PCBs and OCP were not detected above the LOR in all samples.
  - Metals were reported above the LOR but below the SAC. The historic sediment sample (0315\_SD186\_190702) reported elevated concentrations of lead which were above the general solid waste criteria.
165. With respect to the relevant waste classification assessment criteria, all sample concentrations were reported below the NSW EPA Waste Classification guidelines contaminant threshold criteria. All locations reported concentrations below the CT1 criteria, indicating **general solid waste**, this being the lowest level of waste classification.
166. For PFAS, ASLP and TCLP analysis was undertaken to assist in informing the potential constraints in relation to soil management during development.
167. The ASLP results indicate that the PFAS concentrations in soil have the potential to generate surface water run off at concentrations above Freshwater Ecosystems (99%) criteria.
168. Based on the ASLP results, PFOS+PFHxS concentrations are below the landfill Acceptance Criteria (Unlined Landfills). As such, this material could be disposed at an **unlined landfill**.

## G.9 WE 2.1 New Multi-Function Centre

### G.9.1 Field observations

169. Five soil bore samples (0315\_BH36 – 0315\_BH40) were advanced to between 1.5 and 2.5 m bgl.
170. Four surface soil samples (0315\_SS20 – 0315\_SS24) were collected from the top 0.1 m of exposed soil.
171. No ACM, staining or odours were reported for any location.
172. PID measurements of VOCs ranged from 1.2 to 6.0 ppm (0315\_BH38).
173. No anthropogenic inclusions were observed.
174. A general description of the soil encountered in the proposed disturbance area is provided below in Table 21.

**Table 18: WE 2.1 New Multi-Function Centre: general soil descriptions**

Depth (m bgl)	PID Measurement (ppm)	Description
0.0 – 0.2	1.9 – 4.2	Sandy CLAY, dark brown, low plasticity, soft, dry, trace organics (roots)
0.2 – 1.5	1.6 – 6.0	CLAY, orange, low to medium plasticity, soft, no odour or staining
1.5 – 2.5	2.8 - 5.0	SHALE, white to grey, gravel texture, dry, hard, no odour or staining

175. Detailed descriptions of the soil profile at each location are provided in the bore logs provided in Attachment 2.
176. No groundwater monitoring mapped or observed in this area.

### G.9.2 Soil analytical results

177. Soil analytical results are presented in Table 4.1 and 4.2 (refer to Attachment 4) and are summarised below:
- 21 primary samples were collected. Existing historical analytical data from this siting was available for review.
  - PFAS was detected in 20 of the 21 soil samples analysed (~95%).
  - Total PFAS concentrations have a range of <0.0001 mg/kg to 1.4 mg/kg. The PFAS concentrations are within the same order of magnitude as historical data collected within this siting option.
  - 18 samples exceeded the PFAS concentrations outlined in the Defence PFAS Construction and Maintenance Framework (2021) for Category 3 soil criteria (~86%).
  - One sample exceeded the PFAS concentrations outlined in the Defence PFAS Construction and Maintenance Framework (2021) for Category 2 soil criteria (~5%).
  - Exceedances of the adopted SAC are detailed in Table 25.

g Asbestos, TRH, BTEXN, PAHs, PCBs and OCP were not detected above the LOR in all samples.

h Metals were reported above the LOR but below the SAC.

**Table 19: WE 2.1 New Multi-Function Centre: summary of soil criteria exceedances**

CoPC	SAC	Criteria value (mg/kg)	Sample location	Concentration (mg/kg)
PFOS	Ecological Guideline – Indirect Exposure	0.01	0315_BH36_0.1, 0315_BH36_0.5, 0315_BH36_1.5, 0315_BH37_0.1, 0315_BH37_0.5, 0315_BH37_1.5, 0315_BH37_2.5, 0315_BH38_0.1, 0315_BH38_0.5, 0315_BH38_2.5, 0315_BH39_0.1, 0315_BH39_0.5, 0315_BH39_1.5, 0315_BH40_0.1, 0315_BH40_0.5, 0315_BH40_1.5, 0315_SS20, 0315_SS22	0.013 – 0.81
Sum of PFHxS and PFOS	Defence CMF 2021 Table 2 Soil Category 3	>0.01 and <1.0	0315_BH36_0.1, 0315_BH36_0.5, 0315_BH36_1.5, 0315_BH37_0.1, 0315_BH37_0.5, 0315_BH37_1.5, 0315_BH37_2.5, 0315_BH38_0.1, 0315_BH38_2.5, 0315_BH39_0.1, 0315_BH39_0.5, 0315_BH39_1.5, 0315_BH40_0.1, 0315_BH40_0.5, 0315_BH40_1.5, 0315_SS20, 0315_SS22, 0315_SS23	0.011 – 1.0
Sum of PFHxS and PFOS	Defence CMF 2021 Table 2 Soil Category 2	>1.0 and <20	0315_BH38_0.5	1.4

178. With respect to the relevant waste classification assessment criteria, all sample concentrations were reported below the NSW EPA Waste Classification guidelines contaminant threshold criteria. All locations reported concentrations below the CT1 criteria, indicating **general solid waste**, this being the lowest level of waste classification **with the exception of one historical sample** collected in 2017 (0315\_BH001\_1.0).

179. For PFAS, ASLP and TCLP analysis was undertaken to assist in informing the potential constraints in relation to soil management during development. The soil leachate data is presented in Table 4.2 (refer to Attachment 4) and summarised below:

- a The ASLP results indicate that there is the potential for PFAS to leach through the soil profile.
- b Exceedances of the PFAS NEMP (2020) Landfill Acceptance Criteria are detailed in Table 20.
- c Based on the ASLP results, PFOS+PFHxS concentrations are above the PFAS landfill Acceptance Criteria (Unlined landfills, clay/single composite lined and double composite lined landfills). As such, areas of the New Multi-Function Centre development area where higher concentrations of PFAS are present in soil may require treatment at a specialised facility, for example thermal destruction, subject to

further analysis and confirmation of PFAS concentrations in material requiring disposal. This material should be segregated from general solid waste where possible.

It is understood that the preferred management approach for excess material will be re-use on Site subject to consultation with Defence and assessment of risk. ASLP data and comparison to the PFAS NEMP (2020) Landfill Acceptance Criteria is only relevant to any surplus material requiring disposal.

**Table 20: WE 2.1 New Multi-Function Centre: summary of soil leachate (ASLP) criteria exceedances**

CoPC	SAC	Criteria value (mg/kg)	Sample location	Concentration (mg/kg)
Sum of PFHxS and PFOS	PFAS NEMP – Landfill Acceptance Criteria (unlined landfill)	0.07	0315_SS20, 0315_SS23	0.13 – 0.19
Sum of PFHxS and PFOS	PFAS NEMP – Landfill Acceptance Criteria (clay/single composite lined landfill)	0.7	0315_BH37_0.1, 0315_BH37_1.5, 0315_BH37_2.5, 0315_BH38_0.5, 0315_BH38_2.5, 0315_BH39_0.1	10 - 57
Sum of PFHxS and PFOS	PFAS NEMP – Landfill Acceptance Criteria (double composite lined landfill)	7	0315_BH37_0.1, 0315_BH37_1.5, 0315_BH37_2.5, 0315_BH38_0.5, 0315_BH38_2.5, 0315_BH39_0.1	10 - 57

## G.10 WE 2.2 EO Storage and Distribution

### G.10.1 Field observations

- 180. Six soil bores (0315\_BH41 – 0315\_BH46) were advanced to between 2.4 and 2.5 m bgl.
- 181. Three surface soil samples (0315\_SS17 – 0315\_SS19) were collected from the top 0.1 m of exposed soil.
- 182. No ACM, staining or odours were reported for any location.
- 183. PID measurements of VOCs ranged from 0.4 to 6.8 ppm (0315\_SS18).
- 184. No anthropogenic inclusions were observed.
- 185. A general description of the soil encountered in the proposed disturbance area is provided below in Table 21.

**Table 21: WE 2.2 EO Storage and Distribution: general soil descriptions**

Depth (m bgl)	PID Measurement (ppm)	Description
0.0 – 2.5	0.4 – 6.8	CLAY, low to medium plasticity, brown to orange, moist, soft to stiff, no odour or staining

186. Detailed descriptions of the soil profile at each location are provided in the bore logs provided in Attachment 2.
187. Groundwater field sheets are provided in Attachment 8 and summarised below.

**Table 22: WE 2.2 EO storage and distribution: groundwater monitoring well gauging**

Well ID	Flush Mounted /Stick up	Total well depth (m bgl)	Stabilised water depth (m bgl)	Groundwater well comments
0315_MW101	Flush mounted	6.72	-	Groundwater well in good condition. PID reading at well head was 0.1 ppm. The monitoring well was dry at the time of gauging.

188. As no shallow groundwater conditions (<5 m bgl) were encountered, groundwater samples were not collected.

## G.10.2 Soil analytical results

189. Soil analytical results are presented in Table 4.1 and Table 4.2 (refer to Attachment 4) and are summarised below:
- 27 primary samples were collected. No existing analytical data from this siting was available for review.
  - PFAS was detected in three of the 14 soil samples analysed (~21%).
  - Total PFAS concentrations have a range of <0.0001 mg/kg to 0.049 mg/kg.
  - Sum of PFHxS and PFOS concentrations exceeded the lower threshold (namely, the LOR) for Defence PFAS Construction and Maintenance Framework (2019) Category 3 soil criteria in one sample (~7%).
  - Exceedances of the adopted SAC are detailed in Table 23.
  - Asbestos, TRH, BTEXN, PAH, PCBs and OCP were not detected above the LOR in all samples.
  - Metals were detected above the LOR but below the SAC.

**Table 23: WE 2.2 EO Storage and Distribution: summary of soil criteria exceedances**

CoPC	SAC	Criteria value (mg/kg)	Sample location	Concentration (mg/kg)
Sum of PFHxS and PFOS	Defence CMF 2021 Table 2 Soil Category 3	>0.01 mg/kg and <1.0 mg/kg	0315_BH41_2.5	0.049

190. With respect to the relevant waste classification assessment criteria:
- All sample concentrations were reported below the NSW EPA Waste Classification guidelines contaminant threshold criteria. All locations reported concentrations below the CT1 criteria, indicating **general solid waste**, this being the lowest level of waste classification.
  - All PFAS concentrations are below PFAS NEMP (2020) **unlined landfill** criteria.
191. Given the low contaminant concentrations reported in soils (i.e. general solid waste) and the overall suitability of the soils sampled for on-site re-use, ASLP analysis was not undertaken as part of this PCA.

## G.11 WE 2.5 Q Store and Clothing Store

### G.11.1 Field observations

192. Four soil bore samples (BH53 – BH56) were collected.
193. No ACM, staining or odours were reported for any location.
194. PID measurements of VOCs ranged from 1.0 to 4.7 ppm (BH56).
195. No anthropogenic inclusions were observed.
196. A general description of the soil encountered in the proposed disturbance area is provided below in Table 24.

**Table 24: WE 2.5 Q Store and Warehousing: general soil descriptions**

Depth (m bgl)	PID Measurement (ppm)	Description
0.0 – 0.1	1.2 – 3.8	Sandy SILT, low plasticity, brown, minor gravel (<5mm), dry, soft, no odour or staining
0.1 – 1.5	1.0 – 4.7	CLAY, low plasticity, orange to red, dry to moist, soft, no o/s

197. Detailed descriptions of the soil profile at each location are provided in the bore logs provided in Attachment 2.
198. No groundwater monitoring was mapped or observed in this area.

### G.11.2 Soil analytical results

199. Soil analytical results are presented in Table 4.1 and Table 4.2 (refer to Attachment 4) and are summarised below:
- 11 primary samples were collected. No existing analytical data from this siting was available for review.
  - PFAS was detected in seven of the 11 soil samples analysed (63%).
  - Total PFAS concentrations have a range of <0.0001 mg/kg to 0.83 mg/kg.

- d Three samples exceeded the PFAS concentrations outlined in the Defence PFAS Construction and Maintenance Framework (2021) for Category 3 soil criteria (~27%).
- e Exceedances of the adopted SAC are detailed in Table 25.
- f Asbestos, TRH, BTEXN, PCBs and OCP were not detected above the LOR in all samples.
- g PAHs and metals were reported above the LOR but below the SAC.

**Table 25: WE 2.5 Q Store and Warehousing: summary of soil criteria exceedances**

CoPC	SAC	Criteria value (mg/kg)	Sample location	Concentration (mg/kg)
Sum of PFHxS and PFOS	Defence CMF 2021 Table 2 Soil Category 3	>0.01 and <1.0	0315_BH54_0.1, 0315_BH54_0.5, 0315_BH55_0.5	0.12 – 0.83
PFOS	Ecological Guideline – Indirect Exposure	0.01	0315_BH54_0.1, 0315_BH54_0.5, 0315_BH55_0.5	0.12 – 0.81

- 200. With respect to the relevant waste classification assessment criteria, all sample concentrations were reported below the NSW EPA Waste Classification guidelines contaminant threshold criteria. All locations reported concentrations below the CT1 criteria, indicating **general solid waste**, this being the lowest level of waste classification.
- 201. For PFAS, ASLP and TCLP analysis was undertaken to assist in informing the potential constraints in relation to soil management during development. The soil leachate data is presented in Table 4.2 (refer to Attachment 4) and summarised below:
  - a The ASLP results indicate that there is the potential for PFAS to leach through the soil profile.
  - b Exceedances of the PFAS NEMP (2020) Landfill Acceptance Criteria are detailed in Table 26.
  - c Based on the ASLP results, PFOS+PFHxS concentrations are above the landfill Acceptance Criteria (Unlined landfills, clay/single composite lined and double composite lined landfills). As such, areas of the Q Store and Warehousing development area where higher concentrations of PFAS are present in soil may require treatment at a specialised facility, for example thermal destruction, subject to further analysis and confirmation of PFAS concentrations in material requiring disposal. This material should be segregated from general solid waste, where possible.  
It is understood that the preferred management approach for excess material will be re-use on Site subject to consultation with Defence and assessment of risk. ASLP data and comparison to the PFAS NEMP (2020) Landfill Acceptance Criteria is only relevant to any surplus material requiring disposal.

**Table 26: WE 2.5 Q Store and Clothing Store: summary of soil leachate (ASLP) criteria exceedances**

CoPC	SAC	Criteria value (mg/kg)	Sample location	Concentration (mg/kg)
Sum of PFHxS and PFOS	PFAS NEMP – Landfill Acceptance Criteria (unlined landfill)	0.07	0315_BH54_0.1, 0315_BH54_0.5	4.7 – 85
Sum of PFHxS and PFOS	PFAS NEMP – Landfill Acceptance Criteria (clay/single composite lined landfill)	0.7	0315_BH54_0.1, 0315_BH54_0.5	4.7 – 85
Sum of PFHxS and PFOS	PFAS NEMP – Landfill Acceptance Criteria (double composite lined landfill)	7	0315_BH54_0.5	85

## G.12 WE 6.1 Fitness Training Facility & Gym

### G.12.1 Field observations

- 202. Six soil bores (0315\_BH57 – 0315\_BH62) were advanced to between 0.5 and 2.0 m bgl.
- 203. Six surface soil samples (0315\_SS24 – 0315\_SS29) were collected from the top 0.1 m of exposed soil.
- 204. No ACM, staining or odours were reported for any location.
- 205. PID measurements of VOCs ranged from 1.2 to 4.5 ppm (0315\_BH59).
- 206. No anthropogenic inclusions were observed.
- 207. A general description of the soil encountered in the proposed disturbance area is provided below in Table 27.

**Table 27: WE 6.1Gym and Fitness Training Expansion: general soil descriptions**

Depth (m bgl)	PID Measurement (ppm)	Description
0.0 – 0.1	1.4 – 3.3	FILL: Silty SAND, low plasticity, brown, trace gravel (<5 mm), dry to moist, loose, no o/s
0.1 – 0.5	1.2 – 4.5	FILL: Silt, low to medium plasticity, brown, minor gravel (<15 mm), soft, no o/s
0.5 – 1.5	2.8	Clay, medium plasticity, brown to orange, dry to moist, soft to firm, no o/s

- 208. Detailed descriptions of the soil profile at each location are provided in the bore logs provided in Attachment 2.
- 209. No groundwater monitoring was mapped or observed in this area.

### G.12.2 Soil analytical results

210. Soil analytical results are presented in Table 4.1 and Table 4.2 (refer to Attachment 4) and are summarised below:

- a 22 primary samples were collected. No existing analytical data from this siting was available for review.
- b PFAS was detected in 13 of the 18 soil samples analysed (~72%).
- c Total PFAS concentrations have a range of <0.0001 mg/kg to 0.023 mg/kg.
- d Two samples exceeded the PFAS concentrations outlined in the Defence PFAS Construction and Maintenance Framework (2021) for Category 3 soil criteria (~11%).
- e Exceedances of the adopted SAC are detailed in Table 28.
- f Asbestos, BTEXN and OCP were not detected above the LOR in all samples.
- g TRH, metals, PAHs were detected above the LOR but below the SAC.

**Table 28: WE6.1 Gym and Fitness Training Expansion: summary of soil criteria exceedances**

CoPC	SAC	Criteria value (mg/kg)	Sample location	Concentration (mg/kg)
Sum of PFHxS and PFOS	Defence CMF 2021 Table 2 Soil Category 3	>0.01 mg/kg and <1.0 mg/kg	0315_BH58_0.5, 0315_BH59_0.1	0.012 – 0.023
PFOS	Ecological Guideline – Indirect Exposure	0.01	0315_BH59_0.1	0.023

211. With respect to the relevant waste classification assessment criteria, all sample concentrations were reported below the NSW EPA Waste Classification guidelines contaminant threshold criteria. All locations reported concentrations below the CT1 criteria, indicating **general solid waste**, this being the lowest level of waste classification.

212. For PFAS, ASLP and TCLP analysis was undertaken to assist in informing the potential constraints in relation to soil management during development. The soil leachate data is presented in Table 4.2 (refer to Attachment 4) and summarised below:

- a The ASLP results indicate that there is the potential for PFAS to leach through the soil profile.
- b Exceedances of the PFAS NEMP (2020) Landfill Acceptance Criteria are detailed in Table 29.
- c Based on the ASLP results, PFOS+PFHxS concentrations are above the landfill Acceptance Criteria (Unlined landfills). As such, areas of the Gym and Fitness Training Expansion development area where higher concentrations of PFAS are present in soil may require disposal at a clay/single composite lined landfill. This material should be segregated from general solid waste.

It is understood that the preferred management approach for excess material will be re-use on Site subject to consultation with Defence and assessment of risk. ASLP data and comparison to the PFAS NEMP (2020) Landfill Acceptance Criteria is only relevant to any surplus material requiring disposal.

**Table 29: WE 6.1 Fitness Training Facility and Gym: summary of soil leachate (ASLP) criteria exceedances**

CoPC	SAC	Criteria value (mg/kg)	Sample location	Concentration (mg/kg)
Sum of PFHxS and PFOS	PFAS NEMP – Landfill Acceptance Criteria (unlined landfill)	0.07	0315_BH58_0.1, 0315_BH58_0.5, 0315_BH59_0.1	0.08 – 0.67

## H. CONCEPTUAL SITE MODEL

213. A Conceptual Site Model (CSM) has been developed for each of the work elements assessed during CDR phase to identify existing known sources and areas of contamination, associated potential impacts to human health and ecological receptors and to identify exposure source-pathway-receptor (S-P-R) linkages. Typical receptors of the Site would include:

- a site development workers
- b future occupants
- c future intrusive maintenance workers
- d ecological receptors, including terrestrial, groundwater and aquatic ecosystems.

214. The CSM is detailed in Table 30.

**Table 30: Conceptual Site Model**

Work Element	Primary Issue	Release Mechanisms and Transport Pathways	CoPC	Comment
WE 2.11 Entry Precinct upgrades	NIL	-	-	The soil analyses undertaken did not report contaminant concentrations above human health or environmental site assessment criteria (SAC). As such, no complete pathways between a contaminant source and receptor(s) were established.
WE 4.1 Recruit development company LIA	NIL	-	-	The soil analyses undertaken did not report contaminant concentrations above human health or environmental SAC. As such, no complete pathways between a contaminant source and receptor(s) were established.
WE 4.1 New/Refurb 'Lines' (A, B, C and D Companies)	NIL	-	-	The soil analyses undertaken did not report contaminant concentrations above human health or environmental SAC. As such, no complete pathways between a contaminant source and receptor(s) were established.
WE 5.2 New Transit LIA	NIL	-	-	The soil analyses undertaken did not report contaminant concentrations above human health or environmental SAC. As such, no complete pathways between a contaminant source and receptor(s) were established.

Work Element	Primary Issue	Release Mechanisms and Transport Pathways	CoPC	Comment
WE 2.4 Working Accommodation in Contractors Precinct	NIL	-	-	The soil analyses undertaken did not report contaminant concentrations above human health or environmental SAC. As such, no complete pathways between a contaminant source and receptor(s) were established.
WE 3.1 & WE 3.2 HQ Facilities	NIL	-	-	The soil analyses undertaken did not report contaminant concentrations above human health or environmental SAC. As such, no complete pathways between a contaminant source and receptor(s) were established.
WE 6.4 Medical Training Facilities	Residual soil concentrations	<ul style="list-style-type: none"> <li>• Infiltration to groundwater and resultant discharges to surface water and sediment.</li> <li>• Excavation, movement and/or beneficial reuse on the Property can result in the migration of PFAS in soil, sediment, groundwater and surface water.</li> </ul>	PFAS	<p>The soil analyses undertaken reported PFOS concentrations above the ecological SAC in one sample (0315_BH28_0.5) indicating a potentially complete source-pathway-receptor linkage.</p> <p>The exceedance is isolated in nature and is considered to be delineated vertically by the samples collected above (0315_BH28_0.1) and below (0315_BH28_2.5) and not considered representative of gross contamination posing significant risk to ecological receptors.</p> <p>The soil analyses undertaken did not report contaminant concentrations above human health SAC.</p>
WE 7.1 New Weapons Ranges (300 m range)	NIL	-	-	The soil analyses undertaken did not report contaminant concentrations above human health or environmental SAC. As such, no complete pathways between a contaminant source and receptor(s) were established.

Work Element	Primary Issue	Release Mechanisms and Transport Pathways	CoPC	Comment
WE 2.1 New Multi-Function Centre	Residual soil concentrations	<ul style="list-style-type: none"> <li>Infiltration to groundwater and resultant discharges to surface water and sediment.</li> <li>Excavation, movement and/or beneficial reuse on the Property can result in the migration of PFAS in soil, sediment, groundwater and surface water.</li> </ul>	PFAS	<p>The soil analyses undertaken reported PFOS concentrations above the ecological SAC in 18 samples from nine locations indicating a potentially complete source-pathway-receptor-linkage.</p> <p>The exceedances are widespread across this area and could pose risk to ecological receptors.</p> <p>The soil analyses undertaken did not report contaminant concentrations above human health SAC.</p>
WE 2.2 EO Storage and Distribution	Residual soil concentrations	<ul style="list-style-type: none"> <li>Infiltration to groundwater and resultant discharges to surface water and sediment.</li> <li>Excavation, movement and/or beneficial reuse on the Property can result in the migration of PFAS in soil, sediment, groundwater and surface water.</li> </ul>	PFAS	<p>The soil analyses undertaken reported PFOS concentrations above the ecological SAC in one sample (0315_BH28_0.5) indicating a potentially complete source-pathway-receptor linkage.</p> <p>The exceedance is isolated in nature and is considered to be delineated vertically by the samples collected above (0315_BH28_0.1) and below (0315_BH28_2.5) and not considered representative of gross contamination posing significant risk to ecological receptors.</p> <p>The soil analyses undertaken did not report contaminant concentrations above human health SAC.</p>

Work Element	Primary Issue	Release Mechanisms and Transport Pathways	CoPC	Comment
WE 2.5 Q Store and Warehousing	Residual soil concentrations	<ul style="list-style-type: none"> <li>Infiltration to groundwater and resultant discharges to surface water and sediment.</li> <li>Excavation, movement and/or beneficial reuse on the Property can result in the migration of PFAS in soil, sediment, groundwater and surface water.</li> </ul>	PFAS	<p>The soil analyses undertaken reported PFOS concentrations above the ecological SAC in three samples from two locations (0315_BH54 and 0315_BH54) indicating a potentially complete source-pathway-receptor linkage.</p> <p>The exceedances are considered to be isolated in nature and not representative of gross contamination posing significant risk to ecological receptors.</p> <p>The soil analyses undertaken did not report contaminant concentrations above human health SAC.</p>
WE 6.1 Gym and Fitness Training Expansion	Residual soil concentrations	<ul style="list-style-type: none"> <li>Infiltration to groundwater and resultant discharges to surface water and sediment.</li> <li>Excavation, movement and/or beneficial reuse on the Property can result in the migration of PFAS in soil, sediment, groundwater and surface water.</li> </ul>	PFAS	<p>The soil analyses undertaken reported PFOS concentrations above the ecological SAC in one sample (0315_BH54 and 0315_BH54) indicating a potentially complete source-pathway-receptor linkage.</p> <p>The exceedance is considered to be isolated in nature and not representative of gross contamination posing significant risk to ecological receptors.</p> <p>The soil analyses undertaken did not report contaminant concentrations above human health SAC.</p>



## I. DISCUSSION

215. The management implications for each work element are summarised in Table 31.

**Table 31: Delivery Phase implications for contaminated materials**

WE 2.11 Entry precinct upgrades	
Human health and ecological risk	Exceedances of the adopted SAC were not reported.
Material management	<ul style="list-style-type: none"> <li>No samples exceeded the NSW EPA (2014) Waste Classification Guidelines general solid waste criteria limits.</li> <li>Soils are categorised as Category 4 in accordance with the Defence PFAS Framework (2019).                             <ul style="list-style-type: none"> <li>Category 4 soils are suitable for reuse within WE1 or elsewhere on Base without risk assessment or mitigation unless a previous site assessment suggests otherwise.</li> </ul> </li> <li>Soils are generally suitable for off-site disposal to a licensed waste facility as general solid waste, if required.</li> </ul>
Dewatering and groundwater management	Shallow groundwater was not encountered during drilling. There were no known monitoring wells in this area that could be gauged. Based on regional hydrogeology and site observations, shallow groundwater (<2 m bgl) is unlikely to be encountered during construction. Discontinuous shallow perched groundwater could be present in discrete areas.
Residual knowledge gaps and recommendations	<p>No significant knowledge gaps are identified with respect to proposed building locations.</p> <p>The siting of linear infrastructure (roads, underground services) was not known at the time of this assessment and has therefore not been assessed.</p>
WE 4.1 Recruit development company LIA	
Human health and ecological risk	Exceedances of the adopted SAC were not reported.
Material management	<ul style="list-style-type: none"> <li>No samples exceeded the NSW EPA (2014) Waste Classification Guidelines general solid waste criteria limits.</li> <li>Soils are categorised as Category 4 in accordance with the Defence PFAS Framework (2019).                             <ul style="list-style-type: none"> <li>Category 4 soils are suitable for reuse within WE1 or elsewhere on Base without risk assessment or mitigation unless a previous site assessment suggests otherwise.</li> </ul> </li> <li>Soils are generally suitable for off-site disposal to a licensed waste facility as general solid waste, if required.</li> </ul>
Dewatering and groundwater management	Shallow groundwater was not encountered during drilling. There were no known monitoring wells in this area that could be gauged. Based on regional hydrogeology and site observations, shallow groundwater (<2 m bgl) is unlikely to be encountered during construction. Discontinuous shallow perched groundwater could be present in discrete areas.

Residual knowledge gaps and recommendations	<p>No significant knowledge gaps are identified with respect to proposed building locations.</p> <p>The siting of linear infrastructure (roads, underground services) was not known at the time of this assessment and has therefore not been assessed.</p>
WE 4.1 New/Refurb 'Lines' (A, B, C and D Companies)	
Human health and ecological risk	Exceedances of the adopted SAC were not reported.
Material management	<ul style="list-style-type: none"> <li>No samples exceeded the NSW EPA (2014) Waste Classification Guidelines general solid waste criteria limits.</li> <li>Soils are categorised as Category 4 in accordance with the Defence PFAS Framework (2019).                             <ul style="list-style-type: none"> <li>Category 4 soils are suitable for reuse within WE1 or elsewhere on Base without risk assessment or mitigation unless a previous site assessment suggests otherwise.</li> </ul> </li> <li>Soils are generally suitable for off-site disposal to a licensed waste facility as general solid waste, if required.</li> </ul>
Dewatering and groundwater management	Shallow groundwater was not encountered during drilling. There were no known monitoring wells in this area that could be gauged. Based on regional hydrogeology and site observations, shallow groundwater (<2 m bgl) is unlikely to be encountered during construction. Discontinuous shallow perched groundwater could be present in discrete areas.
Residual knowledge gaps and recommendations	<p>No significant knowledge gaps are identified with respect to proposed building locations.</p> <p>The siting of linear infrastructure (roads, underground services) was not known at the time of this assessment and has therefore not been assessed.</p>
WE 5.2 New Transit LIA	
Human health and ecological risk	Exceedances of the adopted SAC were not reported.
Material management	<ul style="list-style-type: none"> <li>No samples exceeded the NSW EPA (2014) Waste Classification Guidelines general solid waste criteria limits.</li> <li>Soils are categorised as Category 4 in accordance with the Defence PFAS Framework (2019).                             <ul style="list-style-type: none"> <li>Category 4 soils are suitable for reuse within WE1 or elsewhere on Base without risk assessment or mitigation unless a previous site assessment suggests otherwise.</li> </ul> </li> <li>Soils are generally suitable for off-site disposal to a licensed waste facility as general solid waste if required.</li> </ul>
Dewatering and groundwater management	Shallow groundwater was not encountered during drilling. There were no known monitoring wells in this area that could be gauged. Based on regional hydrogeology and site observations, shallow groundwater (<2 m bgl) is unlikely to be encountered during construction. Discontinuous shallow perched groundwater could be present in discrete areas.

Residual knowledge gaps and recommendations	The vertical extent of investigation in this siting option is 0.6 m bgl. The geotechnical bore (BH-02) encountered refusal on siltstone bedrock at 0.6 m and additional sampling during Stage 1B was removed from scope.  The siting of linear infrastructure (roads, underground services) was not known at the time of this assessment and has therefore not been assessed.
<b>WE 2.4 Working Accommodation in Contractors Precinct</b>	
Human health and ecological risk	Exceedances of the adopted SAC were not reported.
Material management	<ul style="list-style-type: none"> <li>No samples exceeded the NSW EPA (2014) Waste Classification Guidelines general solid waste criteria limits.</li> <li>PFAS was not detected in samples analysed.</li> <li>Soils are generally suitable for off-site disposal to a licensed waste facility as general solid waste, if required.</li> </ul>
Dewatering and groundwater management	Shallow groundwater was not encountered during drilling. There were no known monitoring wells in this area that could be gauged.  Based on regional hydrogeology and site observations, shallow groundwater (<2 m bgl) is unlikely to be encountered during construction. Discontinuous shallow perched groundwater could be present in discrete areas.
Residual knowledge gaps and recommendations	No significant knowledge gaps are identified with respect to proposed building locations.  The siting of linear infrastructure (roads, underground services) was not known at the time of this assessment and has therefore not been assessed.
<b>WE 3.1&amp; 3.2 HQ Facilities</b>	
Human health and ecological risk	Exceedances of the adopted SAC were not reported.
Material management	<ul style="list-style-type: none"> <li>No samples exceeded the NSW EPA (2014) Waste Classification Guidelines general solid waste criteria limits.</li> <li>Soils are categorised as Category 4 in accordance with the Defence PFAS Framework (2019).               <ul style="list-style-type: none"> <li>Category 4 soils are suitable for reuse within WE1 or elsewhere on Base without risk assessment or mitigation unless a previous site assessment suggests otherwise.</li> </ul> </li> <li>Soils are generally suitable for off-site disposal to a licensed waste facility as general solid waste, if required.</li> </ul>
Dewatering and groundwater management	Shallow groundwater was not encountered during drilling. There were no known monitoring wells in this area that could be gauged.  Based on regional hydrogeology and site observations, shallow groundwater (<2 m bgl) is unlikely to be encountered during construction. Discontinuous shallow perched groundwater could be present in discrete areas.

Residual knowledge gaps and recommendations	The vertical extent of investigation in this siting option is 0.5 m bgl. The geotechnical bore (BH-09) encountered refusal on siltstone bedrock at 0.8 m and additional sampling during Stage 1B was removed from scope.  The siting of linear infrastructure (roads, underground services) was not known at the time of this assessment and has therefore not been assessed.
<b>WE 6.4 Medical Training Facilities</b>	
Human health and ecological risk	PFAS was reported above the ecological SAC in one sample.
Material management	<ul style="list-style-type: none"> <li>No samples exceeded the NSW EPA (2014) Waste Classification Guidelines general solid waste criteria limits.</li> <li>Soils are categorised as Category 3 and Category 4 in accordance with the Defence PFAS Framework (2021).               <ul style="list-style-type: none"> <li>Category 3 soil can be reused within the siting with no additional mitigation procedures or on-Base (subject to Base approvals) if the risk to human health or the environment is not increased or otherwise results in unacceptable risk.</li> <li>Category 4 soils are suitable for reuse within the siting or elsewhere on Base without risk assessment or mitigation unless a previous site assessment suggests otherwise.</li> </ul> </li> <li>Soils are generally suitable for off-site disposal to a licensed waste facility as general solid waste, if required.</li> <li>The ASLP leachate results were above the PFAS NEMP landfill Acceptance Criteria (Unlined Landfills). As such, areas of higher PFAS concentrations may require disposal to a clay/single composite lined landfill. This material should be segregated from general solid waste.</li> </ul>
Dewatering and groundwater management	Shallow groundwater was not encountered during drilling. There were no known monitoring wells in this area that could be gauged.  Based on regional hydrogeology and site observations, shallow groundwater (<2 m bgl) is unlikely to be encountered during construction. Discontinuous shallow perched groundwater could be present in discrete areas.
Residual knowledge gaps and recommendations	Due to changes in the layout of the siting option, the sampled locations conducted in the Stage 1A and Stage 1B investigations are now outside the current proposed footprint.  The siting of linear infrastructure (roads, underground services) was not known at the time of this assessment and has therefore not been assessed.
<b>WE 7.1 New Weapons Ranges (300 m range)</b>	
Human health and ecological risk	Exceedances of the adopted SAC were not reported.
Material management	<ul style="list-style-type: none"> <li>No samples exceeded the NSW EPA (2014) Waste Classification Guidelines general solid waste criteria limits. It is noted that lead concentrations in one historical sediment sample exceeded the general solid waste criteria.</li> <li>Soils are categorised as Category 4 in accordance with the Defence PFAS Framework (2019).</li> </ul>

	<ul style="list-style-type: none"> <li>– Category 4 soils are suitable for reuse within WE1 or elsewhere on Base without risk assessment or mitigation unless a previous site assessment suggests otherwise.</li> <li>• Soils are generally suitable for off-site disposal to a licensed waste facility as general solid waste, if required.</li> <li>• The ASLP leachate results were below the landfill Acceptance Criteria (Unlined Landfills).</li> </ul>
Dewatering and groundwater management	<p>Shallow groundwater was not encountered during drilling. There were no known monitoring wells in this area that could be gauged.</p> <p>Based on regional hydrogeology and site observations, shallow groundwater (&lt;2 m bgl) is unlikely to be encountered during construction. Discontinuous shallow perched groundwater could be present in discrete areas.</p>
Residual knowledge gaps and recommendations	<p>No significant knowledge gaps are identified with respect to proposed building locations.</p> <p>The siting of linear infrastructure (roads, underground services) was not known at the time of this assessment and has therefore not been assessed.</p>
<b>WE 2.1 New Multi-Function Centre</b>	
Human health and ecological risk	<p>PFAS was reported above the ecological SAC in 18 samples from nine locations (0315_SS20 – 0315_SS23, 0315_BH36 – 0315_BH40) as well as in historical samples collected from the siting option.</p>
Material management	<ul style="list-style-type: none"> <li>• No samples exceeded the NSW EPA (2014) Waste Classification Guidelines general solid waste criteria limits.</li> <li>• Soils are categorised as Category 2, Category 3 and Category 4 in accordance with the Defence PFAS Framework (2021). <ul style="list-style-type: none"> <li>– Category 2 soil can be reused within the works site provided that exposure to receptors, and water more generally is minimised. If reuse is not appropriate on the works site, then an assessment of risk should be undertaken to evaluate the following options: off-base disposal to landfill, or on-base encapsulation, containment, treatment and/or destruction.</li> <li>– Category 3 soil can be reused within the siting with no additional mitigation procedures or on-Base (subject to Base approvals) if the risk to human health or the environment is not increased or otherwise results in unacceptable risk.</li> <li>– Category 4 soils are suitable for reuse within the siting or elsewhere on Base without risk assessment or mitigation unless a previous site assessment suggests otherwise.</li> </ul> </li> <li>• The ASLP leachate results were above the PFAS NEMP Landfill Acceptance Criteria (Unlined Landfills, clay/single composite lined and double composite lined landfills). As such, areas of the New Multi-Function Centre development area where higher concentrations of PFAS are present in soil may require treatment at a specialised facility, for example thermal destruction, subject to further analysis and confirmation of PFAS concentrations in material requiring disposal.</li> </ul> <p>This material should be segregated from general solid waste.</p>

Dewatering and groundwater management	<p>Shallow groundwater was not encountered during drilling. There were no known monitoring wells in this area that could be gauged.</p> <p>Based on regional hydrogeology and site observations, shallow groundwater (&lt;2 m bgl) is unlikely to be encountered during construction. Discontinuous shallow perched groundwater could be present in discrete areas.</p>
Residual knowledge gaps and recommendations	<ul style="list-style-type: none"> <li>• PFAS Category 2 soils were detected in 0315_BH38_0.5. The vertical extent of this PFAS impact is considered to be delineated by samples 0315_BH38_0.1 and 0315_BH38_1.5. The horizontal extent of PFAS impact in 0315_BH38_0.5 is partially delineated to the north by historical sample locations BH004 and BH103.</li> <li>• PFAS Category 2 soils were also detected in historical sample locations BH001 and BH003.</li> <li>• Further assessment is required here for volume estimate purposes.</li> <li>• The siting of linear infrastructure (roads, underground services) was not known at the time of this assessment and has therefore not been assessed.</li> </ul>
<b>WE 2.2 EO Storage and Distribution</b>	
Human health and ecological risk	<p>Exceedances of the adopted SAC were not reported.</p>
Material management	<ul style="list-style-type: none"> <li>• No samples exceeded the NSW EPA (2014) Waste Classification Guidelines general solid waste criteria limits.</li> <li>• Soils are categorised as Category 3 and Category 4 in accordance with the Defence PFAS Framework (2021). <ul style="list-style-type: none"> <li>– Category 3 soil can be reused within the siting with no additional mitigation procedures or on-Base (subject to Base approvals) if the risk to human health or the environment is not increased or otherwise results in unacceptable risk.</li> <li>– Category 4 soils are suitable for reuse within the siting or elsewhere on Base without risk assessment or mitigation unless a previous site assessment suggests otherwise.</li> </ul> </li> <li>• Soils are generally suitable for off-site disposal to a licensed waste facility as general solid waste, if required.</li> <li>• The ASLP leachate results were below the PFAS NEMP Landfill Acceptance Criteria (Unlined Landfills) as such, suitable for disposal at an unlined landfill.</li> </ul>
Dewatering and groundwater management	<p>Shallow groundwater was not encountered during drilling and the existing monitoring well (0315_MW101) did not contain groundwater when gauged.</p> <p>Based on regional hydrogeology and site observations, shallow groundwater (&lt;2 m bgl) is unlikely to be encountered during construction. Discontinuous shallow perched groundwater could be present in discrete areas.</p>
Residual knowledge gaps and recommendations	<p>No significant knowledge gaps are identified with respect to proposed building locations.</p> <p>The siting of linear infrastructure (roads, underground services) was not known at the time of this assessment and has therefore not been assessed.</p>

WE 2.5 Q Store and Warehousing	
Human health and ecological risk	PFAS was reported above the ecological SAC in three samples from two locations (0315_BH54 and 0315_BH54).
Material management	<ul style="list-style-type: none"> <li>No samples exceeded the NSW EPA (2014) Waste Classification Guidelines general solid waste criteria limits.</li> <li>Soils are categorised as Category 3 and Category 4 in accordance with the Defence PFAS Framework (2021). <ul style="list-style-type: none"> <li>Category 3 soil can be reused within the siting with no additional mitigation procedures or on-Base (subject to Base approvals) if the risk to human health or the environment is not increased or otherwise results in unacceptable risk.</li> <li>Category 4 soils are suitable for reuse within the siting or elsewhere on Base without risk assessment or mitigation unless a previous site assessment suggests otherwise.</li> </ul> </li> <li>Soils are generally suitable for off-site disposal to a licensed waste facility as general solid waste, if required.</li> <li>The ASLP leachate results were above the PFAS NEMP Landfill Acceptance Criteria (Unlined Landfills, clay/single composite lined and double composite lined landfills). As such, areas of the Q Store and Warehousing development area where higher concentrations of PFAS are present in soil may require treatment at a specialised facility, for example thermal destruction, subject to further analysis and confirmation of PFAS concentrations in material requiring disposal.</li> <li>This material should be segregated from general solid waste.</li> </ul>
Dewatering and groundwater management	<p>Shallow groundwater was not encountered during drilling. There were no known monitoring wells in this area that could be gauged.</p> <p>Based on regional hydrogeology and site observations, shallow groundwater (&lt;2 m bgl) is unlikely to be encountered during construction. Discontinuous shallow perched groundwater could be present in discrete areas.</p>
Residual knowledge gaps and recommendations	<ul style="list-style-type: none"> <li>Due to changes in the layout of the siting option, 50% of the sampled locations conducted in the Stage 1A and Stage 1B investigations are now outside the current proposed footprint.</li> <li>The vertical extent of PFAS impact in soil at location 0315_BH54 have not been confirmed and requires further assessment.</li> <li>The siting of linear infrastructure (roads, underground services) was not known at the time of this assessment and has therefore not been assessed.</li> </ul>
WE 6.1 Gym and Fitness Training Expansion	
Human health and ecological risk	PFAS was reported above the ecological SAC in one sample (0315_0315_BH59_0.1).

Material management	<ul style="list-style-type: none"> <li>No samples exceeded the NSW EPA (2014) Waste Classification Guidelines general solid waste criteria limits.</li> <li>Soils are categorised as Category 3 and Category 4 in accordance with the Defence PFAS Framework (2021). <ul style="list-style-type: none"> <li>Category 3 soil can be reused within the siting with no additional mitigation procedures or on-Base (subject to Base approvals) if the risk to human health or the environment is not increased or otherwise results in unacceptable risk.</li> <li>Category 4 soils are suitable for reuse within the siting or elsewhere on Base without risk assessment or mitigation unless a previous site assessment suggests otherwise.</li> </ul> </li> <li>Soils are generally suitable for off-site disposal to a licensed waste facility as general solid waste, if required. The ASLP leachate results were above the PFAS NEMP Landfill Acceptance Criteria (Unlined Landfills). As such, areas of higher PFAS concentrations may require disposal to a clay/single composite lined landfill.</li> <li>This material should be segregated from general solid waste.</li> </ul>
Dewatering and groundwater management	<p>Shallow groundwater was not encountered during drilling. There were no known monitoring wells in this area that could be gauged.</p> <p>Based on regional hydrogeology and site observations, shallow groundwater (&lt;2 m bgl) is unlikely to be encountered during construction. Discontinuous shallow perched groundwater could be present in discrete areas.</p>
Residual knowledge gaps and recommendations	<ul style="list-style-type: none"> <li>Due to changes in the layout of the siting option, ~50% of the sampled locations conducted in the Stage 1A and Stage 1B investigations are now outside the current proposed footprint.</li> <li>The vertical extent of PFAS impact in soil at 0315_BH58 and 0315 have not been confirmed and requires further assessment.</li> <li>The siting of linear infrastructure (roads, underground services) was not known at the time of this assessment and has therefore not been assessed.</li> </ul>

## J. CONCLUSIONS AND RECOMMENDATIONS

216. The following conclusions with respect to the project objectives are made:
- a No soil contaminant concentrations above the SAC protective of human health were identified. It is understood that the preferred management approach for excess material will be re-use on Site subject to consultation with Defence and assessment of risk.
  - b PFAS was detected in areas investigated with the exception of the working accommodation in the proposed Contractor's precinct (WE 2.4).
  - c The highest PFAS concentrations were from samples collected from the New Multi-Function Centre siting option (WE 2.1). This is consistent with the historical data set. This area intersects a high risk contaminated site record (CSR) and was formerly the transport yard and fire station and activities included mechanical workshops, vehicle garaging, chemical storage, and historical testing of aqueous film-forming foam (AFFF) on to adjacent grassy areas.
  - d Widespread detections of PFOS above the SAC protective of ecological health were detected across the New Multi-Function Centre (WE 2.1) area.
  - e Isolated detections of PFOS above the SAC protective of ecological health were detected at the Medical Training Facility (WE 6.4), the Q Store and Warehousing (WE 2.5) and the Gym and Fitness Training (WE6.1) siting options.
  - f Soil within the Entry Precinct (WE2.11), Recruit Development Company LIA (WE4.1), New/Refurb 'Lines' (A, B, C and D Companies) (WE4.1), New Transit LIA (WE5.2), HQ Facilities (WE3.1 & 3.2) and the New Weapons Range (WE 7.1) would be classified based on the preliminary soil sampling conducted as **Category 4** in accordance with Defence PFAS Framework (2021).
  - g Soil within the Medical Training Facilities (WE 6.4), EO Storage and Distribution (WE 2.2), Q Store and Warehousing (K6.4) and the Gym and Fitness Training Expansion (WE 6.1) would be classified based on the preliminary soil sampling conducted as **Category 3 and Category 4** in accordance with Defence PFAS Framework (2021).
  - h Soil within the New Multi-Function Centre (We 2.1) would be classified based on the preliminary soil sampling conducted as **Category 2, Category 3 and Category 4** in accordance with Defence PFAS Framework (2021).
  - i Leachability results indicated the highest leachable concentrations of PFAS were reported in samples from the Q Store and Warehousing (WE 2.5) and the New Multi-Function Centre (WE2.1). In both of these siting options, the leachable concentrations were higher in samples at depth than surface samples indicating source material is present at depth.
  - j The vertical extent of PFAS impacts Q Store and Warehousing (WE 2.5), the Gym and Fitness Training Expansion (WE 6.1) and the New Multi-Function Centre (WE 2.1) as PFAS was detected in soil samples collected from depth.

- k Due to changes in the layout of the Medical Training Facilities (WE 6.4) and the Q Store and Warehousing (WE 2.5), some sampled locations are now outside the current proposed footprint.
- l Groundwater was not encountered during drilling. A limited number of existing groundwater monitoring wells exist in the vicinity of the siting options investigated. These monitoring wells were gauged and the standing water levels was either >5 m bgl or the monitoring well was dry. It is considered unlikely that shallow groundwater (<2 m bgl) is unlikely to be encountered during construction, however contingency measures should be made for construction work in the event that discontinuous, shallow perched groundwater is encountered.

217. The following recommendations are made:

- a The Category 2, 3 and 4 soil identified should be managed in accordance with Defence PFAS Framework (2021), including management of leachable PFAS.
- b If any soil requires removal from BBK, the soil will need to be classified at an appropriate sample density (subject to the volume of material) in accordance with the NSW EPA Waste Classification Guidelines and the PFAS NEMP. The initial leachability results indicate some material may require disposal to clay/single composite lined and double composite lined landfills or require treatment at a specialised facility prior to disposal in accordance with the Landfill Acceptance Criteria detailed in the PFAS NEMP.
- c Due to the variability in soil waste classes and the Base-wide work element footprint it is recommended that a stockpile management procedure is documented in the CEMP and implemented during Delivery Phase to provide appropriate segregation and tracking of soil following excavation.
- d If soil is intended to be retained, completion of a soil reuse risk assessment in accordance with the PFAS NEMP will be required. This would include further assessment of the source material and the proposed reuse location (if not already assessed). Suitable reuse purposes and siting locations will need to be identified.
- e Further investigation/sampling is required for the following:
  - i Infrastructure services routes and associated features (where intrusive activities will occur). This will enable preliminary characterisation of soil and fill material at the locations sampled to support decision making on contaminated material management, and to evaluate whether these materials pose an unacceptable risk to workers human health and the environment and development of appropriate construction environmental management controls where risk is unacceptable.
  - ii Demolition areas (where intrusive subsurface activities will occur) and contamination risks could be present, where pre-demolition access is feasible.
  - iii Assessment of the extent of PFAS impacts in the Medical Training Facilities (WE6.4), Q Store and Warehousing (WE 2.5), the Gym and Fitness Training Expansion (WE 6.1) and the New Multi-Function Centre (WE 2.1).
  - iv Any scope item which may be introduced or modified in the design.



- v Potential siting options for reuse of construction spoil impacted by PFAS, should the materials balance indicate that a surplus of spoil will likely be generated and/or contaminated materials require relocation within or outside of the project work areas.
- f Where spoil is proposed to be disposed of off-site, waste classification will be required in accordance with the relevant regulatory requirements.
- g Update the Conceptual Site Model (CSM) if and as required.
- h Liaise and consult with the Directorate of Contamination Assessment, Remediation and Management (DCARM) at a frequency determined by Defence, and supply data if and as required to facilitate the update of Defence's systems including ESdat, GEMS and NSIMS.

## K. LIMITATIONS

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This PCA is based on the documentation, information and data made available to EMM during the 5% MPFR and 30% CDR design stages, as referenced in this report, which informed the constraints analysis and the scope of site investigations.  
  
The site investigations conducted to support this PCA were undertaken in September 2022 during the 30% CDR design stage and assessed scope items and proposed building footprints that were preferred at that time. Recommendations made in the 30% CDR version of this report remain extant, and are subject to review and approval by RRJV. The recommendations may require further revision to address data gaps associated with changes in design during 50% SDR (e.g. building siting) which have occurred since the Stage 1A and Stage 1B site investigations were conducted.
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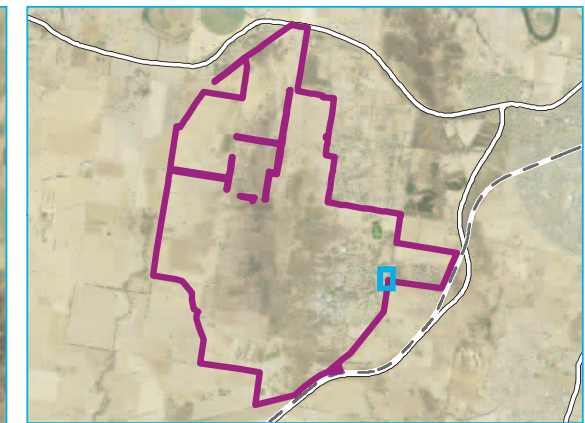
## Attachments

- Attachment 1. Figures
- Attachment 2. Soil investigation logs
- Attachment 3. Calibration certificates
- Attachment 4. Analytical tables
- Attachment 5. Laboratory reports
- Attachment 6. Data quality objectives
- Attachment 7. Data validation
- Attachment 8. Field sheets
- Attachment 9. Site photographs



# ATTACHMENT 1. FIGURES

\\emmsvr1\Defence\3. Projects\2021\1. Defence\E211074 - Riverina Redevelopment\_CPB&Downer\GIS\02 Maps\G007\_KMA\_SoilSampleLocations\_20230517\_04.mxd 17/05/2023



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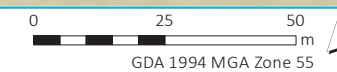
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- Minor road
- Building
- Siting option
- Sampling location
- ⊕ Stage 1A
- ⊕ Existing monitoring well

Sample locations

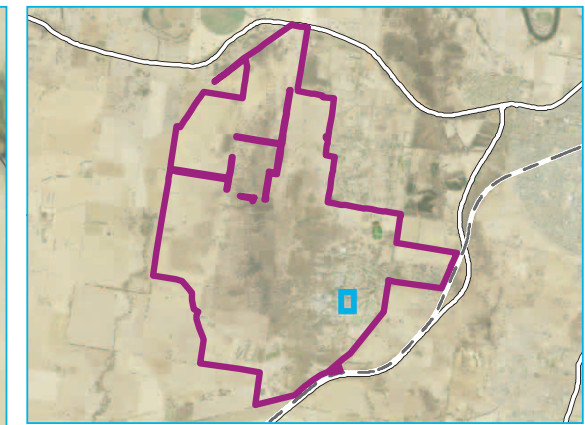
Riverina Redevelopment  
BBK environmental report



Source: EMM (2023); DoD (2022); DELWP (2019); DFSI (2018); GA (2011)



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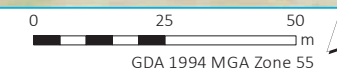
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Sample locations

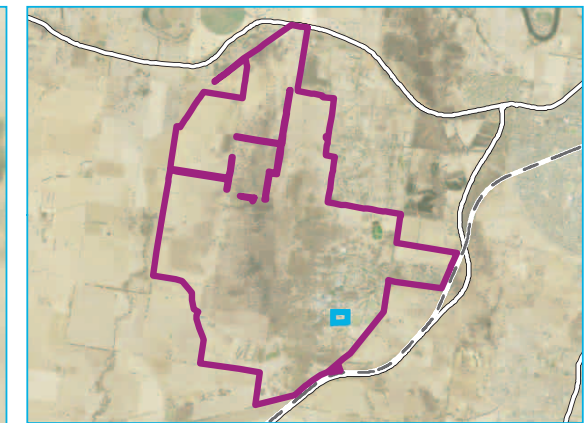
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Source: EMM (2023); DoD (2022); DELWP (2019); DFSI (2018); GA (2011)



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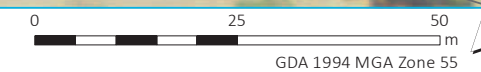
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Sample locations

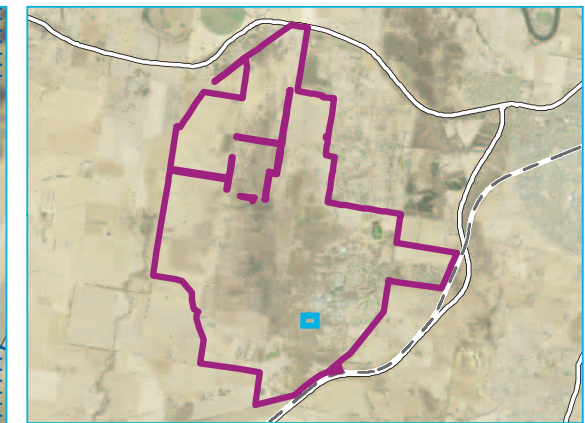
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Source: EMM (2023); DoD (2022); DELWP (2019); DFSI (2018); GA (2011)



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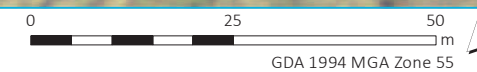
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  - + Stage 1B

Sample locations

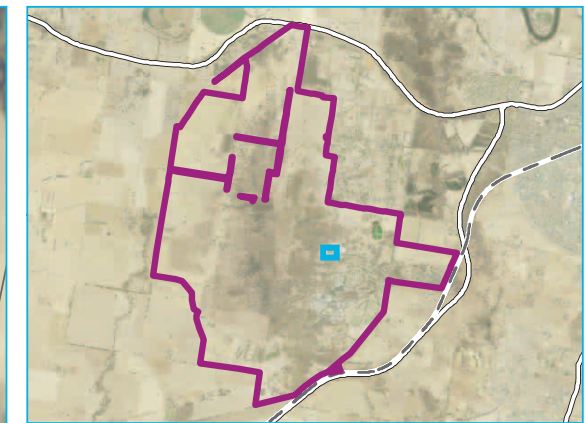
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BBK environmental report



Source: EMM (2023); DoD (2022); DELWP (2019); DFSI (2018); GA (2011)



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- Major road
- Minor road
- Building
- Siting option
- Sampling location
- Stage 1A

Sample locations

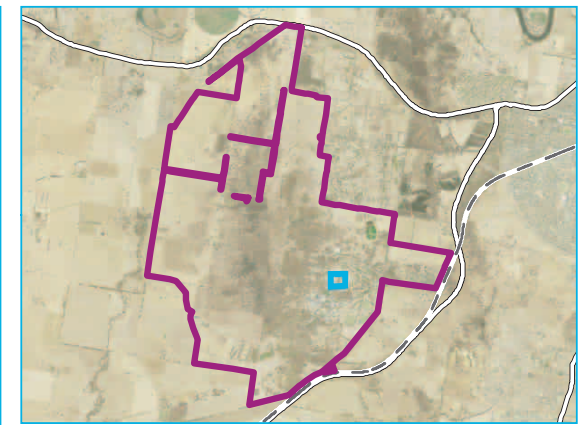
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BBK environmental report



Source: EMM (2023); DoD (2022); DELWP (2019); DFSI (2018); GA (2011)



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  - Existing sample location
  - Rail line
  - Major road
  - Minor road
  - Building
  - Siting option
  - Sampling location
  - ⊕ Stage 1B

Sample locations

Riverina Redevelopment  
BBK environmental report

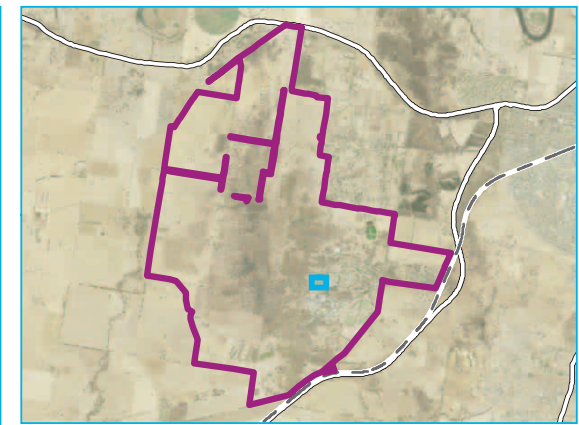


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  - Minor road
  - Building
  - Siting option
- Sampling location**
- Stage 1A
  - Stage 1B

Sample locations

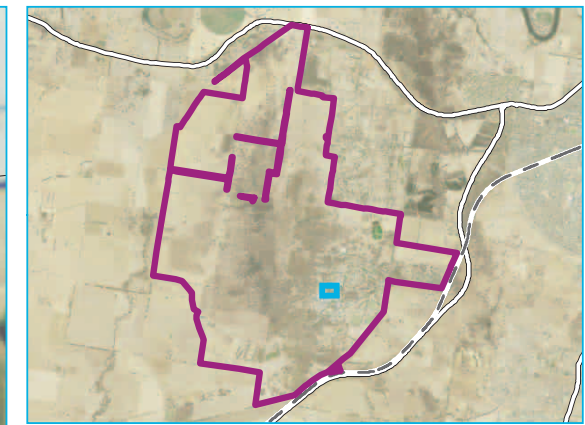
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  - Sampling location**
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  - Stage 1B

Sample locations

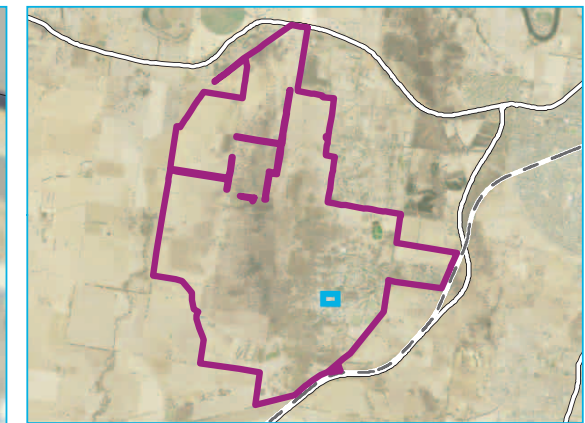
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KEY

- Blamey Barracks Kapooka
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- Building
- Siting option
- Sampling location**
- Stage 1A
- Stage 1B

Sample locations

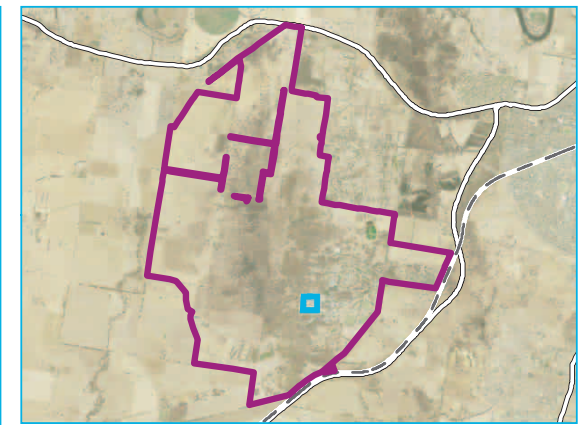
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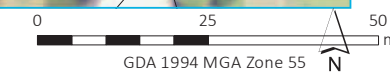
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- Siting option
- + Sampling location
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- + Stage 1B

Sample locations

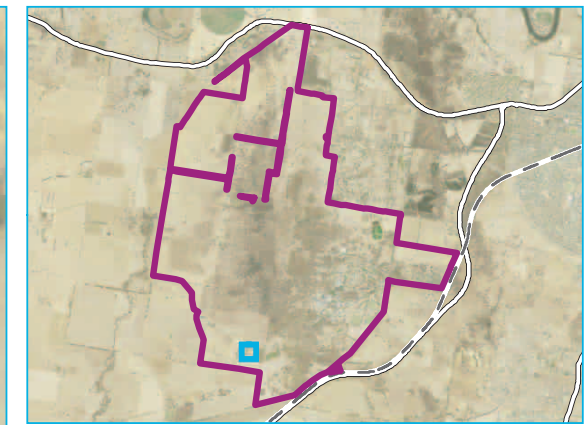
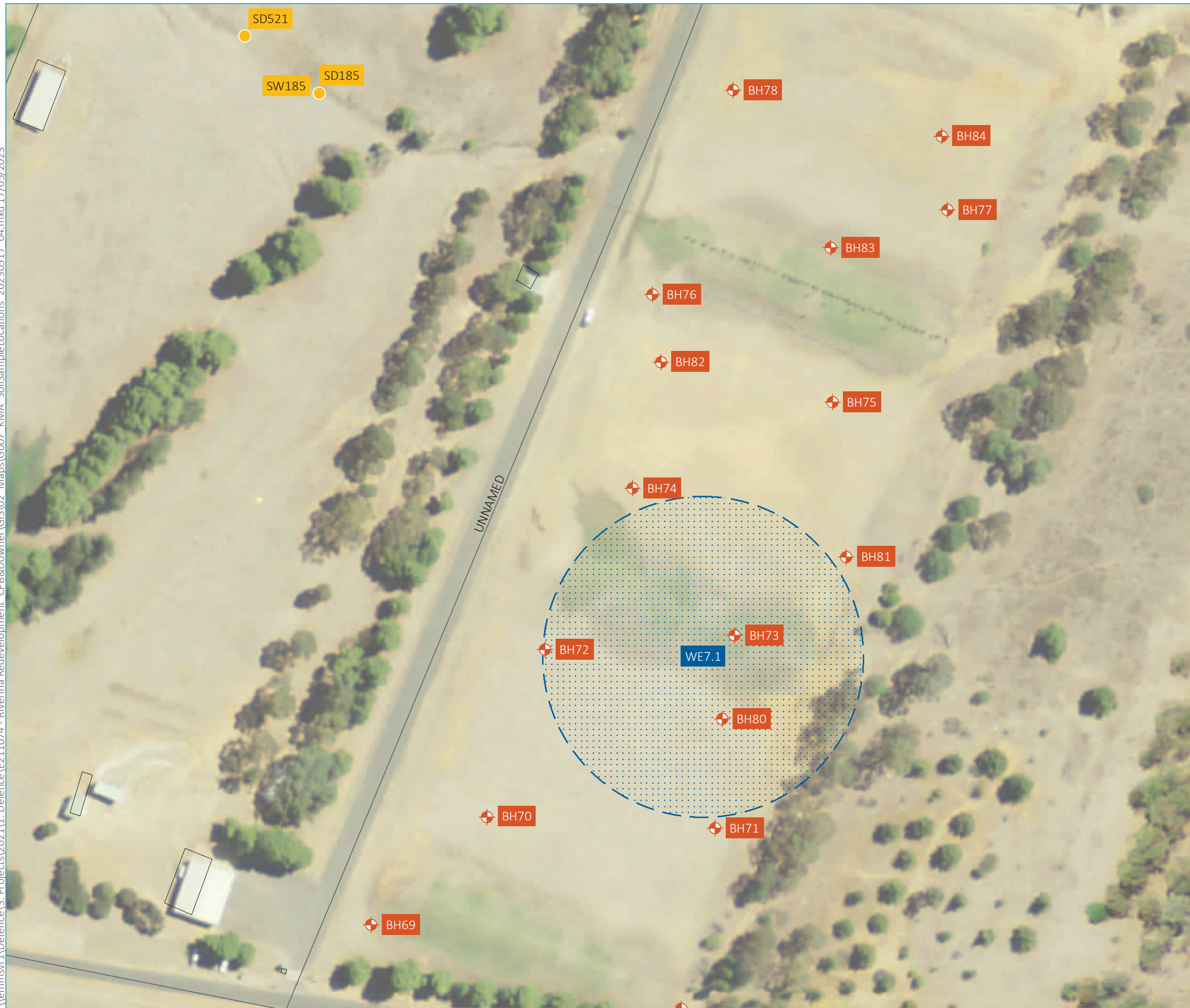
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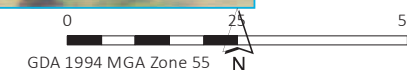
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Sample locations

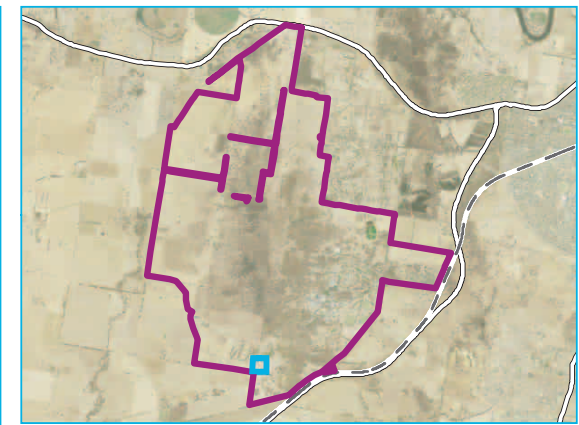
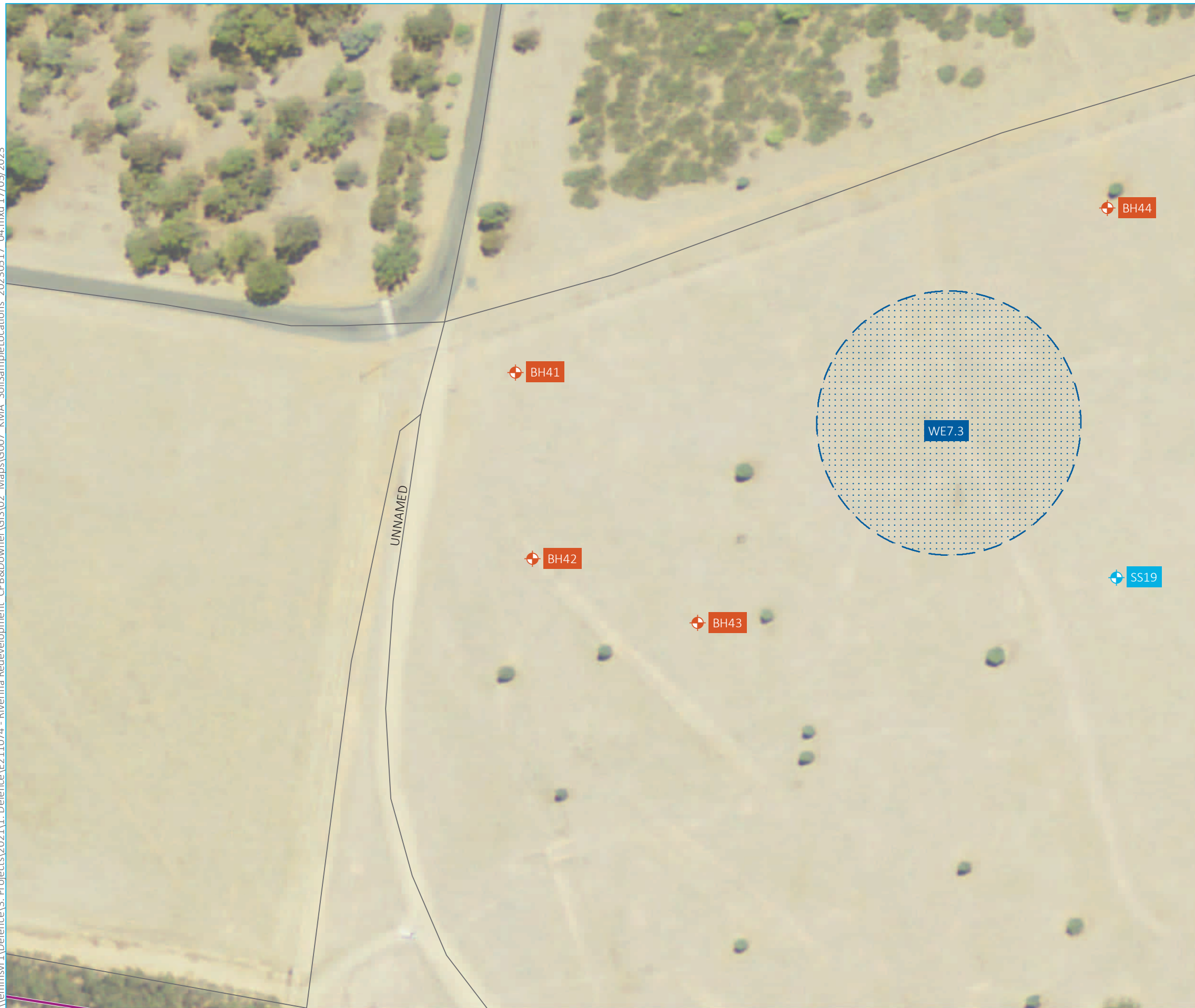
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BBK environmental report



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- KEY**
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- Sampling location**
- + Stage 1A
  - + Stage 1B

Sample locations

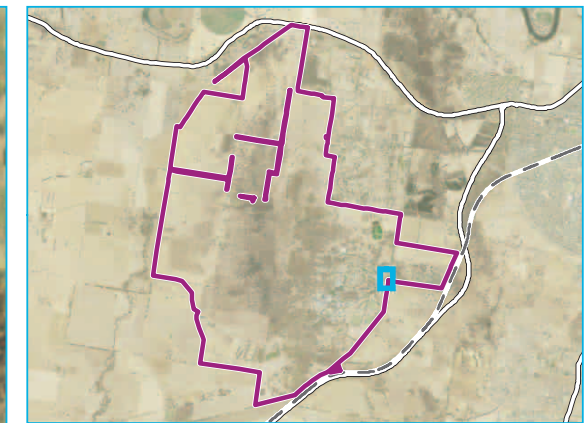
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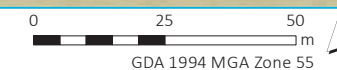
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  - Defence CMF 2021 Table 2 Soil Category 3
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  - NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil
  - PFAS NEMP 2020 Ecological indirect exposure

Soil sample exceedances

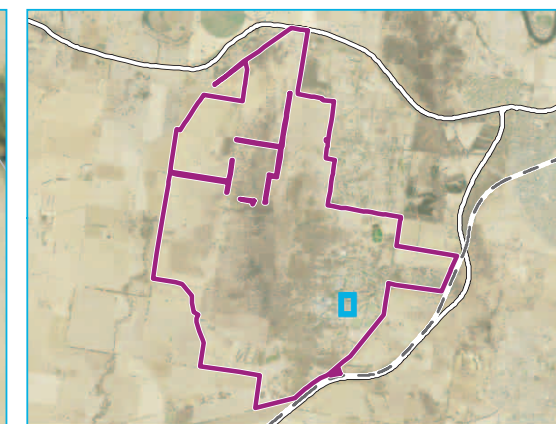
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Soil sample exceedances

Riverina Redevelopment  
BBK environmental report

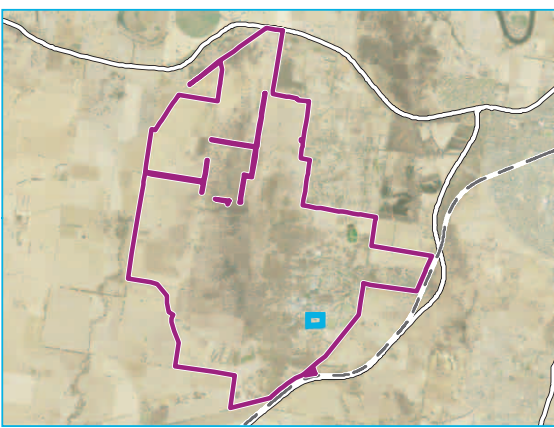


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Soil sample exceedances

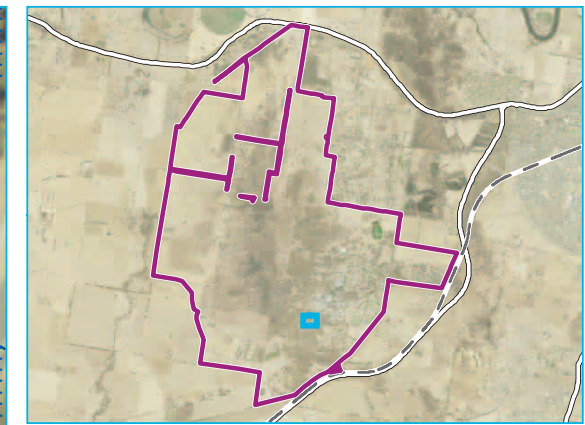
Riverina Redevelopment  
BBK environmental report



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Soil sample exceedances

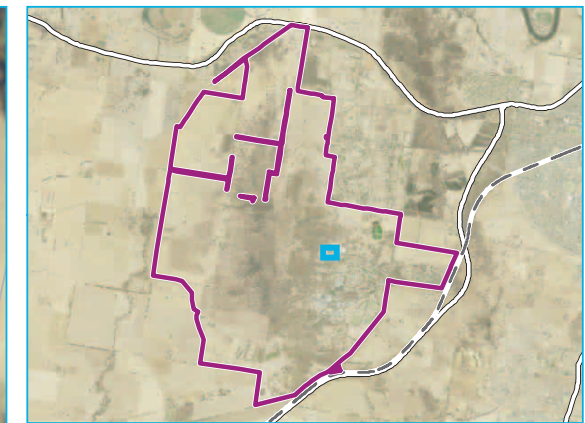
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KEY

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Soil sample exceedances

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Soil sample exceedances

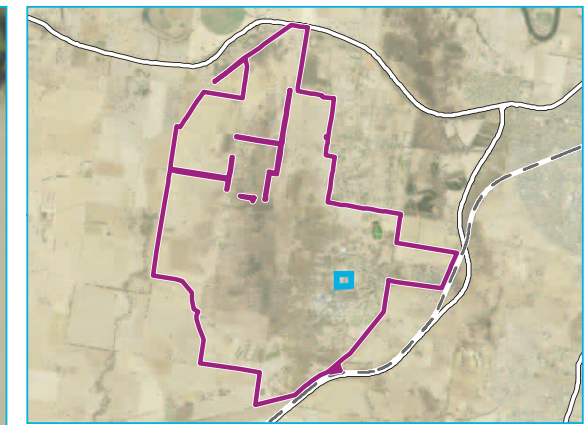
Riverina Redevelopment  
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Soil sample exceedances

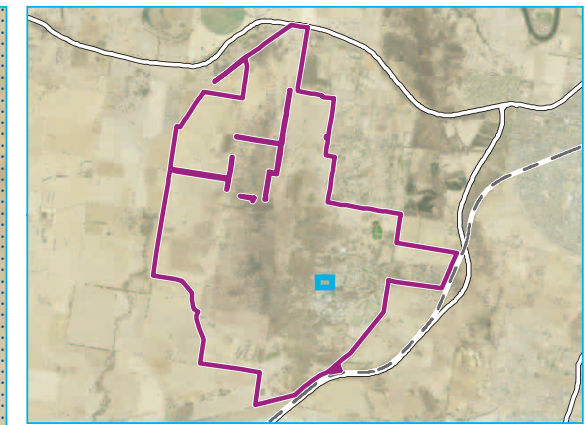
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BBK environmental report



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KEY

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Soil sample exceedances

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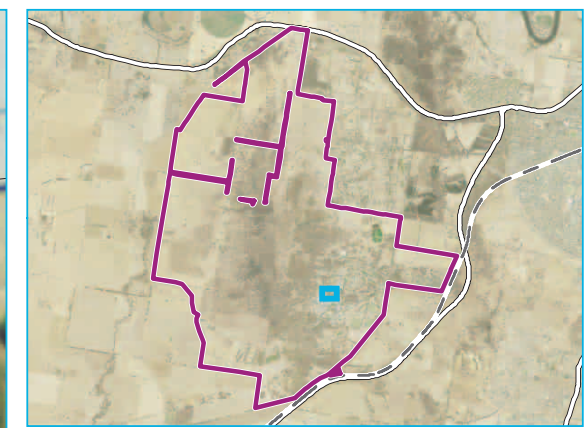
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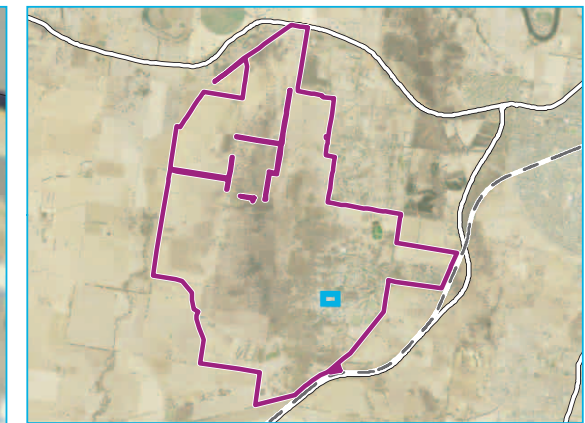
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Soil sample exceedances

Riverina Redevelopment  
BBK environmental report



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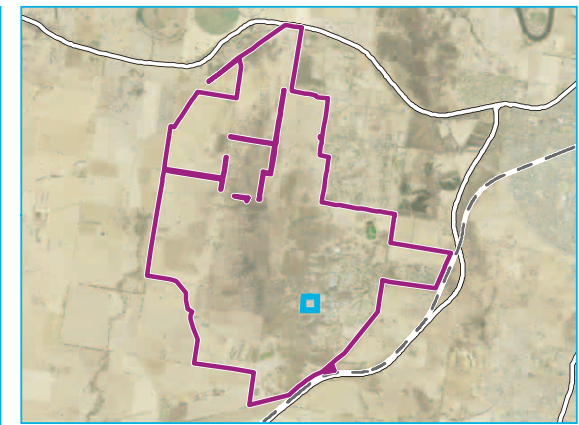
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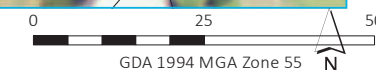
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Soil sample exceedances

Riverina Redevelopment  
BBK environmental report

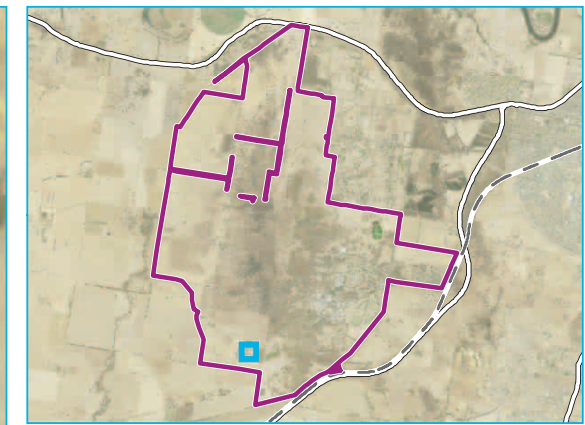


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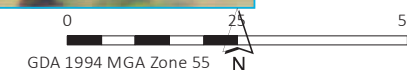
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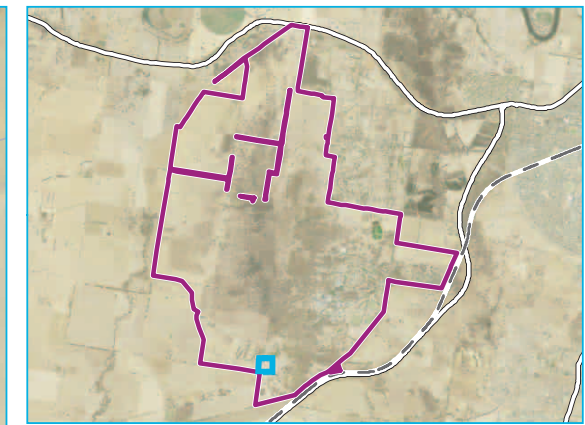
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KEY

Blamey Barracks Kapooka

Rail line

Major road

Minor road

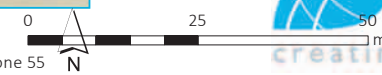
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- NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil
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Soil sample exceedances

Riverina Redevelopment  
BBK environmental report



## **Appendix E. Biodiversity Assessment Report (EMM, 2023a)**

# **Riverina Redevelopment Project: Blamey Barracks Kapooka**

## **Biodiversity Assessment**

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Prepared for Riverina Redevelopment Joint Venture

August 2023

# Riverina Redevelopment Project: Blamey Barracks Kapooka

## Biodiversity Assessment

Riverina Redevelopment Joint Venture

E211074 RP4

August 2023

Version	Date	Prepared by	Approved by	Comments
1.0	17 May 2023	Nathan Garvey	Christopher Holloway	First draft
2.0	19 May 2023	Nadia Eisenlohr	Christopher Holloway	Minor updates to address RRJV comments
3.0	25 May 2023	Christopher Holloway Nathan Garvey	Christopher Holloway	Updates to address PMCA comments
4.0	25 July 2023	Christopher Holloway Nathan Garvey	Christopher Holloway	Updates to address PMCA and DEPAC comments
5.0	10 August 2023	Christopher Holloway	Najah Ishac	Minor editorial updates to address PMCA and DEPAC comments

Approved by



**Christopher Holloway**

Associate Director

10 August 2023

Ground floor 20 Chandos Street

St Leonards NSW 2065

PO Box 21

St Leonards NSW 1590

This report has been prepared in accordance with the brief provided by Riverina Redevelopment Joint Venture and has relied upon the information collected at the time and under the conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of Riverina Redevelopment Joint Venture and no responsibility will be taken for its use by other parties. Riverina Redevelopment Joint Venture may, at its discretion, use the report to inform regulators and the public.

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## Executive Summary

The Riverina Redevelopment Program (RRP) will provide the facilities and infrastructure the Australian Defence Force (ADF) needs for the next 30 years at Royal Australian Air Force (RAAF) Base Wagga (RBW), Albury Wodonga Military Area (AWMA) and Blamey Barracks Kapooka (BBK). The program will replace outdated facilities and equipment, leading to reduced maintenance costs, improved operational reliability, enhanced personnel comfort, safer work environments, and better compliance with Defence standards.

The RRP involves an amalgamation of three redevelopment projects (RBW, AMWA and BBK) within the Riverina / Murray region. However, each project has a separate budget, reporting streams, delivery programs and discrete works to be delivered, and the projects are only grouped under the RRP on logistical grounds. The projects are not reliant on each other and so do not constitute part of a larger action.

This report assesses the biodiversity values at BBK, makes recommendations to avoid, minimise and mitigate impacts and assesses the project against the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Desktop assessments and field surveys were undertaken to obtain an understanding of the biodiversity values present in the study area. This has included detailed mapping of vegetation communities, targeted threatened flora surveys, plots surveys and hollow-bearing tree (HBT) surveys.

These surveys identified two threatened ecological communities (TECs) listed under the EPBC Act, aligned with two NSW plant community types (PCTs), within the study area:

- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia endangered ecological community (EEC) – mapped as PCT 110 – Western Grey Box – Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community (CEEC) – (mapped as PCT 267 – White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion).

An assessment of the significance of impacts to the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC and Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands EEC have been prepared in accordance with *Matters of National Environmental Significance: Significant impact guidelines 1.1* (DoE, 2013) (Appendix D.1).

The assessment for the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC concluded that the project would not result in a significant impact to this CEEC because:

- the project will result in direct impacts to a small area of the community (1.39 ha) at the edge of existing impacts
- this impact represents an insignificant portion of the occurrence of the CEEC at a regional scale (0.01% to 0.09% within the locality) or even at a local scale (0.32% of the CEC within the BBK area)
- impacts are occurring at the edges of existing clearing and will not result in further fragmentation of the TEC
- the project will not modify or destroy abiotic factors necessary for the survival of the TEC
- the project will not cause a substantial change in the species composition or reduction in the quality or integrity

- substantial effort has been placed into refinement of the design to avoid and minimise impacts to the TEC, particularly impacts arising from fragmentation, resulting in a reduction of impacts to the TEC from ~16 ha at CDR to 1.39 ha direct impact and 1.17 ha of indirect impacts.

The assessment for the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands EEC concluded that the project would not result in a significant impact to this EEC because:

- the project will result in direct impacts to a very small area of the community (0.01 ha) at the edge of existing impacts
- this impact represents an insignificant portion of the occurrence of the EEC at a regional scale (0.002% within the locality) or even at a local scale (0.01% of the EEC within the BBK area)
- impacts are occurring at the very edge of existing clearing and will not result in any further fragmentation of the TEC
- the project will not modify or destroy abiotic factors necessary for the survival of the TEC
- the project will not cause a substantial change in the species composition or reduction in the quality or integrity
- the project will not interfere with the recovery of the TEC
- substantial effort has been placed into refinement of the design to avoid and minimise impacts to the TEC, resulting in very minor impacts at the very edge of an existing patch, ensuring no further fragmentation.

No Commonwealth or NSW threatened flora species were observed within the study area or are considered likely to occur.

One EPBC Act and BC Act (NSW) listed threatened fauna species, (the Swift Parrot, *Lathamus discolor*) has previously been recorded within the study area, but was not recorded during any of the surveys undertaken for the project. One EPBC Act and BC Act listed threatened fauna species (the Superb Parrot, *Polytelis swainsonii*) and one BC Act only listed threatened fauna species (the Grey-crowned Babbler, *Pomatostomus temporalis temporalis*) were recorded in the study area during the current surveys. Based on the presence of suitable habitat, an additional 20 threatened fauna species are considered to have a moderate to high likelihood of occurrence in the study area, including six species listed under the EPBC Act and an additional 14 species listed under only the BC Act. Assessments of significance have been prepared in accordance with *Matters of National Environmental Significance: Significant impact guidelines 1.1* (DoE, 2013) (Appendix D.2). These assessments concluded that the project would not result in a significant impact to threatened fauna species.

Considerable effort has been made to avoid and minimise impacts through design. Table ES1 provides a summary of how impacts have been reduced through this design iteration process with further details provided in Section 4.1.1. Residual impacts will be mitigated through the implementation of additional controls during construction, including preparation of a Construction Environmental Management Plan (CEMP) and associated Biodiversity Management Plan (BMP) (see Section 4.1.2).

**Table ES1**      **Avoidance process during design stages**

Design stage	Impact on EPBC Act list TEC (ha)
5% MPFR	Not quantified
30% CDR	Direct impact to ~16 ha of TECs, including White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland and Grey Box Grassy Woodlands, comprising direct impact to ~9 ha and potential for a further ~7 ha as a result of bushfire asset protection zones. Note: indirect impacts from habitat fragmentation were not quantified at this stage.
50% SDR – early design	Direct/indirect impact to 2.74 ha.
50% SDR – final design	Direct/indirect impact to 2.56 ha.

Residual impacts arising from the project, after all measures to avoid, minimise and mitigate impacts, include:

- loss of 1.40 ha native vegetation, including:
  - 1.39 ha of EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC
  - 0.01 ha of EPBC Act listed Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC
- indirect impacts, including fragmentation, to an additional 3.06 ha of native vegetation including 1.17 ha of EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC
- loss and degradation of native fauna habitats
- loss of five hollow-bearing trees (HBTs).

The project was assessed against the requirements of the EPBC Act (Section 5), including assessments of significance in accordance with *Matters of National Environmental Significance: Significant impact guidelines 1.1* (Appendix D). This concluded that:

- the project will not result in any impacts to any Ramsar wetlands
- impacts to the two Commonwealth listed TECs are not considered significant considering the small area of impact (1.39 ha and 0.01 ha), that these impacts are insignificant at a local or regional scale and that impacts will occur at the edge of existing cleared areas
- impacts to threatened species are not considered significant (see Appendix D, Table D.3 to Table D.10 for further details)
- the study area does not support important habitat for any migratory species and will not result in significant impacts to migratory species
- the impacts arising from the project are considered unlikely to result in a significant impact to plants and animals on Commonwealth land.



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# 1 Introduction

## 1.1 Project description

The Riverina Redevelopment Program (RRP) will provide the facilities and infrastructure the Australian Defence Force (ADF) needs for the next 30 years at Royal Australian Air Force (RAAF) Base Wagga (RBW), Albury Wodonga Military Area (AWMA) and Blamey Barracks Kapooka (BBK). The Works will largely replace facilities and equipment at the end of their useful life. This will reduce maintenance costs, address deficiencies in operational reliabilities, improve personnel comfort, provide a safer work environment, and improve compliance with Defence standards.

The RRP has been combined as an opportunity for Defence to transform and sustain the capabilities of RBW, AWMA and BBK. The Program involves an amalgamation of three redevelopment projects within the Riverina–Murray region, each similar in structure and scope, making them well-suited to deliver as a single large sustainment program. The three Projects in the RRP Program of Works are:

- EST02021 ALBURY WODONGA MILITARY AREA REDEVELOPMENT, VIC & NSW
- EST02025 RAAF BASE WAGGA REDEVELOPMENT, NSW
- EST02036 BLAMEY BARRACKS KAPOOKA REDEVELOPMENT, NSW (subject of this report).

These Bases are the ‘front door’ of the ADF, and they deliver the first impression of Army and Air Force life to enlistees and their families. In addition, the AWMA has an important national logistics function. Each has a distinctive place in the Riverina / Murray community with histories spanning generations. The training provided has set the foundation for tens of thousands of careers, sustaining and building the capability of the ADF and contributing to the development of the nation. The program of works under the RRP will support Defence by aligning with the step change toward a contemporary Defence Force, providing exemplar facilities and infrastructure with the flexibility in planning to meet the demand on training facilities likely to arise from Defence’s recent Force Structure Plan 2020 (FSP20).

Although the RRP has been combined as an opportunity for Defence to transform and sustain the capabilities of RBW, AMWA and BBK, each project is a stand-alone development that are considered a single action. The RRP involves an amalgamation of three redevelopment projects within the Riverina / Murray region, each similar in structure and scope, making them well-suited to deliver as a single large sustainment program. However, each project has a separate Planning and Delivery budget, reporting streams, delivery programs and discrete works to be delivered. The individual projects are not reliant on each other and each could proceed independent of the others. As such, each of these projects is managed independently and are only grouped under the RRP on logistical grounds. The projects are not reliant on each other and so do not constitute part of a larger action.

This report assesses the potential biodiversity values that will be impacted by the project at BBK, provides recommendations to avoid, minimise and mitigate these impacts and assesses the project against the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Key project work elements are shown in Figure 1.1 and Figure 1.2.

## 1.2 Terminology

The following terminology and abbreviations are used within this report.

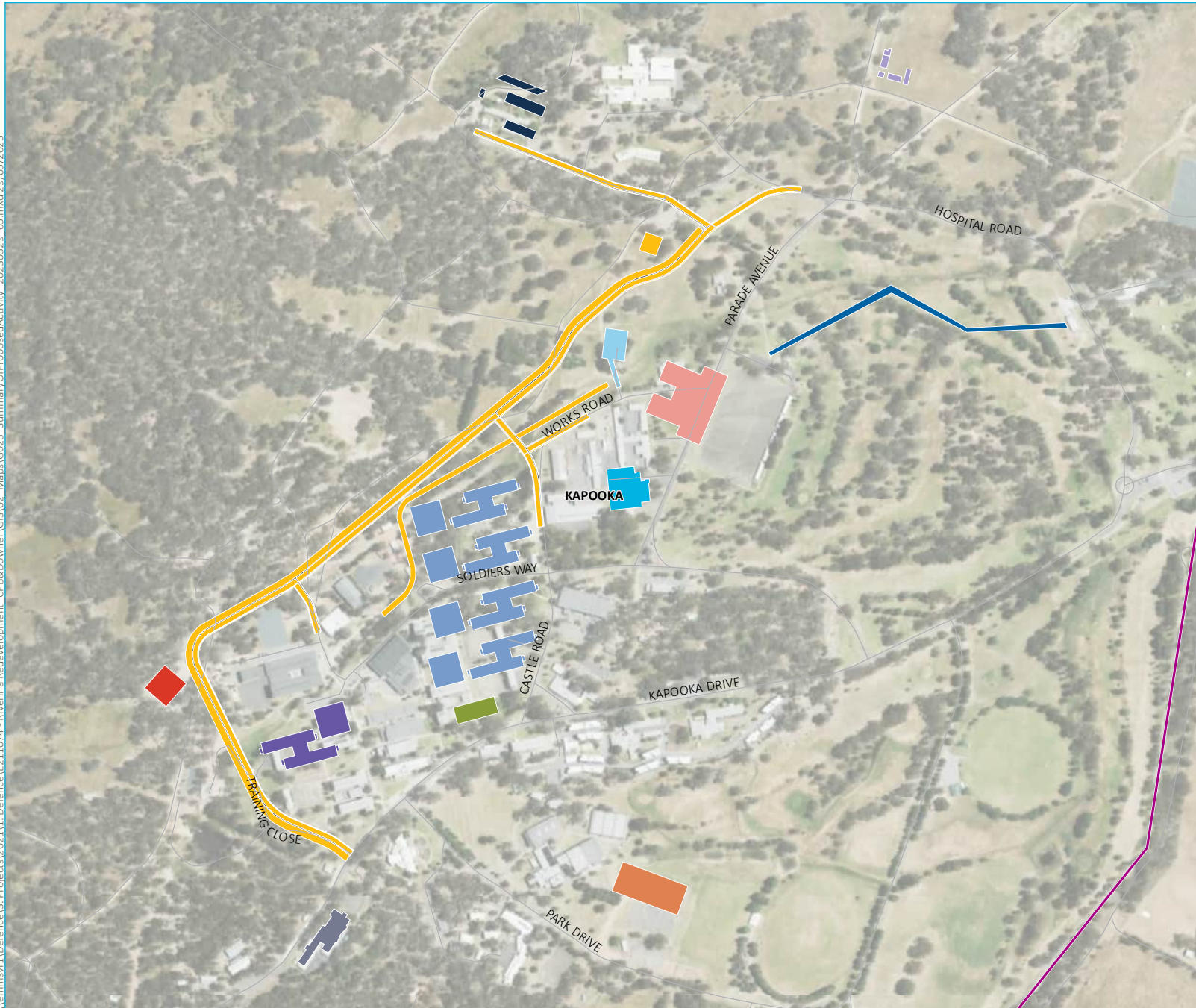
**Table 1.1** Terminology and abbreviation

Term or abbreviation	Meaning
ADF	Australian Defence Force
AWMA	Albury Wodonga Military Area
BAM	NSW Biodiversity Assessment Method
BBK	Blamey Barracks Kapooka (previously known as KMA)
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BMP	Biodiversity Management Plan
CDR	Concept Design Review
CE	Critically Endangered
CEEC	Critically Endangered Ecological Community listed under the EPBC Act or BC Act
CEMP	Construction Environmental Management Plan
DBH	Diameter at Breast Height
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries
EEC	Endangered Ecological Community listed under the EPBC Act or BC Act
EN	Endangered
EMM	EMM Consulting
EO	Explosive Ordnance
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FM Act	NSW <i>Fisheries Management Act 1994</i>
ha	Hectares
HBT	Hollow-bearing tree
KMA	Kapooka Military Area (now referred to as BBK)
Locality	A 10 km buffer around the study area
MNES	Matters of National Environmental Significance listed under the EPBC Act
MPFR	Master Plan and Feasibility Review
NSW	New South Wales
PCT	Plant Community Type
PMST	Protected Matters Search Tool

**Table 1.1**      **Terminology and abbreviation**

<b>Term or abbreviation</b>	<b>Meaning</b>
RAAF	Royal Australian Air Force
RBW	RAAF Base Wagga
RRJV	Riverina Redevelopment Joint Venture
RRP	Riverina Redevelopment Program
SDR	Schematic Design Review
Study area	The area directly impacted by the works associated with the project
SVTM	NSW State Vegetation Type Map
TEC	Threatened Ecological Community listed under the EPBC Act or BC Act
VU	Vulnerable

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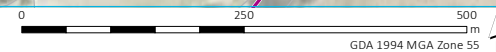


- KEY**
- Blamey Barracks Kapooka
  - Minor road
- Summary of proposed activities**
- WE 2.5 Clothing store and Q-store
  - Car spaces
  - WE 2.4 Contractors precinct
  - WE 2.6 Edmonson Club Refurbishment
  - WE 3.1/3.2 HQ building
  - Kapooka heritage trail
  - WE 4.2 LIA - Alpha Bravo, Charlie Company and Delta Company
  - Recruit Development Company
  - WE 2.7 Land management compound
  - WE 6.4 Medical training centre
  - WE 2.1 Multifunction centre
  - WE 6.1 Recruit physical training facility
  - WE 1.10 Ring road and drainage swale
  - Services

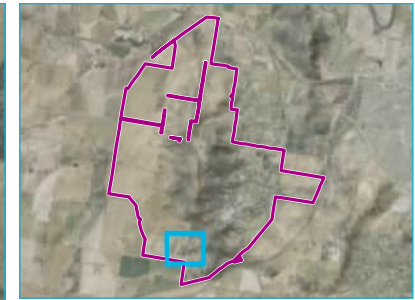
Blamey Barracks Kapooka work elements (Cantonment)

Riverina Redevelopment  
Blamey Barracks Kapooka  
Figure 1.1







Source: EMM (2023); DELWP (2019); DFSI (2018); ESRI (2022); GA (2011)



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KEY

-  Blamey Barracks Kapooka
-  Minor road
-  Watercourse/drainage line
-  Waterbody
-  New EO storage
-  New weapons range

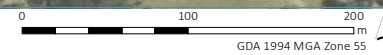
Blamey Barracks Kapooka work elements (Range and EO Facilities)

Riverina Redevelopment  
Blamey Barracks Kapooka

Figure 1.2



Source: EMM (2023); ABS (2021); DELWP (2019); DFSI (2018); ESRI (2022); GA (2011)





## 2 Methods

### 2.1 Desktop assessment

Prior to undertaking the field investigations, a desktop assessment was undertaken and has been subsequently updated. The desktop assessment comprised database searches (conducted on 15 May 2023) and review of relevant information, including the following:

- A search of the Protected Matters Search Tool (PMST), managed by the Department of Climate Change, Energy, the Environment and Water (DCCEEW), for Matters of National Environmental Significance (MNES) protected by the EPBC Act (Appendix A). This included a 10 kilometre (km) buffer around the disturbance footprint.
- A search of the BioNet Atlas of NSW Wildlife, managed by the Biodiversity Conservation Division (BCD) of the NSW Department of Planning and Environment (DPE), for records of threatened species and communities listed under the *Biodiversity Conservation Act 2016* (BC Act) and EPBC Act within 10 km of the disturbance footprint.
- A review of the Fisheries NSW Spatial Data Portal, managed by the Department of Primary Industries (DPI), for threatened species and communities listed under the *Fisheries Management Act 1994* (FM Act).
- A review of relevant vegetation mapping datasets, including the NSW State Vegetation Type Map, Version C1.1.M1.1 (DPE, 2022).
- A review of aerial imagery for the study area and locality.
- A review of relevant literature and previous reports for the area, including:
  - Landscape Management Plan: Kapooka Military Area (Cumberland Ecology, 2010)
  - Box-Gum Woodland Mapping Project and Monitoring Plan for Kapooka Military Area (EcoLogical, 2010)
  - EPBC Box-Gum Woodland Monitoring: Kapooka Military Area (EcoLogical, 2012).
- A review of unpublished arboricultural data (Excel spreadsheet) collected for Department of Defence sites throughout the Riverina.

This desktop assessment was used to inform the field investigation and subsequent analyses.

### 2.2 Field investigations

Several site assessments have been undertaken through the life of the project. These sites assessments are summarised in Table 2.1.

**Table 2.1 Site assessments undertaken**

Survey name	Dates	Personnel	Scope of works
Ecological constraints assessment	28 September 2022	Simon Scott and Stuart Cooney (EcoLink Consulting)	<p>An initial ecological (flora and fauna) constraints assessment was undertaken in September 2022, with the purpose of identifying biodiversity values within the study area (at this time) to identify potential constraints to development and to guide design. The area surveyed included proposed infrastructure and building locations at the 5% Masterplan and Feasibility Review (MPFR) stage, with a 15 metre (m) buffer around each of the proposed building options.</p> <p>Throughout the site assessment, the assessors took general notes on land uses and biodiversity values. This included:</p> <ul style="list-style-type: none"> <li>• the current site uses</li> <li>• ecological features such as wetlands, drains or waterways or vegetation communities</li> <li>• dominant flora and fauna species</li> <li>• incidental observations of threatened flora and fauna species listed under the EPBC Act or BC Act.</li> </ul> <p>Native vegetation was mapped using a hand-held tablet (accuracy +/- 5 m) with patches assessed against relevant conservation advice, listing advice or recovery plan to determine their alignment with any threatened ecological communities (TECs) listed under the EPBC Act or BC Act.</p> <p>Targeted flora surveys were undertaken in areas of suitable habitat within the study area. The two assessors traversed these areas using transects spaces at 10 m intervals.</p>
Vegetation assessment	4 and 5 April 2023	Simon Scott and Stuart Cooney (EcoLink Consulting)	<p>In April 2023, a further vegetation assessment was undertaken for the purposes of updating the previous assessment, including mapping additional area of native vegetation with potential to be impacted by the design due to changes in design extent, and collect additional information to more robustly determine the presence of TECs within the study area.</p> <p>Native vegetation was mapped using a hand-held tablet (accuracy +/- 5 m) with patches stratified based on condition (referred to as a 'vegetation zone' in the NSW Biodiversity Assessment Method (BAM) (DPIE, 2020)) and then further assessed against relevant conservation and listing advice to determine their alignment with any TECs listed under the EPBC Act or BC Act.</p> <p>Representative plot data was collected generally in accordance with the BAM (DPIE, 2020). Plots were 50 m x 20 m in area, totalling 1,000 square metres (m<sup>2</sup>)</p> <p>At each plot location the following was undertaken:</p> <ul style="list-style-type: none"> <li>• one 20 x 20 m plot, for assessment of composition and structure</li> <li>• one 20 x 50 m plots for assessment of function, including a series of five 1 x 1 m plots to assess average leaf litter cover.</li> </ul> <p>The assessment of composition and structure, based on a 20 x 20 m plot, recorded species name, stratum, growth form, cover and abundance rating for each species present within the plot. Cover (foliage cover) and abundance was measured for each species/taxa using the Braun-Blanquet cover abundance scale:</p> <ul style="list-style-type: none"> <li>• R = Rare, &lt;1% cover of taxa</li> <li>• 1 = 1-5% cover of taxa</li> <li>• 2 = 6-25% cover of taxa</li> <li>• 3 = 26-50% cover of taxa</li> <li>• 4 = 51-75% cover of taxa.</li> </ul> <p>The assessment of functional aspects included the visual estimation of leaf litter, rock cover and cover of lichens and mosses to the nearest 1%, and the visual assessment of the numbers of trees within each 10 centimetre (cm) increment:</p> <ul style="list-style-type: none"> <li>• 0-10 cm</li> <li>• 11-20 cm</li> </ul>

**Table 2.1 Site assessments undertaken**

Survey name	Dates	Personnel	Scope of works
			<ul style="list-style-type: none"> <li>• 21-30 cm</li> <li>• 31-40 cm, etc.</li> </ul> <p>A total of four plots were completed (Figure 3.1), including two in PCT 267 – White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion (one in an area of Moderate condition and one in an area of High condition) and two in PCT 110 – Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion (one in an area of Moderate condition and one in an area of High condition).</p> <p>All flora species observed within the study area were recorded, with the exception of planted vegetation that was not considered a ‘weed’ (i.e., planted vegetation that was not spreading or reproducing). Where a species was not able to be confidently identified in the field, a sample was collected and later identified. Plants were identified to species level wherever possible; however, some plants that were planted, cultivars, hybrids, or plants that did not contain suitable fertile material used for identification were recorded to genus level.</p> <p>The location of large trees (&gt;80cm Diameter at Breast Height (DBH) as defined in the BAM (DPIE, 2020)) and scattered trees within habitat zones and TECs were also recorded. This included recording their:</p> <ul style="list-style-type: none"> <li>• location using a hand-held tablet</li> <li>• species</li> <li>• size (DBH).</li> </ul>
Vegetation assessment and mapping of hollow-bearing trees (HBTs)	9 May 2023	Simon Scott (EcoLink) and Nathan Garvey (EMM)	<p>In May 2023 an additional survey was undertaken to review and refine the boundaries of vegetation communities within the study area, undertake additional mapping of native vegetation in some areas, due to changes in design extent, and map HBTs within and adjacent to the study area, particularly those suitable for the Superb Parrot (Rayner, Stojanovic, Heinsohn, &amp; Manning, 2015). Vegetation community boundaries were refined in the field and data on HBTs was collected using GPS-enabled tablet computers using FieldMaps for ArcGIS™.</p> <p>The purpose of this visit was also to work with the design team from RRJV to inform final changes to design and impacts to biodiversity values. The entire access road and some project elements were walked with discussions on opportunities to avoid and minimise impacts</p>

### 2.3 Likelihood of occurrence assessment

The criteria for assessing likelihood of occurrence for threatened species, used to inform the assessments in Appendix B, is listed in Table 2.2.

**Table 2.2 Likelihood of occurrence criteria**

Likelihood	Description	Further assessment conducted?
Negligible	The potential for the species to occur is considered so unlikely as to not be worth considering.	No
Low	<p>Based on data collected during field investigations and/or review of desktop information it was considered that the species was unlikely to occur in the study area or use habitats in the study area. A species may utilise the study area on rare occasions.</p> <p>Species is considered vagrant in the bioregion and is thus considered unlikely to occur in the study area.</p>	No

**Table 2.2** Likelihood of occurrence criteria

Likelihood	Description	Further assessment conducted?
Moderate	The species is known to occur in the bioregion and the study area provides some habitat value for the species. Habitat values may be degraded and considered suboptimal or other factors may mean the species is not considered a high likelihood of occurrence.	Yes
High	The species is known to occur in the bioregion and the study area supports optimal habitat features for the species.	Yes
Recorded	The species has been recorded during current surveys or has been recorded in the study area previously and there has not been any change in habitat values since this time.	Yes

## 2.4 Limitations

Whilst the biodiversity assessments outlined above provide a comprehensive assessment of the biodiversity values, the assessment is subject to a number of limitations outlined below. In many cases these limitations do not represent a significant limitation on this survey.

- Biodiversity surveys provide a sample of the species present at a site, but there are a number of reasons why not all species present will be recorded. This includes low abundance, distribution across a site, activity levels or behaviour. EMM has undertaken detailed surveys to minimise the impacts of this limitation.
- Site assessments were conducted in September, March and May, with targeted flora surveys undertaken in September. This is considered an optimal time for undertaking these surveys with most threatened flora species being detectable at this time. However, due to minor design changes between September 2022 and May 2023, some minor areas remain unsurveyed.
- The biodiversity assessment included a habitat assessment for threatened flora and fauna species. Other than targeted flora surveys in September 2022, no targeted surveys have been undertaken. This was considered suitable given the limited nature of the impacts of the project. A conservative approach to assuming the presence of threatened species has been taken.
- Some flora and fauna species may only be recorded during certain times or seasons (e.g. plants that only contain above-ground biomass and are only visible annually, nocturnal mammals and birds, migratory birds, or fauna identified through seasonal breeding calls such as some frog species).
- While some species have been assessed as having a low likelihood of occurrence, it is acknowledged that this does not indicate the species will never occur. Rather, it means that based on data collected during field investigations it was considered that the species was unlikely to occur in the study area or use habitats in the study area. A species may utilise the study area on rare occasions.
- Planted non-indigenous and exotic species were not recorded. Small trees, <20 cm DBH were not recorded.

## 3 Results

### 3.1 Native vegetation

#### 3.1.1 Flora species

A total of 120 flora species were recorded by EcoLink across the study area. This comprised 77 indigenous species and 43 exotic species. A list of all flora species is provided in Appendix C.

#### 3.1.2 Vegetation communities

Field investigations, including determination of vegetation communities using the methods described in Section 2.2, identified the presence of two NSW PCTs within the study area. These PCTs were stratified into four vegetation zones. PCTs are summarised in Table 3.1, including both direct impacts and indirect (e.g. via fragmentation) impacts, and shown in Figure 3.1.

**Table 3.1 PCTs and vegetation zones mapped within the study area**

Plant community type	Condition	Area (ha)	
		Direct	Indirect
PCT 110 – Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion	Moderate	0.02	0.00
PCT 110 – Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion	High	0.01	0.00
PCT 267 – White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Moderate	1.14	1.90
PCT 267 – White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	High	1.39	1.17
<b>TOTAL</b>		<b>2.56</b>	<b>3.06</b>

Each of the two PCTs is described in further detail within the following section.

**Table 3.2 PCT 110 – Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion**

PCT 110 – Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion	
PCT ID	110
Common name	Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion
Condition class and extent within the study area	Moderate – 0.02 ha (Direct: 0.02 ha, Indirect: 0.00 ha) High – 0.01 ha (Direct 0.01 ha, Indirect 0.00 ha)
Description	The canopy is generally dominated by Inland Grey Box ( <i>Eucalyptus macrocarpa</i> ) with occasional Blakely's Red Gum ( <i>Eucalyptus blakelyi</i> ), White Box ( <i>Eucalyptus albens</i> ) and Yellow Box ( <i>Eucalyptus melliodora</i> ). However, these other species or not dominant throughout the broader patch. The midstorey is largely absent with no shrubs observed within plots and only a sparse cover of shrubs

**Table 3.2 PCT 110 – Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion**

PCT 110 – Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion	
	<p>observed more broadly within this PCT.</p> <p>The ground layer is dominated by tussock grasses such as Rough Spear-grass (<i>Austrostipa scabra</i> subsp. <i>falcata</i>) Wallaby Grass (<i>Rytidosperma racemosum</i>) and Yanganbil (<i>Austrostipa bigeniculata</i>) with a diverse array of forbs such as Sticky Everlasting (<i>Xerochrysum viscosum</i>) and Climbing Saltbush (<i>Einadia nutans</i>), rushes such as Wattle Matt-rush (<i>Lomandra filiformis</i>) and the fern Cloak-fern (<i>Cheilanthes sieberi</i>).</p> <p>In areas of Moderate condition, exotic grasses such as Kikuyu (<i>Cenchrus clandestinus</i>) dominate the ground layer with other exotic species such as Catsear (<i>Hypochaeris radicata</i>) and St Johns Wort (<i>Hypericum perforatum</i>) relatively common.</p>
Survey effort	<p>Two plots were completed within this PCT (Figure 3.1):</p> <ul style="list-style-type: none"> <li>• Moderate: one plot (P3)</li> <li>• High: one plot (P4).</li> </ul>
Condition description	<p>Areas in Moderate condition have been impacted by past clearing and contained non-grass weeds which exceeded more than 30% of the plant cover in the ground layer. These areas are generally located closer to existing infrastructure and buildings and may have had historic or irregular disturbance such as previous earthworks to modify the ground (e.g. bunding to manage rainfall down slopes, or dams) and may include areas of planted native vegetation.</p> <p>Areas in High condition were unlikely to have experienced regular disturbance, other than occasional, light foot traffic. As a result, the groundcover was predominantly native. These areas also tended to support a larger number of mature trees.</p>
Status	<p>An assessment was undertaken of the potential for PCT 110 to be representative of the Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia endangered ecological community (EEC) listed under the EPBC Act. The PCT was assessed against the key diagnostic characteristics and condition thresholds outlined in the <i>Grey Box (E. microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia listing advice</i> (Threatened Species Scientific Committee, 2010) and the <i>Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia - EPBC Act policy statement</i> (DSEWPac, 2012).</p> <ul style="list-style-type: none"> <li>• The study area is within the area shown on the Grey Box Grassy Woodland distribution map on page 13 of DSEWPac (2012).</li> <li>• In areas of High condition, at least 50% of the plant cover in the ground layer is made up of perennial native species. <ul style="list-style-type: none"> <li>– However, in areas of Moderate condition exotic species dominate the ground layer and less than 10% of plant cover in the ground layer is made up of perennial native grass species. These areas, therefore, do not form part of the listed community.</li> </ul> </li> <li>• Within PCT 110, Inland Grey Box is the most common tree species.</li> <li>• Areas of PCT 110 in High condition form part of a patch that is &gt;0.5 ha in size, with 2.88 ha mapped within and adjacent to the study area, which forms part of a larger patch extending beyond the study area.</li> <li>• Non-grass weeds make up less than 30% of the plant cover in the ground layer.</li> <li>• Trees cover at least 10% of the patch.</li> <li>• The patch is bigger than 2 ha (2.88 ha).</li> <li>• There at least 8 trees/ha which have a diameter &gt;60 cm at 1.3 m above ground level.</li> <li>• ≥50% of the plant cover in the ground layer is made up of perennial native grass species.</li> </ul> <p><b>Based on this, areas of PCT 110 in High condition are considered to form part of the Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC. Areas in Moderate condition do not meet required thresholds for listing.</b></p>

**Table 3.2** PCT 110 – Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion

PCT 110 – Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion



**Photograph 3.1** Plot 4 facing west

**Table 3.3** PCT 267 – White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion

PCT 267 – White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion

PCT ID	267
Common name	White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion
Condition class and extent within the study area	Moderate – 3.04 ha (Direct: 1.14 ha, Indirect: 1.90 ha) High – 3.58 ha (Direct 1.39 ha, Indirect 1.17 ha)
Description	<p>The canopy is generally dominated by White Box, with occasional emergent Inland Grey Box, Blakely's Red Gum or Yellow Box. However, these species are sparse within this PCT.</p> <p>The midstorey is largely absent with no shrubs observed within plots and only a sparse cover of shrubs such as Kangaroo Thorn (<i>Acacia paradoxa</i>) observed more broadly within this PCT.</p> <p>The ground layer is dominated by tussock grasses such as Brown's Lovegrass (<i>Eragrostis brownii</i>), Rough Spear-grass, Wallaby Grass and Yanganbil, with a diverse array of forbs such as Blue Crowfoot (<i>Erodium cicutarium</i>), Fuzzy New Holland Daisy (<i>Vittadinia cuneata</i>), Small St John's Wort (<i>Hypericum gramineum</i>) and Sticky Everlasting, and rushes such as Wattle Matt-rush and Finger Rush (<i>Juncus subsecundus</i>).</p> <p>In areas of Moderate condition, exotic species such as Flaxleaf Fleabane (<i>Conyza bonariensis</i>), Panic</p>

**Table 3.3 PCT 267 – White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion**

PCT 267 – White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	
	Veldt-grass ( <i>Ehrharta erecta</i> ) and St Johns Wort dominate the ground layer.
Survey effort	Two plots were completed within this PCT (Figure 3.1): <ul style="list-style-type: none"> <li>• Moderate: one plot (P1)</li> <li>• High: one plot (P2).</li> </ul>
Condition description	<p>Areas in Moderate condition have been impacted by past clearing and contained non-grass weeds which exceeded more than 30% of the plant cover in the ground layer. These areas are generally located closer to existing infrastructure and buildings and may have had historic or irregular disturbance such as previous earthworks to modify the ground (e.g., bunding to manage rainfall down slopes, or dams) and may include areas of planted native vegetation.</p> <p>Areas in High condition were unlikely to have experienced regular disturbance, other than occasional, light foot traffic. As a result, the groundcover was predominantly native. These areas also tended to support a larger number of mature trees.</p>
Status	<p>An assessment was undertaken of the potential for PCT 267 to be representative of the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community (CEEC) listed under the EPBC Act. The PCT was assessed against the flow charts outlined in <i>National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland</i> (DECCW, 2010), which has been updated from the <i>EPBC Act policy statement 3.5 - White box - yellow box - Blakely's red gum grassy woodlands and derived native grasslands</i> (DEH, 2006) .</p> <ul style="list-style-type: none"> <li>• The most common overstorey species across PCT 267 is White Box.</li> <li>• In areas of High condition, at least 50% of the ground layer is made up of perennial native species. <ul style="list-style-type: none"> <li>– However, in areas of Moderate condition exotic species dominate the ground layer and the ground layer is not considered predominantly native. These areas, therefore, do not form part of the listed community.</li> </ul> </li> <li>• The patch, comprising 12.19 ha mapped within and adjacent to the study area and connected to a much larger patch extending beyond the study area, is &gt;0.1 ha in size.</li> <li>• Within plot 2 19 native species were recorded (excluding grasses), including Small St John's Wort, which is listed as an important species. Corrugated Sida (<i>Sida corrugata</i>) was also observed to be common in areas of PCT 267 in High condition which had previously been subject to some level of ground disturbance.</li> </ul> <p><b>Based on this, areas of PCT 267 in High condition are considered to form part of the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. Areas in Moderate condition do not meet required thresholds for listing.</b></p>



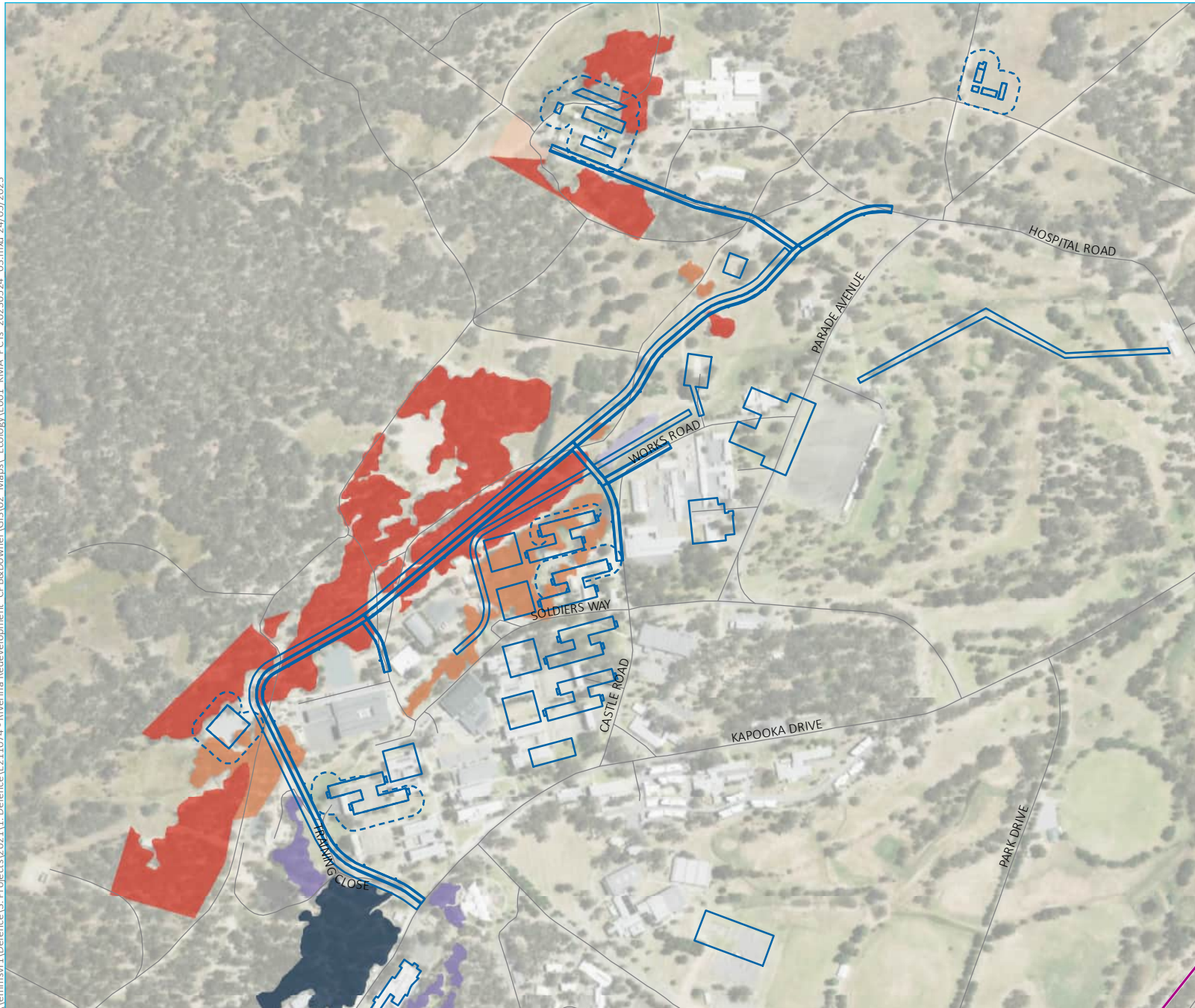
**Table 3.3**      **PCT 267 – White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion**

PCT 267 – White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion



**Photograph 3.2**      **Plot 2 facing west**

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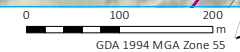
- KEY**
- Blamey Barracks Kapooka
  - Proposed design
  - APZ
  - Minor road
- Plant community type (condition)**
- PCT 110 Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion (planted)
  - PCT 110 Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion (moderate)
  - PCT 110 Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion (high)
  - PCT 267 White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion (DNG)
  - PCT 267 White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion (moderate)
  - PCT 267 White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion (high)

NSW vegetation communities mapped within the study area, including plot locations

Riverina Redevelopment  
Blamey Barracks Kapooka  
Figure 3.1



Source: EMM (2023); DELWP (2019); DFSI (2018); ESRI (2022); GA (2011)



### 3.1.3 Threatened ecological communities

Based on desktop assessment three threatened ecological communities (TECs) are known or predicted to occur within the locality in which the study area is located:

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.
  - This community is also listed as White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions CEEC under the BC Act.
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC.
  - This community is also listed as Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penneplain, Nandewar and Brigalow Belt South Bioregions EEC under the BC Act.
- Weeping Myall Woodlands EEC.
  - This community is also listed as Weeping Myall Woodlands EEC under the BC Act.

Weeping Myall Woodlands was not observed within the study area and is not discussed further.

The two PCTs observed within the study area are both associated with TECs listed under the EPBC Act and BC Act. A description of the PCTs is provided in Section 3.1.2 with extent of these TECs shown in Figure 3.2.

Areas of PCT 267 in High condition meet the definition of the White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland CEEC as listed under the EPBC Act and associated community under the BC Act (totalling 2.56 ha, including 1.39 ha of direct impact and 1.17 ha of indirect impact) while areas of PCT 267 in Moderate condition do not meet the thresholds for listing under the EPBC Act but would be considered representative of the CEEC under the BC Act (totalling 3.04 ha, including 1.14 ha of direct impact and 1.90 ha of indirect impact). The BBK area and Wagga Wagga region are known to support large areas of White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland (EcoLogical, 2010), with 433 ha mapped by EcoLogical (2010) in the BBK area (c.f. 232 ha modelled within the BBK area by DPE (2022)) and 1,557 ha modelled within the locality (DPE, 2022) (Figure 3.3).

Areas of PCT 110 in High condition meet the definition of the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC as listed under the EPBC Act and associated community under the BC Act (totalling 0.01 ha of direct impact and no indirect impact), while areas of PCT 110 in Moderate condition do not meet the thresholds for listing under the EPBC Act but would be considered representative of the EEC under the BC Act (totalling 0.02 ha of direct impact and no indirect impact). Grey Box Grassy Woodlands are known to occur extensively in the region around Wagga Wagga, with the region referenced in the *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia - EPBC Act policy statement* (DSEWPaC, 2012). EcoLogical (2010) maps 95 ha of Grey Box Grassy Woodlands in the BBK area, while regional vegetation mapping (OEH, 2016) indicates that there is with 146 ha modelled within the BBK area and 422 ha modelled within the locality (Figure 3.3).

Table 3.4 provides a summary of the TECs mapped in the study area.

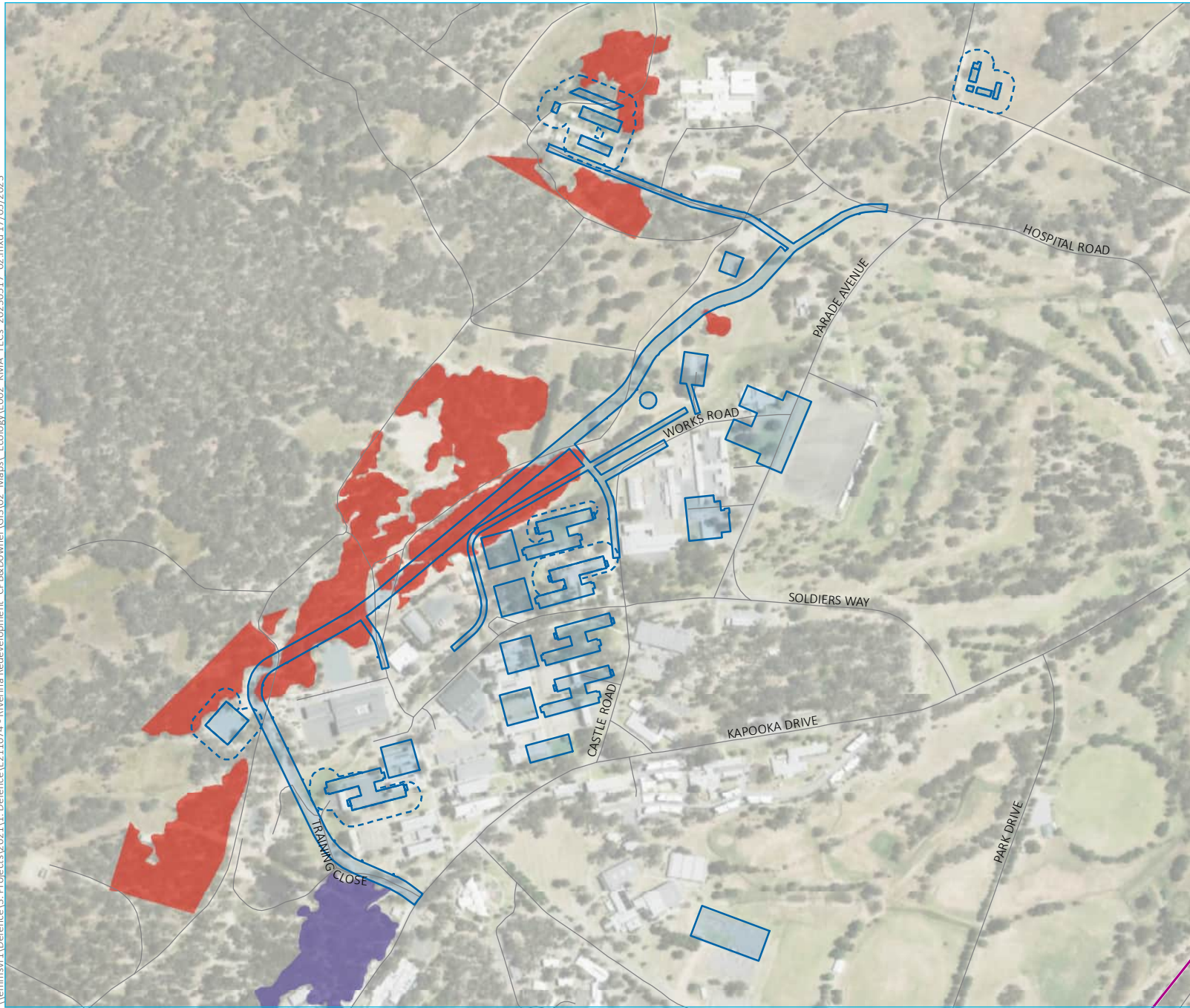
**Table 3.4 Threatened ecological communities mapped within the study area**

PCT	Condition	EPBC Act	BC Act	Area (ha)	
				Direct	Indirect
PCT 110 – Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion	Moderate	Not listed	EEC <sup>2</sup>	0.02	0.00
PCT 110 – Western Grey Box - Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion	High	EEC <sup>1</sup>	EEC <sup>2</sup>	0.01	0.00
PCT 267 – White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Moderate	Not listed	CEEC <sup>4</sup>	1.14	1.90
PCT 267 – White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	High	CEEC <sup>3</sup>	CEEC <sup>4</sup>	1.39	1.17

Notes: CEEC = critically endangered ecological community, EEC = endangered ecological community.

1. Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC listed under the EPBC Act.
2. Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penneplain, Nandewar and Brigalow Belt South Bioregions EEC under the BC Act.
3. White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC listed under the EPBC Act.
4. White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions CEEC under the BC Act.

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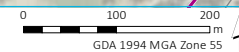
- KEY**
- Blamey Barracks Kapooka
  - Minor road
  - Proposed design
  - APZ
- Threatened ecological community**
- Critically endangered | White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC)
  - Endangered | Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC

Threatened ecological communities mapped within the study area

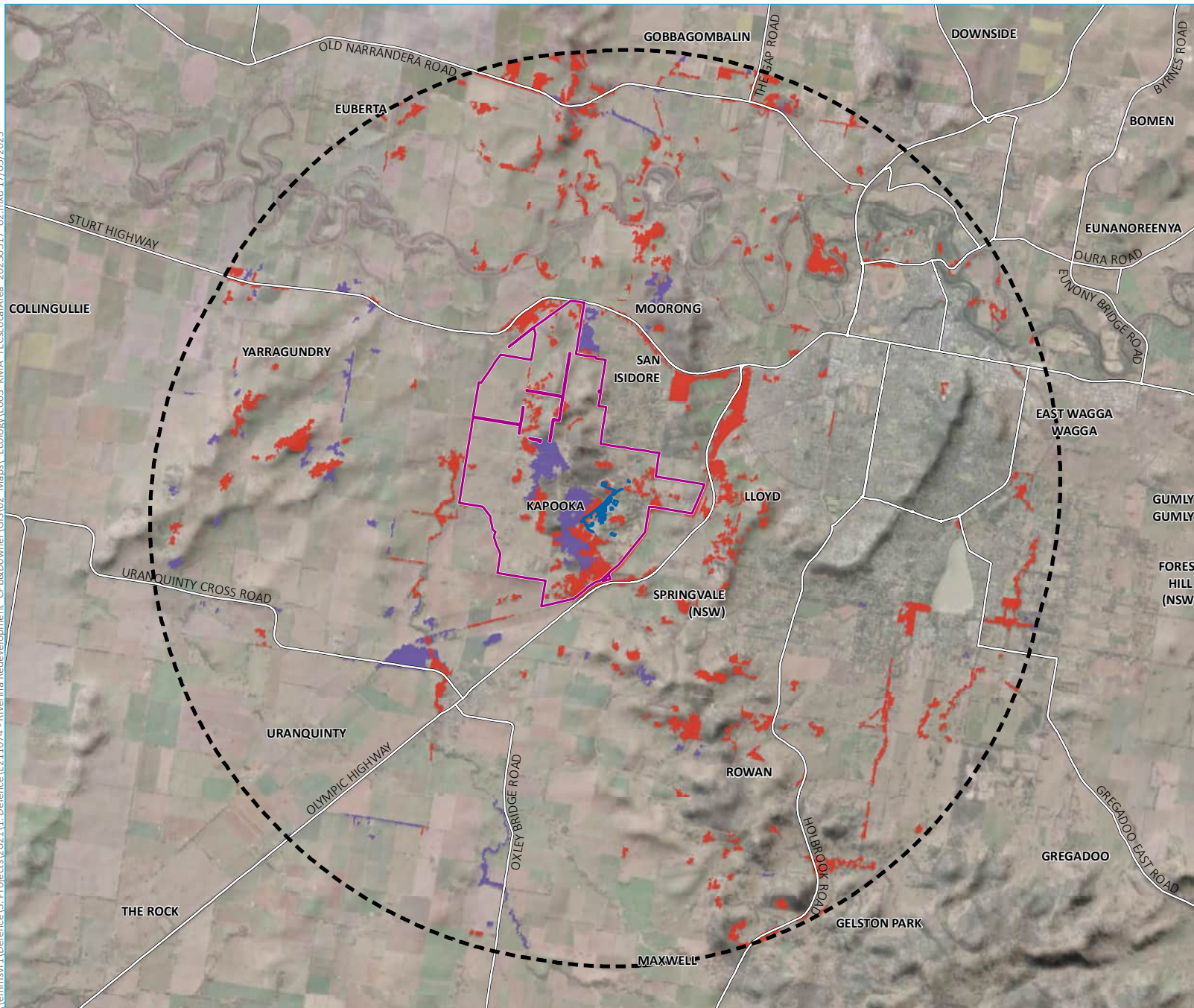
Riverina Redevelopment  
Blamey Barracks Kapooka  
Figure 3.2



Source: EMM (2023); DELWP (2019); DFSI (2018); ESRI (2022); GA (2011)



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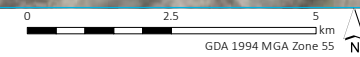
- KEY**
- Blamey Barracks Kapooka
  - Major road
  - Proposed design
  - 10 km buffer
  - Threatened ecological community
    - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC)
    - Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC

Threatened ecological communities mapped within the locality

Riverina Redevelopment  
Blamey Barracks Kapooka  
Figure 3.3



Source: EMM (2023); DELWP (2019); DFSI (2018); ESRI (2022); GA (2011)



## 3.2 Threatened species

### 3.2.1 Habitat description

The study area supports a mix of Eucalypt forests in varying condition, amongst a matrix of building and infrastructure associated with the BBK area. Area of intact vegetation support a grassy Eucalypt forest community with trees of various age classes, a sparse midstorey and grassy groundcover. In these areas, hollows are limited to larger, more mature trees with are restricted to areas not historically cleared. In these areas, with small hollows reasonably abundant but no large hollows were observed. Large logs are mostly absent, while coarse woody debris and leaf litter are also less common, providing more limited habitat for fauna species.

No watercourses were observed within the study area.

### 3.2.2 Flora

Based on the desktop assessment, nine threatened flora species listed under the EPBC Act (and/or BC Act) are known from the locality or considered to have potential to occur in the study area (Figure 3.4, Appendix B).

No threatened flora species have been recorded in the study area previously and none are considered to have a moderate to high likelihood of occurrence in the study area based on the presence of suitable habitat (Appendix B).

No additional species listed under the BC Act only were known from the locality or considered to have potential to occur in the study area.

### 3.2.3 Fauna

Based on the desktop assessment, 33 threatened fauna species listed under the EPBC Act (and/or BC Act), are known from the locality or considered to have potential to occur in the study area (Figure 3.4, Appendix B). One EPBC Act (and BC Act) listed threatened fauna species, (the Swift Parrot, *Lathamus discolor*) has previously been recorded within the study area while one additional EPBC Act (and BC Act) listed threatened fauna species (the Superb Parrot, *Polytelis swainsonii*) was recorded in the study area during the current surveys. Based on the presence of suitable habitat, an additional six threatened fauna species listed under the EPBC Act (and BC Act) are considered to have a moderate to high likelihood of occurrence in the study area (Appendix B).

Table 3.5 provides a summary of the EPBC Act listed species known or considered likely to occur in the study area. Significance assessments have been completed for these species (see Section 5.2 and Appendix D).

**Table 3.5 Threatened fauna species listed under the EPBC Act known or likely to occur in the study area**

Scientific name	Common name	EPBC Act status	BC Act status	Habitat/potential habitat in study area
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	Moderate. The species forages broadly within a variety of communities, particularly Box/Ironbark communities, with a patch distribution across its range (DoE, 2016). Single record from the locality dated to 1980. Suitable flowering Eucalypts occur in the study area, including White Box and Yellow Box. The species is likely to be nomadic within the study area, occurring when Eucalypts are flowering. Unlikely to breed within the study area.

**Table 3.5 Threatened fauna species listed under the EPBC Act known or likely to occur in the study area**

Scientific name	Common name	EPBC Act status	BC Act status	Habitat/potential habitat in study area
<i>Lathamus discolor</i>	Swift Parrot	CE	EN	Recorded. The species is a winter, non-breeding migrant to mainland Australia where it can be found dispersed widely in Eucalypt forests and woodlands on the coast and western slopes of NSW (Commonwealth of Australia, 2019). The species forages on a range of winter-flowering Eucalypts including White Box and Yellow Box, which are found in the study area. The species has been recorded within the footprint of the project in 2012, with a number of records throughout the locality. Likely to utilise the study area when winter-flowering species in bloom.
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	EN	VU	Moderate. The species is distributed across south-eastern Australia, inhabiting dry Eucalypt and Acacia woodlands and shrublands with an open understorey, some grassy areas and a complex ground layer (DCCEEW, 2023). Suboptimal habitat is present within the study area; suitable habitat tends to have a denser tree cover and the ground layer tends to lack complexity in the form of coarse woody debris. However, potential for the species to occur cannot be discounted.
<i>Phascolarctos cinereus</i>	Koala	EN	EN	Moderate. The Koala has a wide but patchy distribution across eastern Australia and inhabits a range of Eucalypt forests and woodlands (DAWE, 2022). In the Riverina, Yellow Box and Grey Box are identified as locally important Koala trees, with White Box identified as an ancillary tree (Youngentob, Marsh, & Skewes, 2021). Vegetation in the study area is dominated by White Box with occasional Yellow Box, and Inland Grey Box in adjacent habitat. There are no recent sightings of the species in the locality, with those present dating back to 2006. The species may utilise the study area on occasion and possible presence cannot be ruled out.
<i>Aphelocephala leucopsis</i>	Southern Whiteface	VU		Moderate. The species is distributed across mainland Australia and inhabits a wide range of open woodlands and forests dominated by Eucalypts or Acacias, with an understorey or shrubs or grasses, generally on ranges, foothills, lowlands and plains (DCCEEW, 2023). Suitable open woodland habitat is present with a number of records from the locality. Habitat may be more marginal as tree densities are moderate to high, but the potential for the species to occur cannot be ruled out.
<i>Polytelis swainsonii</i>	Superb Parrot	VU	VU	Recorded. The species has been recorded within the footprint of the project in 2007 and was recorded during the current assessment. At least 12 individual birds were observed within the northern and western portions of the study area during the morning of the 4 April, foraging amongst flowering Eucalypts singly, in pairs and small groups. A further ten birds were observed within the southern portion of the study area during the site assessment on 5 April. The calls of the species were heard throughout the mornings of both surveys, and it is likely that there were a many more birds feeding in the flowering gums within the study area, and wider base area. The study area supports abundant foraging resources when Eucalypts are flowering. Hollows capable of supporting nesting birds occur within the study area and broader landscape, with hollows more likely to occur



**Table 3.5 Threatened fauna species listed under the EPBC Act known or likely to occur in the study area**

Scientific name	Common name	EPBC Act status	BC Act status	Habitat/potential habitat in study area
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	VU	VU	High. The species is distributed across eastern Australia generally on coastal lowlands, tablelands and western slopes (DAWE, 2021). The species feeds primarily on blossoms of a variety of flowering plants, including rainforest species, Figs ( <i>Ficus</i> spp.) and plants from the Myrtaceae ( <i>Eucalyptus</i> , <i>Corymbia</i> and <i>Angophora</i> spp.) (DAWE, 2021). The Grey-headed Flying-fox can range widely when foraging and will migrate in response to food availability. The species has been recorded in the BBK area and is likely to forage within the study area during suitable flowering events. No camps located nearby.
<i>Stagonopleura guttata</i>	Diamond Firetail	VU	VU	Moderate. The species is distributed across south-eastern Australia where it inhabits a range of open forests, open woodlands and lightly timbered habitats (DCCEEW, 2023). The key characteristics indicating preferred habitat include low tree density, few large logs, low levels of litter cover and high grass cover (DCCEEW, 2023). Marginal habitat is present in the study area, with vegetation in the study area being more densely timbered with moderate levels of grass cover. However, the presence of the species cannot be discounted.

Based on the desktop assessment, an additional 24 species listed under only the BC Act are known from the locality or considered to have potential to occur in the study area (Figure 3.4, Appendix B). One BC Act only listed threatened fauna species (the Grey-crowned Babbler, *Pomatostomus temporalis temporalis*) was recorded in the study area during the current surveys. Based on the presence of suitable habitat, an additional 14 species listed under only the BC Act are considered to have a moderate to high likelihood of occurrence in the study area (Appendix B).

Table 3.6 provides a summary of the BC Act only listed species known or considered likely to occur in the study area. BC Act only listed species are considered further in Section 5.4.

**Table 3.6 Threatened fauna species listed under the BC Act only known or likely to occur in the study area**

Scientific name	Common name	EPBC Act status	BC Act status	Habitat/potential habitat in study area
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow		VU	Moderate. The species is widespread across much of mainland Australia, including large portions of NSW, excluding arid areas where the species is relatively rare. The species inhabits dry, open eucalypt forests and woodlands with an open or sparse understorey of and grassy ground-cover with some fallen woody debris. Suitable habitat is present within the study area.
<i>Burhinus grallarius</i>	Bush Stone-curlew		EN	Moderate. The species inhabits open forest and woodlands throughout Australia, but is now considered rare to extinct across much of this range, particularly south-eastern Australia. While suitable habitat is present, records from the locality are now dated.

**Table 3.6**      **Threatened fauna species listed under the BC Act only known or likely to occur in the study area**

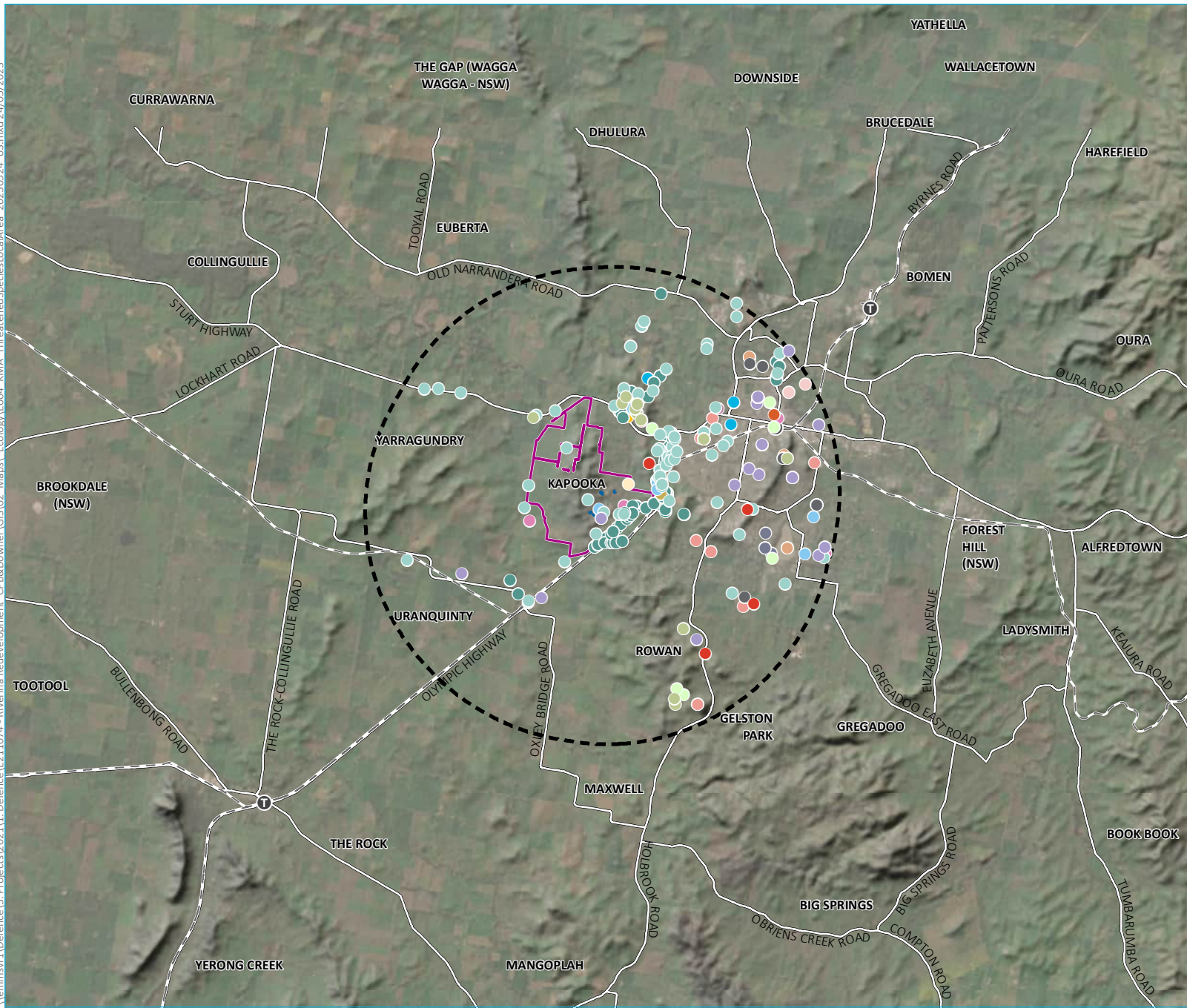
Scientific name	Common name	EPBC Act status	BC Act status	Habitat/potential habitat in study area
<i>Chthonicola sagittata</i>	Speckled Warbler		VU	Moderate. The species has a patchy distribution across eastern Australia, inhabiting a wide range of Eucalyptus forests and woodlands with a grassy understorey with a sparse shrub layer. The species is often associated with rocky ridges or gullies, but can inhabit another areas. The species require relatively large, undisturbed remnants to persist. Suitable habitat is present in the study area.
<i>Circus assimilis</i>	Spotted Harrier		VU	High. The species is distributed throughout Australia where it inhabits grassy open woodlands and grasslands, including agricultural land, harrying for small malls, birds and reptiles. Recorded adjacent to the study area in 2014. Likely to forage over the study area on occasion.
<i>Daphoenositta chrysoptera</i>	Varied Sittella		VU	High. Species inhabits eucalypt forest across mainland Australia, particularly those supporting rough-barked species and mature smooth-barked gums with dead branches. Suitable habitat is present in the study area and the species has been recorded nearby.
<i>Glossopsitta pusilla</i>	Little Lorikeet		VU	Moderate. A nectarivorous species which feeds in the canopy of Eucalypt forests and woodlands. Suitable habitat is present; however, Wagga Wagga is at the western extent of the species range. Likely to make seasonal movement into suitable habitat when Eucalypts are flowering.
<i>Hieraetus morphnoides</i>	Little Eagle		VU	Moderate. The species is found throughout the Australian mainland where it occupies Eucalypt forests and woodlands. There are several records of the species from the locality. The species is likely to utilise the study area on occasion. No nests were observed within or in proximity to the study area.
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)		VU	Moderate. The species occurs across the tablelands and western slopes of NSW where it inhabits drier open forests and woodlands dominated by Box and Ironbark species. Suitable habitat is present in the study area and the species is likely to forage in the study area on occasions.
<i>Neophema pulchella</i>	Turquoise Parrot		VU	High. The species is distributed across the coastal plains to western slopes of eastern Australia where it inhabits open eucalypt forests and woodland, including Box Gum Woodlands. More fertile creeklines, riverflats and foothills are preferred. The species has been recorded in the BBK area in 2016 and is likely to forage within the study area on occasion.
<i>Ninox connivens</i>	Barking Owl		VU	Moderate. The species inhabits a variety of woodlands and open forests, and can tolerate fragmentation using urban remnants and cleared farmland. Nests in large old trees with suitable hollows. While the species may forage within the study area on occasions, suitable nesting habitat was not observed in or in proximity to the study area.

**Table 3.6**      **Threatened fauna species listed under the BC Act only known or likely to occur in the study area**

Scientific name	Common name	EPBC Act status	BC Act status	Habitat/potential habitat in study area
<i>Petaurus norfolcensis</i>	Squirrel Glider		VU	High. The Squirrel Glider is broadly but sparsely distributed across eastern Australia where it inhabits old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest in coastal areas. The species requires abundant tree hollows to persist. The BBK area in general, including the study area, provides important habitat to the species, and is part of a corridor for the species moving within the landscape (Grabham, 2005).
<i>Petroica boodang</i>	Scarlet Robin		VU	Moderate. The species inhabits dry Eucalypt forests and woodlands with a grassy understorey and abundant coarse woody debris. While the study area is generally at the western extent of the species distribution and would likely support most breeding movement areas, suitable habitat is present. Species likely to occur on occasions.
<i>Petroica phoenicea</i>	Flame Robin		VU	Moderate. The species is nomadic, breeding in tall moist Eucalypt forests and woodlands in upland area before dispersing to drier more open habitats, including dry forests and woodlands and pastures and native grasslands, following breeding. The species may occur in the study area outside the breeding period.
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)		VU	Recorded. The species is distributed along the western slopes of the Great Dividing Range and western plains where it inhabits a variety of more open woodlands and forests including Box Gum Woodland. The Grey-crowned Babbler lives in family groups and will defend territories from other groups or species. The species was recorded from the study area in 2022 and 2023, in road-side vegetation along Kapooka Road in the eastern portion of the study area and along the proposed ring-road. Suitable woodland habitat present. No nests were observed within the disturbance footprint.
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat		VU	Moderate. The species is broadly distributed across northern and eastern Australia where it forages in a wide variety of habitats, generally above the canopy. Roosts in tree hollows and buildings. The species may forage above the canopy of the study area.

Notes: CE = critically endangered, E = endangered, V = vulnerable

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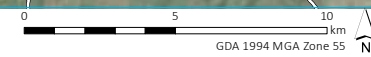
- KEY**
- Blamey Barracks Kapooka
  - Train station
  - Rail line
  - == Major road
  - Proposed design
  - 10 km buffer
- BC Act**
- Barking Owl (*Ninox connivens*)
  - Bush Stone-curlew (*Burhinus grallarius*)
  - Dusky Woodswallow (*Artamus cyanopterus cyanopterus*)
  - Flame Robin (*Petroica phoenicea*)
  - Little Eagle (*Hieraetus morphnoides*)
  - Little Lorikeet (*Glossopsitta pusilla*)
  - Scarlet Robin (*Petroica boodang*)
  - Speckled Warbler (*Chthonicola sagittata*)
  - Spotted Harrier (*Circus assimilis*)
  - Squirrel Glider (*Petaurus norfolcensis*)
  - Turquoise Parrot (*Neophema pulchella*)
  - Varied Sittella (*Daphoenositta chrysoptera*)
  - Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*)
- EPBC Act**
- Diamond Firetail (*Stagonopleura guttata*)
  - Grey-headed Flying-fox (*Pteropus poliocephalus*)
  - Koala (*Phascolarctos cinereus*)
  - Regent Honeyeater (*Anthochaera phrygia*)
  - Superb Parrot (*Polytelis swainsonii*)
  - Swift Parrot (*Lathamus discolor*)

Threatened species mapped within the locality that are known or likely to occur in the study area

Riverina Redevelopment  
Blamey Barracks Kapooka  
Figure 3.4



Source: EMM (2023); DELWP (2019); DFSI (2018); ESRI (2022); GA (2011)



## 4 Impact assessment

### 4.1 Avoidance, minimisation and mitigation

The mitigation hierarchy of avoid, minimise and mitigate has been used in the development of the project as the project design has progressed.

A key focus of project design has been to avoid and minimise impacts to biodiversity values identified during the field investigation wherever feasible, particularly TECs and significant threatened species habitat. The process below has been followed to ensure impacts are avoided and minimised to the greatest extent possible, within the design and other limitations of the project:

- Identification of biodiversity values through biodiversity surveys.
- Communication of identified values to the project team.
- Consultation between the project team and project ecologists on various elements to consider both direct and indirect impacts and work through an iterative design process, with multiple iterations of design elements to achieve best practice outcomes.
- Finalisation of measures to avoid, minimise and mitigate impacts.
- Discussion of measures to mitigate impacts during construction.

The measures outlined below have been incorporated into the project to avoid, minimise and mitigate impacts.

#### 4.1.1 Design and siting

The Defence & Infrastructure Life Cycle phases sets out a systematic approach to infrastructure development. As part of this process, alternative locations, consisting of rigorous and comprehensive options assessment, are undertaken to arrive at the optimal design solution, considering impacts to the environment. The planning phase of this project has consisted of the following key design activities and milestones which include the following options assessments:

- Master Plan and Feasibility Review (MPFR): During MPFR, the design is developed to a 5% level which has involved the assessment of multiple site options at a precinct level.
- Concept Design Review (CDR): During CDR, the concept design is developed to a 30% level. During CDR the precinct level options were refined to building footprints and associated options.
- Schematic Design Review (SDR): During SDR, the design is developed to a 50% level. Further options were assessed to minimise and avoid impacts on EPBC listed TECs and habitat areas.

An outline of the avoidance activities undertaken and potential impacts to EPBC Act listed TECs during each of the above design stages is presented in Table 4.1.

**Table 4.1** Avoidance process during design stages

Design stage	Avoidance	Impact on EPBC Act list TEC (ha)
5% MPFR	<p>The MPFR process was designed to allow for the balanced consideration of key criteria, including environment and heritage. Each individual aspect of the design was assessed against a set of alternatives in terms of key environmental impacts.</p> <p>The desktop assessment work undertaken for MPFR identified areas of ecological constraint (low to very high) and recommended development focused of the study area are undertaken in those areas of lowest ecological constraint.</p>	Not quantified
30% CDR	<p>Each element of the design was separated to allow for a reduction in direct impacts to be targeted. A preliminary assessment of bushfire risk was also undertaken to ensure asset protection zones where considered.</p> <p>Further biodiversity surveys were undertaken for CDR. These field assessments confirmed the presence of areas of significant biodiversity constraint, including TECs and threatened species habitat.</p> <p>A key recommendation was that the SDR design phase should aim to avoid patches of native vegetation and TECs wherever possible by choosing alternate building and infrastructure options or micro-siting where possible.</p>	<p>Direct impact to ~16 ha of TECs, including White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland and Grey Box Grassy Woodlands, comprising direct impact to ~9 ha and potential for a further ~7 ha as a result of bushfire asset protection zones.</p> <p>Note: indirect impacts from habitat fragmentation were not quantified at this stage.</p>
50% SDR – early design	<p>Significant revision of the design to minimise impacts on native vegetation and TECs. This stage included further site assessment and survey to support the design refinement and result in a reduction in predicted impacts of over 13 ha.</p>	Direct/indirect impact to 2.74 ha.
50% SDR – final design	<p>For final design, an additional site visit was undertaken with discussion held between the design team and project ecologists to optimise and refine the design to avoid and minimise impacts where feasible within the constraints of the project. This included discussion of the costs and benefits of direct versus indirect impacts such as fragmentation and discussing of modifications outbuilding locations and micrositing to minimise impacts.</p> <p>Through this process, further refinement of the design was undertaken to reduce habitat fragmentation and minimise impacts to threatened species habitat and TECs. A key change was the relocation of the access road from a previous location which bisected vegetation and resulted in larger indirect impacts through fragmentation, to the edge of vegetation and existing impacts to maintain the condition of remaining habitat and minimise fragmentation.</p>	Direct/indirect impact to 2.56 ha.

#### 4.1.2 Construction

During construction impacts will be further mitigated through implementation of appropriate controls. A Construction Environmental Management Plan (CEMP) and associated Biodiversity Management Plan (BMP) will be prepared for the construction phase of the project, and the CEMP and BMP will incorporate these measures to ensure impacts are appropriately managed and mitigated. Additional controls implemented during construction are outlined in Table 4.2.

**Table 4.2 Proposed mitigation measures**

Impact	Mitigation	Responsibility	Timing
Impacts to biodiversity values	<ul style="list-style-type: none"> <li>Clearing limits have been established which avoid and minimise impacts to the greatest extent practicable.</li> </ul>	Design team	Prior to construction – complete
Impacts to retained vegetation due to inadvertent clearing	<ul style="list-style-type: none"> <li>All works, including ancillary facilities and laydown areas will be retained within the approved disturbance footprint.</li> <li>Area of retained vegetation will be protected during construction. This will include fencing of exclusion areas and sign-posting these areas as no-go zones.</li> <li>This will be maintained and checked daily through construction.</li> </ul>	Construction contractor	During construction – daily
Impacts to retained vegetation due to sediment and hydrology	<ul style="list-style-type: none"> <li>The drainage of the road will be constructed to ensure that increased hardstand does not result in increased surface water runoff and mobilised grits and oils flowing into adjacent areas of retained vegetation.</li> <li>Appropriate sediment control measures will be implemented, including sediment, erosion and pollution control measures.</li> </ul>	Construction contractor	During construction – throughout
Degradation of retained vegetation due to weeds	<ul style="list-style-type: none"> <li>Potential for introduction of weeds will be reduced through implementation of soil and vehicle hygiene measures.</li> <li>Monthly checks of construction areas will be undertaken to document any significant growth of priority weeds (Weeds of National Significance or weeds listed as Priority weeds for Riverina Local Land Services Region in the Riverina Regional Strategic Weed Management Plan (LLS, 2017)).</li> <li>Weed management of all priority weeds will be undertaken within and at the edges of the construction area.</li> </ul>	Construction contractor	During construction – throughout
Impacts to fauna during clearing	<ul style="list-style-type: none"> <li>Pre-clearing surveys will be undertaken to document significant habitat features present within the clearing area, including hollows, nests or other features.</li> <li>An Ecologist will be present during clearing. Clearing will include the following: <ul style="list-style-type: none"> <li>A staged approach to clearing, clearing non-significant habitat first, allowing animals to vacate the clearing area before significant habitat features are cleared. Staging should ideally be separated by 1-2 days.</li> <li>All trees felled will be inspected by the Ecologist to relocate any fauna located during clearing to nearest retained vegetation.</li> <li>Any animals injured during clearing works will be taken to a veterinarian.</li> </ul> </li> </ul>	Construction contractor Project Ecologist	During construction – clearing
Impacts to threatened species	<ul style="list-style-type: none"> <li>Signage will be implemented on the access road to raise awareness of the potential for Koalas and Parrot species to occur.</li> <li>Koala fencing will be constructed in the area to the north of the company lines to prevent Koalas from accessing works areas.</li> </ul>	Construction contractor	Commencement of construction
Noise and dust impacts to retained vegetation and fauna habitat	<ul style="list-style-type: none"> <li>Noise mitigation measures will be implemented to be protective of sensitive fauna species.</li> <li>Dust mitigation measures will be implemented, including use of water carts to control dust and minimise dust impacts to retained vegetation.</li> </ul>	Construction contractor	During construction – throughout

## 4.2 Residual impacts

The residual impacts of the project, after application of the hierarchy of avoid, minimise and mitigate, are described here and were used to inform the assessments of impact significance for threatened ecological communities and species (Appendix D).

Clearing of native vegetation can result in a range of direct and indirect impacts:

- Reduction in the extent of vegetation communities.
- Loss of local populations of species.
- Fragmentation of remnants of vegetation communities or local populations of individual species.
- Increased edge effects and habitat for invasive species.
- Reduction in the viability of ecological communities resulting from loss or disruption of ecological functions (e.g., increased desiccation, light penetration, increased herbivore activity, weed invasion, increased predation, and loss of animals that are seed dispersers and pollinators).
- Destruction of flora and fauna habitat and associated loss of biological diversity (habitat removal may include removal of hollow bearing trees, loss of leaf litter layer, and resultant changes to soil biota).
- Soil exposure and altered water flow patterns resulting in increased erosion and sedimentation.

These direct and indirect impacts are discussed below.

### 4.2.1 Direct impacts

This section outlines the project's direct impacts, following the implementation of avoidance, minimisation and mitigation measures outlined in Section 4.1. Direct impacts for the project comprise:

- loss of 2.56 ha native vegetation, including:
  - loss of 1.40 ha of EPBC Act listed TECs
  - loss of 1.16 ha of other native vegetation (BC Act listed TECs)
- loss and degradation of native fauna habitats
- loss of five HBTs.

As outlined in Section 3.1.2 and 3.1.3, only areas of PCT 110 and PCT 267 in High condition are considered TECs under the EPBC Act. The project will result in the removal of 1.40 ha of TEC is listed under the EPBC Act. Areas of PCT 110 and PCT 267 in both Moderate and High condition are representative of TECs under the BC Act. The project will result in the removal of 2.56 ha of TECs listed under the BC Act<sup>1</sup>. The project will result in the direct impacts shown in Table 4.3.

<sup>1</sup> This is cumulative and includes the 1.40 ha of EPBC Act listed TECs.



**Table 4.3 Direct impacts to native vegetation and TECs**

TEC	EPBC Act	BC Act	Area (ha)
<b>EPBC Act listed communities</b>			
Grey Box ( <i>Eucalyptus microcarpa</i> ) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (PCT 110   High)	EEC	-	0.01
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (PCT 267   High)	CEEC	-	1.39
<b>BC Act only listed communities</b>			
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penneplain, Nandewar and Brigalow Belt South Bioregions (PCT 110   Moderate)	-	EEC	0.03
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (PCT 267   Moderate)	-	CEEC	2.54

Notes: CEEC = critically endangered ecological community, EEC = endangered ecological community.

#### 4.2.2 Indirect impacts

This section outlines the project's indirect impacts, following the implementation of avoidance, minimisation and mitigation measures outlined in Section 4.1. Indirect impacts relating to the project comprise:

- fragmentation of existing native vegetation and fauna habitat
- erosion and sedimentation
- weed introduction and spread
- feral animal invasion into retained habitats
- potential inadvertent disturbance of retained habitats
- increased noise, vibration and dust levels resulting in disturbance of fauna species, and consequent abandonment of habitat, or changes in behaviour (including breeding behaviour)
- lighting for night works, resulting in disturbance to fauna species and changes in occupancy or behaviour.

The mitigation measures outlined in Section 4.1.2 will ensure that these indirect impacts arising from the project are minor in nature and managed appropriately.

Fragmentation impacts were considered extensively during the design of the project due to the potential to fragment areas of TECs during the construction of the access road. Significant consultation was undertaken between the design team and project ecologists to balance direct impacts due to clearing and indirect impacts arising from fragmentation. This resulted in the relocation of the access road from a previous location which bisected vegetation and resulted in larger indirect impacts through fragmentation, to the edge of vegetation further south and existing impacts to maintain the condition of remaining habitat and minimise fragmentation. The project will result in indirect impacts to an additional 3.06 ha of native vegetation, including 1.17 ha of TECs listed under the EPBC Act.

## 5 Assessment against the EPBC Act

The project has been assessed against the requirements of the EPBC Act in the following sections.

### 5.1 Wetlands of international importance (declared Ramsar wetlands)

Four wetlands of international importance (Ramsar wetlands) were predicted by the PMST (Appendix A) search to have the potential to be impacted by the project (Table 5.1).

**Table 5.1 Wetlands of International Importance (Ramsar Wetlands) downstream of the project**

Ramsar Site No.	Ramsar Site Name	Proximity
16	Hattah-Kulkyne Lakes	400–500 km upstream from Ramsar site
25	The Coorong, and Lakes Alexandrina and Albert Wetland	600–700 km upstream from Ramsar site
63	Banrock Station Wetland Complex	600–700 km upstream from Ramsar site
29	Riverland	500–600 km upstream from Ramsar site

The project will not result in any impacts to any Ramsar wetlands. The nearest Ramsar wetland is the Hattah-Kulkyne Lakes, which is approximately 400 to 500 km downstream of the project. Suitable sediment and erosion controls will be implemented to ensure impacts are retained within the disturbance footprint, with negligible chance of any impacts to Ramsar wetlands to arise from the project.

The project will not result in any significant impacts to Ramsar wetlands.

### 5.2 Listed threatened species and ecological communities

Two TECs listed under the EPBC Act occur within the study area and will be impacted by the project:

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC.

An assessment of the significance of impacts to the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC has been prepared in accordance with *Matters of National Environmental Significance: Significant impact guidelines 1.1* (DoE, 2013) (Appendix D.1). This assessment concluded that the project would not result in a significant impact to this TEC because:

- the project will result in direct impacts to a small area of the community (1.39 ha) at the edge of existing impacts
- this impact represents an insignificant portion of the occurrence of the CEEC at a regional scale (0.01% to 0.09% within the locality) or even at a local scale (0.32% of the CEEC within the BBK area)
- impacts are occurring at the edges of existing clearing and will not result in further fragmentation of the TEC
- the project will not modify or destroy abiotic factors necessary for the survival of the TEC
- the project will not cause a substantial change in the species composition or reduction in the quality or integrity

- substantial effort has been placed into refinement of the design to avoid and minimise impacts to the TEC, particularly impacts arising from fragmentation, resulting in a reduction of impacts to the TEC from ~16 ha at CDR to 1.39 ha direct impact and 1.17 ha of indirect impacts.

An assessment of the significance of impacts to the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands EEC has been prepared in accordance with *Matters of National Environmental Significance: Significant impact guidelines 1.1* (DoE, 2013) (Appendix D.1). This assessment concluded that the project would not result in a significant impact to this TEC because:

- the project will result in direct impacts to a very small area of the community (0.01 ha) at the edge of existing impacts
- this impact represents an insignificant portion of the occurrence of the EEC at a regional scale (0.002% within the locality) or even at a local scale (0.01% of the EEC within the BBK area)
- impacts are occurring at the very edge of existing clearing and will not result in any further fragmentation of the TEC
- the project will not modify or destroy abiotic factors necessary for the survival of the TEC
- the project will not cause a substantial change in the species composition or reduction in the quality or integrity
- the project will not interfere with the recovery of the TEC
- substantial effort has been placed into refinement of the design to avoid and minimise impacts to the TEC, resulting in very minor impacts at the very edge of an existing patch, ensuring no further fragmentation.

Eight threatened fauna species listed under the EPBC Act have been recorded within the study area or are deemed a moderate to high likelihood of occurrence within the study area:

- Regent Honeyeater (CE)
- Swift Parrot (CE)
- Hooded Robin (south-eastern form) (EN)
- Koala (EN)
- Southern Whiteface (VU)
- Superb Parrot (VU)
- Grey-headed Flying-fox (VU)
- Diamond Firetail (VU).

Assessments of significance have been prepared in accordance with *Matters of National Environmental Significance: Significant impact guidelines 1.1* (DoE, 2013) (Appendix D.1). These assessments concluded that the project would not result in a significant impact. Justification for each individual species is provided in Appendix D, Table D.3 to Table D.10.

The project will not result in any significant impacts to threatened species or communities.

### 5.3 Listed migratory species

Based on the desktop assessment, ten species listed under the migratory provisions of the EPBC Act are known from the locality or considered to have potential to occur in the study area (Appendix B). Table 5.2 provides an assessment of the potential for these migratory species to occur in the study area.

**Table 5.2 Assessment of migratory species predicted to occur in the study area**

Scientific name	Common name	EPBC Act	Habitat/potential habitat in study area
<i>Actitis hypoleucos</i>	Common Sandpiper	Mi	Negligible. The study area does not support suitable inter-tidal or other wetland habitat for this species.
<i>Apus pacificus</i>	Fork-tailed Swift	Mi	Low. Although the species may overfly the study area on occasion, it is unlikely to be impacted by the project.
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Mi	Negligible. The study area does not support suitable inter-tidal or other wetland habitat for this species.
<i>Calidris ferruginea</i>	Curlew Sandpiper	Mi	Negligible. The study area does not support suitable inter-tidal or other wetland habitat for this species.
<i>Calidris melanotos</i>	Pectoral Sandpiper	Mi	Negligible. The study area does not support suitable inter-tidal or other wetland habitat for this species.
<i>Gallinago hardwickii</i>	Latham's Snipe	Mi	Negligible. The study area does not support suitable wetland habitat for this species.
<i>Hirundapus caudacutus</i>	White-throated Needletail	Mi	Low. The species is largely aerial and may overfly the study area on occasion. The study area may provide marginal roosting habitat; however, the canopy is not as dense as most known roosts.
<i>Motacilla flava</i>	Yellow Wagtail	Mi	Low. The species inhabits wide range of damp to wet habitats such as marshes and wetlands. Suitable habitat does not occur within the study area.
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	Mi	Low. The species occurs in a range of habitats, preferring tall forest and wetter habitats such as forested gullies. Suitable habitat are not present and the study area is unlikely to support important habitat for the species.
<i>Numenius madagascariensis</i>	Eastern Curlew	Mi	Negligible. The study area does not support suitable inter-tidal or other wetland habitat for this species.

Notes: Mi = migratory

The project does not support any areas of inter-tidal or other wetlands that many of the migratory shorebird species require. No suitable habitat is located in proximity to the study area or will be indirectly impacted by the project. As a result, the project will not result in impact to important habitat for these species (DoE, 2015).

The Fork-tailed Swift and White-throated Needletail are largely aerial species and may overfly the study area on occasion (DoE, 2015). The White-throated Needletail roosts at night in the crowns of tall trees, mainly in forest habitats (DoE, 2015); however, the canopy within the study area is not as dense as known roost sites. As a result, the study area is considered highly unlikely to provide important habitat for these species.

The Satin Flycatcher prefers tall forest and wetter habitats such as forested gullies, habitats which are not present in the study area. The species is considered allow likelihood of occurrence and the study area is considered highly unlikely to provide important habitat for this species.

As a result of the above, no further assessment or assessments of significance have been undertaken.

The project will not result in any significant impacts to migratory species.

## 5.4 The whole of environment on Commonwealth land or Commonwealth agency action

### 5.4.1 Impacts on plants

A total of 120 flora species were recorded across the study area by EcoLink during surveys undertaken for the project, comprising 77 indigenous species and 43 exotic species. No threatened flora species were observed within the study area or are considered likely to occur. The project will result in clearing of 2.56 ha of native vegetation, including 1.40 ha of TECs listed under the EPBC Act (1.39 ha of White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland CEEC and 0.01 ha of Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC. Regional vegetation mapping (OEH, 2016) models 4,489 ha of native vegetation within the locality, including 1,557 ha of White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland and 422 ha of Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia. This clearing will occur on the edge of existing disturbance resulting from the construction and operation of the BBK area. The regional scale of these impacts is shown in Table 5.3. At this scale these impacts are considered minor to insignificant.

**Table 5.3 Impacts to native vegetation and EPBC Act listed TECs at a regional scale**

Community	Direct impacts (ha)	Locality (ha)	% of locality impacted
Native vegetation	2.56 <sup>1</sup>	4,489	0.06%
White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland	1.39 <sup>1</sup>	1,557	0.09%
Grey Box ( <i>Eucalyptus microcarpa</i> ) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	0.01 <sup>1</sup>	422	<0.01%

Note: Direct impact areas presented in Table 5.3 are not cumulative – ie the total loss of native vegetation is 2.56 ha, including 1.40 ha of EPBC Act lists TECs.

No threatened flora species listed under the EPBC Act and BC Act were considered to have potential to occur within the study area.

Unmitigated, the project has the potential to result in the introduction of invasive species into retained vegetation, particularly weed species. Mitigation measures outlined in Section 4.1.2 have been developed to be consistent with the requirements of recovery plans for various recovery plans, including the White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland CEEC (DECCW, 2010) and Small Purple-pea (OEH, 2012). These mitigation measures, to be captured in a CEMP, will ensure that the potential introduction of invasive weed species is effectively managed and mitigated.

The project will not involve any use of chemicals which could stunt the growth of native vegetation or any controlled burning.

The project will not result in any significant impacts to plants.

#### 5.4.2 Impacts on animals

A total of 23 threatened species listed under the EPBC Act and/or BC Act have been recorded within the study area or are considered to have a moderate to high likelihood of occurrence in the study area (two bats, 19 birds and two marsupials) (Appendix B).

Unmitigated, the project could result in death or injury to native animal populations during clearing. Mitigation measures outlined in Section 4.1.2 have been developed to ensure that this does not occur, including the requirement for pre-clearing surveys and clearing to be supervised by the project ecologist. This will ensure these impacts do not arise. The changes of these impacts occurring during operation are considered very low, with possible impacts limited to fauna strike by cars; however, this is considered a negligible likelihood of occurrence due to vehicle speeds within BBK and the number of vehicle movements.

Impacts will occur at the edge of existing impacts resulting from previous clearing of the BBK area. For mobile species such as avifauna (bats and birds) these impacts are unlikely to result in any impacts to dispersal capability, limitations to movement or fragmentation. These species will readily move through the landscape. For terrestrial and arboreal species some level of displacement may occur due to loss of habitat. The project team has undertaken extensive design revisions to avoid and minimise impacts (see Section 4.1.1), including avoiding fragmentation as much as possible. Resident animals will be readily able to disperse into other parts of their home range during clearing and will be relocated to nearest retained vegetation if found during clearing surveys (see Section 4.1.2). These impacts, if they occur, are highly unlikely to substantially limit movement or substantially reduce or fragment habitat.

As outlined in Section 5.4.1, unmitigated, the project has the potential to result in the introduction of invasive species into retained vegetation, particularly weed species which may reduce habitat quality or resources for native species. Mitigation measures have been developed which will effectively manage and mitigate the impacts of any weed species on fauna habitat.

The project will not result in any significant impacts to animals.

## 6 Recommendations

Table 6.1 presents the proposed mitigation measures to be implemented during the construction phase of the project.

**Table 6.1 Mitigation measures**

Impact	Mitigation	Timing
Impacts to biodiversity values	Clearing limits have been established which avoid and minimise impacts to the greatest extent practicable.	Prior to construction – complete
Impacts to retained vegetation due to inadvertent clearing	All works, including ancillary facilities and laydown areas will be retained within the approved disturbance footprint. Area of retained vegetation will be protected during construction. This will include fencing of exclusion areas and sign-posting these areas as no-go zones. This will be maintained and checked daily through construction.	During construction – daily
Impacts to retained vegetation due to sediment and hydrology	The drainage of the road will be constructed to ensure that increased hardstand does not result in increased surface water runoff and mobilised grits and oils flowing into adjacent areas of retained vegetation. Appropriate sediment control measures will be implemented, including sediment, erosion and pollution control measures.	During construction – throughout
Degradation of retained vegetation due to weeds	Potential for introduction of weeds will be reduced through implementation of soil and vehicle hygiene measures. Monthly checks of construction areas will be undertaken to document any significant growth of priority weeds (Weeds of National Significance or weeds listed as Priority weeds for Riverina Local Land Services Region in the Riverina Regional Strategic Weed Management Plan (LLS, 2017)). Weed management of all priority weeds will be undertaken within and at the edges of the construction area.	During construction – throughout
Impacts to fauna during clearing	Pre-clearing surveys will be undertaken to document significant habitat features present within the clearing area, including hollows, nests or other features. An Ecologist will be present during clearing. Clearing will include the following: A staged approach to clearing, clearing non-significant habitat first, allowing animals to vacate the clearing area before significant habitat features are cleared. Staging should ideally be separated by 1-2 days. All trees felled will be inspected by the Ecologist to relocate any fauna located during clearing to nearest retained vegetation. Any animals injured during clearing works will be taken to a veterinarian.	During construction – clearing
Impacts to threatened species	Signage will be implemented on the access road to raise awareness of the potential for Koalas and Parrot species to occur. Koala fencing will be constructed in the area to the north of the company lines to prevent Koalas from accessing works areas.	Commencement of construction
Noise and dust impacts to retained vegetation and fauna habitat	Noise mitigation measures will be implemented to be protective of sensitive fauna species. Dust mitigation measures will be implemented, including use of water carts to control dust and minimise dust impacts to retained vegetation.	During construction – throughout

## 7 Conclusions

The RRP aims to provide the necessary facilities and infrastructure for the ADF at RAAF Base Wagga, AWMA and BBK over the next 30 years. The program will replace outdated facilities and equipment, leading to reduced maintenance costs, improved operational reliability, enhanced personnel comfort, safer work environments, and better compliance with Defence standards. This report assessed the biodiversity values at BBK and made recommendations to avoid, minimise and mitigate impacts and assessed the project against the requirements of the EPBC Act.

The proposed project has the potential to impact general biodiversity, threatened species and communities listed under the EPBC Act. The project has spent considerable effort assessing biodiversity values and going through an iterative design process to avoid impacts to the greatest extent possible, before mitigating residual impacts. As a result, impacts to TECs habitat have been reduced considerably from ~16 ha to 2.56 ha with direct impacts limited to 1.4 ha.

The impacts arising from the project are considered unlikely to result in a significant impact to MNES listed under the EPBC Act or plants and animals on Commonwealth land.



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# Appendix A

## Protected Matters Search

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Australian Government

Department of Climate Change, Energy,  
the Environment and Water

# EPBC Act Protected Matters Report

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

Report created: 15-May-2023

[Summary](#)

[Details](#)

[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

# Summary

## Matters of National Environment Significance

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

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance (Ramsar)</a>	4
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	3
<a href="#">Listed Threatened Species:</a>	41
<a href="#">Listed Migratory Species:</a>	10

## Other Matters Protected by the EPBC Act

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

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

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

<a href="#">Commonwealth Lands:</a>	234
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	17
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None
<a href="#">Habitat Critical to the Survival of Marine Turtles:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">EPBC Act Referrals:</a>	10
<a href="#">Key Ecological Features (Marine):</a>	None
<a href="#">Biologically Important Areas:</a>	None
<a href="#">Bioregional Assessments:</a>	None
<a href="#">Geological and Bioregional Assessments:</a>	None

# Details

## Matters of National Environmental Significance

### Wetlands of International Importance (Ramsar Wetlands) [ [Resource Information](#) ]

Ramsar Site Name	Proximity
<a href="#">Banrock station wetland complex</a>	600 - 700km upstream from Ramsar site
<a href="#">Hattah-kulkyne lakes</a>	400 - 500km upstream from Ramsar site
<a href="#">Riverland</a>	500 - 600km upstream from Ramsar site
<a href="#">The coorong, and lakes alexandrina and albert wetland</a>	600 - 700km upstream from Ramsar site

### Listed Threatened Ecological Communities [ [Resource Information](#) ]

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

Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text
<a href="#">Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia</a>	Endangered	Community likely to occur within area
<a href="#">Weeping Myall Woodlands</a>	Endangered	Community may occur within area
<a href="#">White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland</a>	Critically Endangered	Community likely to occur within area

### Listed Threatened Species [ [Resource Information](#) ]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.

Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		

Scientific Name	Threatened Category	Presence Text
<a href="#">Anthochaera phrygia</a> Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area
<a href="#">Aphelocephala leucopsis</a> Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Botaurus poiciloptilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
<a href="#">Callocephalon fimbriatum</a> Gang-gang Cockatoo [768]	Endangered	Species or species habitat may occur within area
<a href="#">Calyptorhynchus lathami lathami</a> South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Climacteris picumnus victoriae</a> Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Falco hypoleucos</a> Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Grantiella picta</a> Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area



Scientific Name	Threatened Category	Presence Text
<a href="#">Leipoa ocellata</a> Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Lophochroa leadbeateri leadbeateri</a> Major Mitchell's Cockatoo (eastern), Eastern Major Mitchell's Cockatoo [82926]	Endangered	Species or species habitat may occur within area
<a href="#">Melanodryas cucullata cucullata</a> South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat known to occur within area
<a href="#">Neophema chrysostoma</a> Blue-winged Parrot [726]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Polytelis swainsonii</a> Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
<a href="#">Stagonopleura guttata</a> Diamond Firetail [59398]	Vulnerable	Species or species habitat known to occur within area
<b>FISH</b>		
<a href="#">Bidyanus bidyanus</a> Silver Perch, Bidyan [76155]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Galaxias rostratus</a> Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Maccullochella macquariensis</a> Trout Cod [26171]	Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Maccullochella peelii</a> Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Macquaria australasica</a> Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
<a href="#">Nannoperca australis Murray-Darling Basin lineage</a> Southern Pygmy Perch (Murray-Darling Basin lineage) [91711]	Vulnerable	Species or species habitat likely to occur within area

## FROG

<a href="#">Crinia sloanei</a> Sloane's Froglet [59151]	Endangered	Species or species habitat may occur within area
<a href="#">Litoria raniformis</a> Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat may occur within area

## INSECT

<a href="#">Keyacris scurra</a> Key's Matchstick Grasshopper [89739]	Endangered	Species or species habitat may occur within area
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## MAMMAL

<a href="#">Dasyurus maculatus maculatus (SE mainland population)</a> Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
<a href="#">Nyctophilus corbeni</a> Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
<a href="#">Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</a> Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat likely to occur within area
<a href="#">Pteropus poliocephalus</a> Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area

## PLANT

Scientific Name	Threatened Category	Presence Text
<a href="#">Austrostipa wakoolica</a> [66623]	Endangered	Species or species habitat may occur within area
<a href="#">Brachyscome muelleroides</a> Mueller Daisy [15572]	Vulnerable	Species or species habitat may occur within area
<a href="#">Caladenia arenaria</a> Sand-hill Spider-orchid [9275]	Endangered	Species or species habitat may occur within area
<a href="#">Lepidium aschersonii</a> Spiny Peppercross [10976]	Vulnerable	Species or species habitat may occur within area
<a href="#">Lepidium monoplocoides</a> Winged Pepper-cress [9190]	Endangered	Species or species habitat may occur within area
<a href="#">Prasophyllum petilum</a> Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area
<a href="#">Swainsona murrayana</a> Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Swainsona recta</a> Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat may occur within area

## REPTILE

<a href="#">Aprasia parapulchella</a> Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area
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## Listed Migratory Species

[ [Resource Information](#) ]

Scientific Name	Threatened Category	Presence Text
<b>Migratory Marine Birds</b>		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area

## Migratory Terrestrial Species

Scientific Name	Threatened Category	Presence Text
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

## Other Matters Protected by the EPBC Act

### Commonwealth Lands [\[ Resource Information \]](#)

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

Commonwealth Land Name	State
Commonwealth Bank of Australia	

Commonwealth Land Name	State
Commonwealth Land - Commonwealth Bank of Australia [14932]	NSW
Commonwealth Land - Commonwealth Bank of Australia [14796]	NSW
Commonwealth Land - Commonwealth Bank of Australia [14775]	NSW
Commonwealth Land - Commonwealth Bank of Australia [14772]	NSW

Communications, Information Technology and the Arts - Australian Broadcasting Corporation	
Commonwealth Land - Australian Broadcasting Corporation [14954]	NSW

Communications, Information Technology and the Arts - Telstra Corporation Limited	
Commonwealth Land - Australian Telecommunications Commission [14953]	NSW

Commonwealth Land - Australian Telecommunications Commission [14959]NSW

Commonwealth Land - Australian Telecommunications Commission [14955]NSW

Commonwealth Land - Australian Telecommunications Commission [14691]NSW

Commonwealth Land - Australian Telecommunications Commission [14945]NSW

Commonwealth Land - Australian Telecommunications Commission [14911]NSW

Commonwealth Land - Australian Telecommunications Commission [14946]NSW

Commonwealth Land - Australian Telecommunications Commission [14697]NSW

Defence	
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Commonwealth Land - Defence Service Homes Corporation [14949] NSW

Commonwealth Land - Defence Service Homes Corporation [14920] NSW

Commonwealth Land - Defence Service Homes Corporation [14921] NSW

Commonwealth Land - Defence Service Homes Corporation [14947] NSW

Commonwealth Land - Defence Service Homes Corporation [14917] NSW

Commonwealth Land - Defence Service Homes Corporation [14919] NSW

Commonwealth Land - Defence Service Homes Corporation [14910] NSW

Commonwealth Land - Defence Service Homes Corporation [14915] NSW

Commonwealth Land - Defence Service Homes Corporation [14916] NSW

Commonwealth Land Name	State
Defence - BLAMEY BARRACKS - KAPOOKA [11190]	NSW
Defence - BLAMEY BARRACKS - KAPOOKA [11191]	NSW
Defence - BLAMEY BARRACKS - KAPOOKA [11193]	NSW
Defence - BLAMEY BARRACKS - KAPOOKA [11189]	NSW
Defence - BLAMEY BARRACKS - KAPOOKA [11187]	NSW
Defence - BLAMEY BARRACKS - KAPOOKA [11181]	NSW
Defence - BLAMEY BARRACKS - KAPOOKA [11183]	NSW
Defence - BLAMEY BARRACKS - KAPOOKA [11184]	NSW
Defence - BLAMEY BARRACKS - KAPOOKA [11182]	NSW
Defence - BLAMEY BARRACKS - KAPOOKA [11188]	NSW
Defence - BLAMEY BARRACKS - KAPOOKA [11185]	NSW
Defence - BLAMEY BARRACKS - KAPOOKA [11180]	NSW
Defence - BLAMEY BARRACKS - KAPOOKA [11186]	NSW
Defence - BLAMEY BARRACKS - KAPOOKA [11192]	NSW
Defence - WAGGA ARES DEPOT ; BLAMEY BKS -WAGGA WAGGA TRG DEP [11207]	NSW
Defence - WAGGA ARES DEPOT ; BLAMEY BKS -WAGGA WAGGA TRG DEP [11208]	NSW
Defence - WAGGA ARES DEPOT ; BLAMEY BKS -WAGGA WAGGA TRG DEP [11206]	NSW
<b>Defence - Defence Housing Authority</b>	
Commonwealth Land - Defence Housing Authority [14831]	NSW
Commonwealth Land - Defence Housing Authority [14830]	NSW
Commonwealth Land - Defence Housing Authority [14836]	NSW
Commonwealth Land - Defence Housing Authority [14835]	NSW
Commonwealth Land - Defence Housing Authority [14933]	NSW
Commonwealth Land - Defence Housing Authority [14931]	NSW
Commonwealth Land - Defence Housing Authority [14930]	NSW
Commonwealth Land - Defence Housing Authority [14937]	NSW

Commonwealth Land Name	State
Commonwealth Land - Defence Housing Authority [14936]	NSW
Commonwealth Land - Defence Housing Authority [14856]	NSW
Commonwealth Land - Defence Housing Authority [14923]	NSW
Commonwealth Land - Defence Housing Authority [14877]	NSW
Commonwealth Land - Defence Housing Authority [14850]	NSW
Commonwealth Land - Defence Housing Authority [16249]	NSW
Commonwealth Land - Defence Housing Authority [14838]	NSW
Commonwealth Land - Defence Housing Authority [14948]	NSW
Commonwealth Land - Defence Housing Authority [14818]	NSW
Commonwealth Land - Defence Housing Authority [14819]	NSW
Commonwealth Land - Defence Housing Authority [14762]	NSW
Commonwealth Land - Defence Housing Authority [14906]	NSW
Commonwealth Land - Defence Housing Authority [14834]	NSW
Commonwealth Land - Defence Housing Authority [14832]	NSW
Commonwealth Land - Defence Housing Authority [14810]	NSW
Commonwealth Land - Defence Housing Authority [14811]	NSW
Commonwealth Land - Defence Housing Authority [14812]	NSW
Commonwealth Land - Defence Housing Authority [14815]	NSW
Commonwealth Land - Defence Housing Authority [14860]	NSW
Commonwealth Land - Defence Housing Authority [14817]	NSW
Commonwealth Land - Defence Housing Authority [14814]	NSW
Commonwealth Land - Defence Housing Authority [14774]	NSW
Commonwealth Land - Defence Housing Authority [14777]	NSW
Commonwealth Land - Defence Housing Authority [14958]	NSW
Commonwealth Land - Defence Housing Authority [14771]	NSW
Commonwealth Land - Defence Housing Authority [16250]	NSW
Commonwealth Land - Defence Housing Authority [16251]	NSW

Commonwealth Land Name	State
Commonwealth Land - Defence Housing Authority [14773]	NSW
Commonwealth Land - Defence Housing Authority [14779]	NSW
Commonwealth Land - Defence Housing Authority [14828]	NSW
Commonwealth Land - Defence Housing Authority [14952]	NSW
Commonwealth Land - Defence Housing Authority [14951]	NSW
Commonwealth Land - Defence Housing Authority [14950]	NSW
Commonwealth Land - Defence Housing Authority [14957]	NSW
Commonwealth Land - Defence Housing Authority [14956]	NSW
Commonwealth Land - Defence Housing Authority [14763]	NSW
Commonwealth Land - Defence Housing Authority [14822]	NSW
Commonwealth Land - Defence Housing Authority [14840]	NSW
Commonwealth Land - Defence Housing Authority [14823]	NSW
Commonwealth Land - Defence Housing Authority [14837]	NSW
Commonwealth Land - Defence Housing Authority [14833]	NSW
Commonwealth Land - Defence Housing Authority [14909]	NSW
Commonwealth Land - Defence Housing Authority [14813]	NSW
Commonwealth Land - Defence Housing Authority [14824]	NSW
Commonwealth Land - Defence Housing Authority [14929]	NSW
Commonwealth Land - Defence Housing Authority [14864]	NSW
Commonwealth Land - Defence Housing Authority [14821]	NSW
Commonwealth Land - Defence Housing Authority [14865]	NSW
Commonwealth Land - Defence Housing Authority [14901]	NSW
Commonwealth Land - Defence Housing Authority [14866]	NSW
Commonwealth Land - Defence Housing Authority [14928]	NSW
Commonwealth Land - Defence Housing Authority [14900]	NSW
Commonwealth Land - Defence Housing Authority [14767]	NSW
Commonwealth Land - Defence Housing Authority [14825]	NSW



Commonwealth Land Name	State
Commonwealth Land - Defence Housing Authority [14868]	NSW
Commonwealth Land - Defence Housing Authority [14797]	NSW
Commonwealth Land - Defence Housing Authority [14808]	NSW
Commonwealth Land - Defence Housing Authority [14768]	NSW
Commonwealth Land - Defence Housing Authority [14891]	NSW
Commonwealth Land - Defence Housing Authority [16129]	NSW
Commonwealth Land - Defence Housing Authority [14799]	NSW
Commonwealth Land - Defence Housing Authority [14798]	NSW
Commonwealth Land - Defence Housing Authority [14905]	NSW
Commonwealth Land - Defence Housing Authority [14841]	NSW
Commonwealth Land - Defence Housing Authority [14781]	NSW
Commonwealth Land - Defence Housing Authority [14843]	NSW
Commonwealth Land - Defence Housing Authority [14869]	NSW
Commonwealth Land - Defence Housing Authority [14842]	NSW
Commonwealth Land - Defence Housing Authority [14926]	NSW
Commonwealth Land - Defence Housing Authority [14927]	NSW
Commonwealth Land - Defence Housing Authority [14924]	NSW
Commonwealth Land - Defence Housing Authority [14925]	NSW
Commonwealth Land - Defence Housing Authority [14845]	NSW
Commonwealth Land - Defence Housing Authority [14902]	NSW
Commonwealth Land - Defence Housing Authority [14903]	NSW
Commonwealth Land - Defence Housing Authority [14863]	NSW
Commonwealth Land - Defence Housing Authority [14862]	NSW
Commonwealth Land - Defence Housing Authority [14861]	NSW
Commonwealth Land - Defence Housing Authority [15719]	NSW
Commonwealth Land - Defence Housing Authority [14867]	NSW
Commonwealth Land - Defence Housing Authority [14886]	NSW

Commonwealth Land Name	State
Commonwealth Land - Defence Housing Authority [14942]	NSW
Commonwealth Land - Defence Housing Authority [14849]	NSW
Commonwealth Land - Defence Housing Authority [16248]	NSW
Commonwealth Land - Defence Housing Authority [14848]	NSW
Commonwealth Land - Defence Housing Authority [14944]	NSW
Commonwealth Land - Defence Housing Authority [14769]	NSW
Commonwealth Land - Defence Housing Authority [14938]	NSW
Commonwealth Land - Defence Housing Authority [14859]	NSW
Commonwealth Land - Defence Housing Authority [16345]	NSW
Commonwealth Land - Defence Housing Authority [14778]	NSW
Commonwealth Land - Defence Housing Authority [14806]	NSW
Commonwealth Land - Defence Housing Authority [16343]	NSW
Commonwealth Land - Defence Housing Authority [14847]	NSW
Commonwealth Land - Defence Housing Authority [14858]	NSW
Commonwealth Land - Defence Housing Authority [14844]	NSW
Commonwealth Land - Defence Housing Authority [14761]	NSW
Commonwealth Land - Defence Housing Authority [14764]	NSW
Commonwealth Land - Defence Housing Authority [14765]	NSW
Commonwealth Land - Defence Housing Authority [16350]	NSW
Commonwealth Land - Defence Housing Authority [14939]	NSW
Commonwealth Land - Defence Housing Authority [14935]	NSW
Commonwealth Land - Defence Housing Authority [14760]	NSW
Commonwealth Land - Defence Housing Authority [14934]	NSW
Commonwealth Land - Defence Housing Authority [14907]	NSW
Commonwealth Land - Defence Housing Authority [14776]	NSW
Commonwealth Land - Defence Housing Authority [16128]	NSW
Commonwealth Land - Defence Housing Authority [16131]	NSW

Commonwealth Land Name	State
Commonwealth Land - Defence Housing Authority [14770]	NSW
Commonwealth Land - Defence Housing Authority [14881]	NSW
Commonwealth Land - Defence Housing Authority [14880]	NSW
Commonwealth Land - Defence Housing Authority [14885]	NSW
Commonwealth Land - Defence Housing Authority [14829]	NSW
Commonwealth Land - Defence Housing Authority [14878]	NSW
Commonwealth Land - Defence Housing Authority [14870]	NSW
Commonwealth Land - Defence Housing Authority [14879]	NSW
Commonwealth Land - Defence Housing Authority [14872]	NSW
Commonwealth Land - Defence Housing Authority [14871]	NSW
Commonwealth Land - Defence Housing Authority [14873]	NSW
Commonwealth Land - Defence Housing Authority [14874]	NSW
Commonwealth Land - Defence Housing Authority [14875]	NSW
Commonwealth Land - Defence Housing Authority [14876]	NSW
Commonwealth Land - Defence Housing Authority [15720]	NSW
Commonwealth Land - Defence Housing Authority [16130]	NSW
Commonwealth Land - Defence Housing Authority [14826]	NSW
Commonwealth Land - Defence Housing Authority [14827]	NSW
Commonwealth Land - Defence Housing Authority [14852]	NSW
Commonwealth Land - Defence Housing Authority [14855]	NSW
Commonwealth Land - Defence Housing Authority [14854]	NSW
Commonwealth Land - Defence Housing Authority [14857]	NSW
Commonwealth Land - Defence Housing Authority [14912]	NSW
Commonwealth Land - Defence Housing Authority [14913]	NSW
Commonwealth Land - Defence Housing Authority [14895]	NSW
Commonwealth Land - Defence Housing Authority [14722]	NSW
Commonwealth Land - Defence Housing Authority [14908]	NSW

Commonwealth Land Name	State
Commonwealth Land - Defence Housing Authority [14839]	NSW
Commonwealth Land - Defence Housing Authority [14851]	NSW
Commonwealth Land - Defence Housing Authority [14882]	NSW
Commonwealth Land - Defence Housing Authority [14888]	NSW
Commonwealth Land - Defence Housing Authority [14889]	NSW
Commonwealth Land - Defence Housing Authority [14853]	NSW
Commonwealth Land - Defence Housing Authority [14896]	NSW
Commonwealth Land - Defence Housing Authority [16346]	NSW
Commonwealth Land - Defence Housing Authority [14805]	NSW
Commonwealth Land - Defence Housing Authority [14940]	NSW
Commonwealth Land - Defence Housing Authority [14941]	NSW
Commonwealth Land - Defence Housing Authority [14820]	NSW
Commonwealth Land - Defence Housing Authority [14801]	NSW
Commonwealth Land - Defence Housing Authority [14846]	NSW
Commonwealth Land - Defence Housing Authority [14804]	NSW
Commonwealth Land - Defence Housing Authority [16127]	NSW
Commonwealth Land - Defence Housing Authority [14802]	NSW
Commonwealth Land - Defence Housing Authority [14803]	NSW
Commonwealth Land - Defence Housing Authority [14800]	NSW
Commonwealth Land - Defence Housing Authority [16126]	NSW
Commonwealth Land - Defence Housing Authority [14809]	NSW
Commonwealth Land - Defence Housing Authority [14755]	NSW
Commonwealth Land - Defence Housing Authority [14757]	NSW
Commonwealth Land - Defence Housing Authority [14754]	NSW
Commonwealth Land - Defence Housing Authority [14758]	NSW
Commonwealth Land - Defence Housing Authority [14759]	NSW
Commonwealth Land - Defence Housing Authority [14898]	NSW

Commonwealth Land Name	State
Commonwealth Land - Defence Housing Authority [14899]	NSW
Commonwealth Land - Defence Housing Authority [14897]	NSW
Commonwealth Land - Defence Housing Authority [14894]	NSW
Commonwealth Land - Defence Housing Authority [14780]	NSW
Commonwealth Land - Defence Housing Authority [14816]	NSW
Commonwealth Land - Defence Housing Authority [14883]	NSW
Commonwealth Land - Defence Housing Authority [16348]	NSW
Commonwealth Land - Defence Housing Authority [14766]	NSW
Commonwealth Land - Defence Housing Authority [14904]	NSW
Commonwealth Land - Defence Housing Authority [16349]	NSW
Commonwealth Land - Defence Housing Authority [14893]	NSW
Commonwealth Land - Defence Housing Authority [14892]	NSW
Commonwealth Land - Defence Housing Authority [14890]	NSW
Commonwealth Land - Defence Housing Authority [16344]	NSW
Commonwealth Land - Defence Housing Authority [14756]	NSW
Commonwealth Land - Defence Housing Authority [16347]	NSW
Commonwealth Land - Defence Housing Authority [14887]	NSW
Commonwealth Land - Director of War Service Homes [14922]	NSW
Commonwealth Land - Director of War Service Homes [14782]	NSW
Commonwealth Land - Director of War Service Homes [14943]	NSW
Commonwealth Land - Director of War Service Homes [14918]	NSW
Commonwealth Land - Director of War Service Homes [14914]	NSW
<b>Unknown</b>	
Commonwealth Land - [14884]	NSW
Commonwealth Land - [14807]	NSW
Commonwealth Land - [14696]	NSW

Scientific Name	Threatened Category	Presence Text
<b>Bird</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
<a href="#">Bubulcus ibis as Ardea ibis</a> Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
<a href="#">Chalcites osculans as Chrysococcyx osculans</a> Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area overfly marine area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area
<a href="#">Neophema chrysostoma</a> Blue-winged Parrot [726]	Vulnerable	Species or species habitat likely to occur within area overfly marine area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Rostratula australis as Rostratula benghalensis (sensu lato)</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area

## Extra Information

EPBC Act Referrals			[ <a href="#">Resource Information</a> ]
Title of referral	Reference	Referral Outcome	Assessment Status
<a href="#">EnergyConnect NSW - Eastern Section</a>	2020/8766		Post-Approval
<b>Controlled action</b>			
<a href="#">Olympic Highway Realignment &amp; Construct Road-Over-Rail Bridge, Wagga Wagga NSW</a>	2013/6956	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
<b>Controlled action</b>			
<b>Not controlled action</b>			
<a href="#">Albury to Illabo Section of Inland Rail</a>	2020/8670	Not Controlled Action	Completed
<a href="#">Gregadoo Solar Farm 19-590</a>	2020/8643	Not Controlled Action	Completed
<a href="#">Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia</a>	2015/7522	Not Controlled Action	Completed
<a href="#">INDIGO Central Submarine Telecommunications Cable</a>	2017/8127	Not Controlled Action	Completed
<a href="#">Red Hill Road extension</a>	2005/2311	Not Controlled Action	Completed
<a href="#">Wagga Wagga Gas-Fired Power Station</a>	2003/1182	Not Controlled Action	Completed
<b>Not controlled action (particular manner)</b>			
<a href="#">INDIGO Marine Cable Route Survey (INDIGO)</a>	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval
<b>Referral decision</b>			
<a href="#">New transmission infrastructure, HumeLink</a>	2021/9121	Referral Decision	Referral Publication



# Caveat

## 1 PURPOSE

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

The report contains the mapped locations of:

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

## 2 DISCLAIMER

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

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

## 3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

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

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

## 4 LIMITATIONS

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

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

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

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

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

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

# Acknowledgements

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

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

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

Please feel free to provide feedback via the [Contact us](#) page.

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# Appendix B

## Likelihood of occurrence assessment

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## B.1 Likelihood of occurrence assessment

**Table B.1** Likelihood of occurrence assessment

Scientific name	Common name	EPBC Act	BC Act	FM Act	PMST	Bionet	Likelihood of occurrence	Justification
<i>Austrostipa wakoolica</i>	A spear-grass	EN	EN		Yes		Low	The study area is outside the known distribution of the species, which is generally recorded from drier floodplain habitats further west in NSW.
<i>Brachyscome muelleroides</i>	Claypan Daisy	VU	VU		Yes	Yes	Low	The species is recorded in areas which are seasonally damp, including shallow depressions, margins of waterbodies and claypans. Suitable habitat does not occur within the study area.
<i>Caladenia arenaria</i>	Sand-hill Spider Orchid	EN	EN		Yes		Low	The species inhabits woodlands with sandy soils. Suitable habitat does not occur within the study area.
<i>Lepidium aschersonii</i>	Spiny Peppercross	VU	VU		Yes		Low	The species inhabits areas subject to some degree of soil waterlogging or seasonal flooding, including Gilgai depressions and the margins of freshwater and saline marshes and shallow lakes, usually on heavy clay soil. Suitable habitat does not occur within the study area.
<i>Lepidium monoplacoides</i>	Winged Peppercross	EN	EN		Yes		Low	The species occurs on semi-arid to arid inland plains in habitats subject to season waterlogging or flooding. Suitable habitat does not occur within the study area.
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	EN	EN		Yes		Low	The species is known from a limited number of locations with the nearest records approximately 140 km north-east of the study area near Booroowa. The study area is outside this distribution. <i>Prasophyllum</i> spp. prefer moister habitats; habitat within the study area would not be considered moist.
<i>Senecio garlandii</i>	Woolly Ragwort	VU	VU			Yes	Low	The species inhabits south to east facing slopes of rocky outcrops, often in association with Box Gum Woodland. Suitable rocky outcrop habitat is not present in the study area.
<i>Swainsona murrayana</i>	Slender Darling Pea	VU	VU		Yes		Low	The species generally occurs in grasslands, herblands and Black-box woodlands. Suitable habitat is not present within the study area.
<i>Swainsona recta</i>	Small Purple-pea	EN	EN		Yes	Yes	Low	The species inhabits grassy woodlands, including Box Gum woodlands. Suitable habitat is present in the study area. The species is thought to be extinct in the Wagga Wagga region, with all records greater than 120 years old. The species was not detected during targeted flora surveys undertaken.
<i>Actitis hypoleucos</i>	Common Sandpiper	Mi			Yes		Negligible	The study area does not support suitable wetland habitat for this species.

**Table B.1 Likelihood of occurrence assessment**

Scientific name	Common name	EPBC Act	BC Act	FM Act	PMST	Bionet	Likelihood of occurrence	Justification
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE		Yes	Yes	Moderate	The species forages broadly within a variety of communities, particularly Box/Ironbark communities, with a patch distribution across its range. The species is likely to be nomadic within the study area, occurring when Eucalypts are flowering.
<i>Aphelocephala leucopsis</i>	Southern Whiteface	VU			Yes		Moderate	The species is distributed across mainland Australia and inhabits a wide range of open woodlands and forests dominated by Eucalypts or Acacias, with a understorey or shrubs or grasses, generally on ranges, foothills, lowlands and plains. Suitable open woodland habitat present with a number of records from the locality. Habitat may be more marginal as tree densities are moderate-high.
<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	VU	VU		Yes		Low	The study area does not support suitable rock habitat for this species.
<i>Apus pacificus</i>	Fork-tailed Swift	Mi			Yes		Low	Although the species may overfly the study area on occasion, it is unlikely to be impacted by the project.
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow		VU			Yes	Moderate	The species is widespread across much of mainland Australia, including large portions of NSW, excluding arid areas where the species is relatively rare. The species inhabits dry, open eucalypt forests and woodlands with an open or sparse understorey of and grassy ground-cover with some fallen woody debris. Suitable habitat is present within the study area.
<i>Bidyanus bidyanus</i>	Silver Perch	CE		EN	Yes		Negligible	Suitable aquatic habitat does not occur within the study area.
<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN	EN		Yes		Negligible	The study area does not support suitable wetland habitat for this species.
<i>Burhinus grallarius</i>	Bush Stone-curlew		EN			Yes	Moderate	The species inhabits open forest and woodlands throughout Australia, but is now considered rare to extinct across much of this range, particularly south-eastern Australia. While suitable habitat is present, records from the locality are now dated.
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Mi			Yes		Negligible	The study area does not support suitable wetland habitat for this species.
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE, Mi	EN		Yes	Yes	Negligible	The study area does not support suitable wetland habitat for this species.

**Table B.1** Likelihood of occurrence assessment

Scientific name	Common name	EPBC Act	BC Act	FM Act	PMST	Bionet	Likelihood of occurrence	Justification
<i>Calidris melanotos</i>	Pectoral Sandpiper	Mi			Yes		Negligible	The study area does not support suitable wetland habitat for this species.
<i>Collocephalon fimbriatum</i>	Gang-gang Cockatoo	EN	VU		Yes	Yes	Low	The study area represents the western distribution of the species in NSW and is "considered rare at the extremities of its range" (DAWE, 2022). May use Box Gum woodlands within the study area on rare occasions, but unlikely to be resident or for the study area to provide important habitat.
<i>Calyptorhynchus lathami lathami</i>	South-eastern Glossy Black-Cockatoo	VU	VU		Yes	Yes	Low	The species is reliant on She-oaks ( <i>Allocasuarina</i> spp. and <i>Casuarina</i> spp.). These species were not recorded in the study area, and would be considered sparse at best.
<i>Chthonicola sagittata</i>	Speckled Warbler		VU			Yes	Moderate	The species has a patchy distribution across eastern Australia, inhabiting a wide range of Eucalyptus forests and woodlands with a grassy understorey with a sparse shrub layer. The species is often associated with rocky ridges or gullies, but can inhabit another areas. The species require relatively large, undisturbed remnants to persist. Suitable habitat is present in the study area.
<i>Circus assimilis</i>	Spotted Harrier		VU			Yes	High	Recorded adjacent to the study area from 2014. Likely to forage over the study area on occasion.
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	VU	VU		Yes	Yes	Low	The species is endemic to south-eastern Australia where it inhabits woodlands dominated by Stringybarks and other rough-barked Eucalypts with a grassy understorey. Wagga Wagga forms the western extent of the species distribution (DECCW 2023). The study area does not support Stringybark species or other rough-barked Eucalypts they provide preferred habitat for the species.
<i>Crinia sloanei</i>	Sloane's Froglet	EN	VU		Yes		Negligible	
<i>Daphoenositta chrysoptera</i>	Varied Sittella		VU			Yes	High	Species inhabits eucalypt forest across mainland Australia, particularly those supporting rough-barked species and mature smooth-barked gums with dead branches. Suitable habitat is present in the study area and the species has been recorded nearby.
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	EN	VU		Yes		Low	
<i>Epthianura albifrons</i>	White-fronted Chat		VU			Yes	Low	The species is generally associated with wetland habitats or ecotonal habitats with wetlands. Suitable habitat is not present.

**Table B.1 Likelihood of occurrence assessment**

Scientific name	Common name	EPBC Act	BC Act	FM Act	PMST	Bionet	Likelihood of occurrence	Justification
<i>Falco hypoleucos</i>	Grey Falcon	VU	VU		Yes		Low	The species is generally distributed in semi-arid to arid regions further west, where it inhabits lightly timbered lowland plains. Suitable habitat does not occur within the study area.
<i>Falco subniger</i>	Black Falcon		VU			Yes	Low	The species is widely but sparsely distributed across inland regions of NSW, where its preferred foraging habitat is wooded watercourses and agricultural land with scattered remnant trees where prey densities are high. Prey was not observed to be abundant in the study area and preferred foraging habitat is not present. The species may utilise the study area on rare occasions.
<i>Galaxias rostratus</i>	Flathead Galaxias	CE		CE	Yes		Negligible	Suitable aquatic habitat does not occur within the study area.
<i>Gallinago hardwickii</i>	Latham's Snipe	Mi			Yes		Negligible	The study area does not support suitable wetland habitat for this species.
<i>Glossopsitta pusilla</i>	Little Lorikeet		VU			Yes	Moderate	A nectarivorous species which feeds in the canopy of Eucalypt forests and woodlands. Suitable habitat is present; however, Wagga Wagga is at the western extent of the species range. Likely to make seasonal movement into suitable habitat when Eucalypts are flowering.
<i>Grantiella picta</i>	Painted Honeyeater	VU	VU		Yes		Low	The Painted Honeyeater is specialised to feed on Mistletoe species. Mistletoes were observed to be sparse to absent across the study area.
<i>Grus rubicunda</i>	Brolga		VU			Yes	Negligible	The study area and surrounds do not support suitable wetland habitat for this species.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle		VU			Yes	Low	Suitable foraging habitat of this species does not occur in proximity to the study area.
<i>Hieraaetus morphnoides</i>	Little Eagle		VU			Yes	Moderate	The species is found throughout the Australian mainland where it occupies Eucalypt forests and woodlands. There are several records of the species from the locality. The species is likely to utilise the study area on occasion. No nests were observed within or in proximity to the study area.
<i>Hirundapus caudacutus</i>	White-throated Needletail	VU, Mi			Yes	Yes	Low	The species is largely aerial and may overfly the study area on occasion. The study area may provide marginal roosting habitat; however, the canopy is not as dense as most known roosts.
<i>Keyacris scurra</i>	Key's Matchstick Grasshopper	EN	EN		Yes		Low	The study area is beyond the known distribution of the species and lacks key indicators such as <i>Themeda triandra</i> and known food plants from the Asteraceae family.



**Table B.1** Likelihood of occurrence assessment

Scientific name	Common name	EPBC Act	BC Act	FM Act	PMST	Bionet	Likelihood of occurrence	Justification
<i>Lathamus discolor</i>	Swift Parrot	CE	EN		Yes	Yes	Recorded	The species has been recorded within the footprint of the project in 2012. Likely to utilise the study area when winter-flowering species in bloom.
<i>Leipoa ocellata</i>	Malleefowl	VU	EN		Yes		Negligible	The species is distributed further west, in the semi-arid to arid zones of NSW, inhabiting shrublands and low woodlands. Suitable habitat is not present in the study area.
<i>Litoria raniformis</i>	Southern Bell Frog	VU	EN		Yes		Negligible	Suitable aquatic habitat does not occur within the study area.
<i>Lophochroa leadbeateri leadbeateri</i>	Major Mitchell's Cockatoo	EN	VU		Yes		Low	The species inhabits woodlands in semi-arid to arid areas of NSW, with the species generally distributed further west of the study area. The species may occur in the study area on occasion, but it unlikely to resident.
<i>Maccullochella macquariensis</i>	Trout Cod	EN		VU	Yes		Negligible	Suitable aquatic habitat does not occur within the study area.
<i>Maccullochella peelii</i>	Murray Cod	VU			Yes		Negligible	Suitable aquatic habitat does not occur within the study area.
<i>Macquaria australasica</i>	Macquarie Perch	EN		VU	Yes		Negligible	Suitable aquatic habitat does not occur within the study area.
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	EN	VU		Yes	Yes	Moderate	The species is distributed across south-eastern Australia, inhabiting dry Eucalypt and Acacia woodlands and shrublands with an open understorey, some grassy areas and a complex ground layer. Suboptimal habitat is present within the study area, as the suitable habitat tends to have a denser tree cover and the ground layer tends to lack complexity in the form of coarse woody debris. However, potential for the species to occur cannot be discounted
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)		VU			Yes	Moderate	The species occurs across the tablelands and western slopes of NSW where it inhabits drier open forests and woodlands dominated by Box and Ironbark species. Suitable habitat is present in the study area and the species is likely to forage in the study area on occasions.
<i>Motacilla flava</i>	Yellow Wagtail	Mi			Yes		Low	The species inhabits wide range of damp to wet habitats such as marshes and wetlands. Suitable habitat does not occur within the study area.

**Table B.1 Likelihood of occurrence assessment**

Scientific name	Common name	EPBC Act	BC Act	FM Act	PMST	Bionet	Likelihood of occurrence	Justification
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	Mi			Yes		Low	The species occurs in a range of habitats, preferring tall forest and wetter habitats such as forested gullies. Suitable habitat are not present and the study area is unlikely to support important habitat for the species.
<i>Myotis macropus</i>	Southern Myotis		VU			Yes	Low	The species roosts close to water in a variety of natural and man-made structures and forages over streams and pools catching insects and small fish. Whilst the species may fly through the study area on occasion, suitable waterbodies are not present in the study area.
<i>Nannoperca australis</i>	Southern Pygmy Perch (Murray-Darling Basin lineage)	VU		VU	Yes		Negligible	Suitable aquatic habitat does not occur within the study area.
<i>Neophema chrysostoma</i>	Blue-winged Parrot	VU			Yes		Low	The species inhabits a wide range of habitats, including grasslands and woodlands with a grassy understorey. The species is an infrequent occurrence in south-eastern NSW. The species may occur within the study area on occasion, but is unlikely to be resident and the study area is unlikely to provide important habitat.
<i>Neophema pulchella</i>	Turquoise Parrot		VU			Yes	High	The species has been recorded in the BBK area in 2016 and is likely to forager within the study area on occasion.
<i>Ninox connivens</i>	Barking Owl		VU			Yes	Moderate	The species inhabits a variety of woodlands and open forests, and can tolerate fragmentation using urban remnants and cleared farmland. Nests in large old trees with suitable hollows. While the species may forage within the study area on occasions, suitable nesting habitat was not observed in or in proximity to the study area.
<i>Numenius madagascariensis</i>	Eastern Curlew	CE, Mi			Yes		Negligible	The study area does not support suitable wetland habitat for this species.
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	VU	VU		Yes		Low	The species is distributed in drier Box / Ironbark / Cypress pine woodlands on the western slopes and plains of NSW. Suitable habitat is not present in the study area.
<i>Oxyura australis</i>	Blue-billed Duck		VU			Yes	Negligible	The study area does not support suitable wetland habitat for this species.

**Table B.1 Likelihood of occurrence assessment**

Scientific name	Common name	EPBC Act	BC Act	FM Act	PMST	Bionet	Likelihood of occurrence	Justification
<i>Pachycephala inornata</i>	Gilbert's Whistler		VU			Yes	Low	The species is sparsely distributed over semi-arid and arid areas of NSW where it inhabits a wide variety of habitats with a dense shrub layer. Suitable habitat was not observed in the study area and the study area is at the eastern extent of the species distribution.
<i>Petaurus norfolcensis</i>	Squirrel Glider		VU			Yes	High	The species has been recorded in the BBK area and is abundant in the wider Wagga Wagga locality.
<i>Petroica boodang</i>	Scarlet Robin		VU			Yes	Moderate	The species inhabits dry Eucalypt forests and woodlands with a grassy understorey and abundant coarse woody debris. While the study area is generally at the western extent of the species distribution and would likely support most breeding movement areas, suitable habitat is present. Species likely to occur on occasions.
<i>Petroica phoenicea</i>	Flame Robin		VU			Yes	Moderate	The species is nomadic, breeding in tall moist Eucalypt forests and woodlands in upland area before dispersing to drier more open habitats, including dry forests and woodlands and pastures and native grasslands, following breeding. The species may occur in the study area outside the breeding period.
<i>Phascolarctos cinereus</i>	Koala	EN	EN		Yes	Yes	Moderate	The Koala has a wide but patchy distribution across eastern Australia, and inhabits a range of Eucalypt forests and woodlands. In the Riverina, Yellow Box and Grey Box are identified as locally important Koala trees, with White Box identified as an ancillary tree. Vegetation in the study area is dominated by White Box with occasional Yellow Box, and Inland Grey Box in adjacent habitat. There are no recent sightings of the species in the locality, with those present dating back to 2006. The species is considered unlikely to occur, but presence cannot be ruled out.
<i>Polytelis swainsonii</i>	Superb Parrot	VU	VU		Yes	Yes	Recorded	The species has been recorded within the footprint of the project in 2007.
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)		VU			Yes	Recorded	The species was recorded from the study area in 2023. Suitable woodland habitat present.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	VU	VU		Yes	Yes	High	The species is distributed across eastern Australia generally on coastal lowlands, tablelands and western slopes. The species feeds primarily on blossoms of a variety of flowering plants, including rainforest species, Figs ( <i>Ficus</i> spp.) and plants from the Myrtaceae ( <i>Eucalyptus</i> , <i>Corymbia</i> and <i>Angophora</i> spp.). The Grey-headed Flying-fox can range widely when foraging, and will migrate in response to food availability. The species has been recorded in the BBK area and is likely to forage within the study area during suitable flowering events. No camps located nearby.

**Table B.1 Likelihood of occurrence assessment**

Scientific name	Common name	EPBC Act	BC Act	FM Act	PMST	Bionet	Likelihood of occurrence	Justification
<i>Rostratula australis</i>	Australian Painted Snipe	EN	EN		Yes		Negligible	The study area does not support suitable wetland habitat for this species.
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat		VU			Yes	Moderate	The species is broadly distributed across northern and eastern Australia where it forages in a wide variety of habitats, generally above the canopy. Roosts in tree hollows and buildings. The species may forage above the canopy of the study area.
<i>Stagonopleura guttata</i>	Diamond Firetail	VU	VU		Yes	Yes	Moderate	The species is distributed across south-eastern Australia where it inhabits a range of open forests, open woodlands and lightly timbered habitats. The key characteristics indicating preferred habitat include low tree density, few large logs, low levels of litter cover and high grass cover. Marginal habitat is present in the study area, with vegetation in the study area being more densely timbered with moderate levels of grass cover. However, the presence of the species cannot be discounted.
<i>Stictonetta naevosa</i>	Freckled Duck		VU			Yes	Negligible	The study area does not support suitable wetland habitat for this species.
<i>Vespadelus baverstocki</i>	Inland Forest Bat		VU			Yes	Low	The species is distributed in western regions and NSW where it inhabits a variety of woodland formations, including Mallee, Mulga and River Red Gum. The study area is at the far western extremity of the species distribution and suitable habitat is not present in the study area.

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# Appendix C

## Flora species

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## C.1 Flora species recorded in the study area

**Table C.1** Flora species recorded in the study area (EcoLink)

Scientific Name	Common Name	Origin
<i>Acacia acinacea</i>	Gold-dust Wattle	Native
<i>Acacia baileyana</i>	Cootamundra Wattle	Native
<i>Acacia deanei</i>	Green Wattle	Native
<i>Acacia decora</i>	Western Silver Wattle	Native
<i>Acacia linearifolia</i>	Narrow-leaved Wattle	Native
<i>Acacia paradoxa</i>	Kangaroo Thorn	Native
<i>Acacia pycnantha</i>	Golden Wattle	Native
<i>Acacia verniciflua</i>	Varnish Wattle	Native
<i>Acetosella vulgaris</i>	Sheep Sorrel	Exotic
<i>Agrostis spp.</i>	Bent Grass	Exotic
<i>Alternanthera pungens</i>	Khaki Weed	Exotic
<i>Amyema miquelii</i>	Box Mistletoe	Native
<i>Anthosachne scabra</i>	Common Wheatgrass	Native
<i>Arctotheca calendula</i>	Capeweed	Exotic
<i>Aristida behriana</i>	Bunch Wiregrass	Native
<i>Atriplex semibaccata</i>	Creeping Saltbush	Native
<i>Austrostipa bigeniculata</i>	Yanganbil	Native
<i>Austrostipa densiflora</i>	Foxtail Spear-grass	Native
<i>Austrostipa scabra</i> subsp. <i>falcata</i>	Rough Speargrass	Native
<i>Austrostipa scabra</i> subsp. <i>scabra</i>	Rough Speargrass	Native
<i>Austrostipa spp.</i>	Spear Grass	Native
<i>Boerhavia dominii</i>	Tarvine	Native
<i>Bothriochloa macra</i>	Red Grass	Native
<i>Brachychiton populneus</i>	Kurrajong	Native
<i>Bromus catharticus</i>	Prairie Grass	Exotic
<i>Bromus diandrus</i>	Great Brome	Exotic
<i>Callistemon spp.</i>	Bottlebrush	Native
<i>Callitris glaucophylla</i>	White Cypress Pine	Native
<i>Carthamus lanatus</i>	Saffron Thistle	Exotic
<i>Cenchrus clandestinus</i>	Kikuyu Grass	Exotic

**Table C.1 Flora species recorded in the study area (EcoLink)**

Scientific Name	Common Name	Origin
<i>Centaureum erythraea</i>	Common Centaury	Exotic
<i>Cheilanthes sieberi</i>	Cloak-fern	Native
<i>Chenopodium album</i>	Fat Hen	Exotic
<i>Chloris truncata</i>	Windmill Grass	Native
<i>Cirsium vulgare</i>	Spear Thistle	Exotic
<i>Convolvulus angustissimus</i>	Bindweed	Native
<i>Conyza bonariensis</i>	Flaxleaf Fleabane	Exotic
<i>Cynodon dactylon</i>	Common Couch	Native
<i>Cyperus eragrostis</i>	Umbrella Sedge	Exotic
<i>Dactylis glomerata</i>	Cocksfoot	Exotic
<i>Daucus glochidiatus</i>	Native Carrot	Native
<i>Dichondra repens</i>	Kidney Weed	Native
<i>Digitaria divaricatissima</i>	Umbrella Grass	Native
<i>Dittrichia graveolens</i>	Stinkwort	Exotic
<i>Echium plantagineum</i>	Patterson's Curse	Exotic
<i>Ehrharta erecta</i>	Panic Veldt-grass	Exotic
<i>Einadia hastata</i>	Berry Saltbush	Native
<i>Einadia nutans</i>	Climbing Saltbush	Native
<i>Eleusine spp.</i>	Crowsfoot Grass	Exotic
<i>Enneapogon nigricans</i>	Nine-awn Grass	Native
<i>Enteropogon acicularis</i>	Curly Windmill Grass	Native
<i>Eragrostis brownii</i>	Brown's Lovegrass	Native
<i>Erodium botrys</i>	Long Storksbill	Exotic
<i>Erodium cicutarium</i>	Common Crowfoot	Exotic
<i>Erodium cicutarium</i>	Blue Crowfoot	Native
<i>Eucalyptus albens</i>	White Box	Native
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	Native
<i>Eucalyptus melliodora</i>	Yellow Box	Native
<i>Eucalyptus microcarpa</i>	Western Grey Box	Native
<i>Eucalyptus sideroxylon</i>	Mugga Ironbark	Native
<i>Euchiton sphaericus</i>	Star Cudweed	Native

**Table C.1 Flora species recorded in the study area (EcoLink)**

Scientific Name	Common Name	Origin
<i>Euphorbia drummondii</i>	Caustic Weed	Native
<i>Geranium molle</i> subsp. <i>molle</i>	Cranesbill Geranium	Exotic
<i>Geranium solanderi</i>	Native Geranium	Native
<i>Geranium</i> spp.	Geranium sp.	Native
<i>Gonocarpus elatus</i>	Raspwort	Native
<i>Gonocarpus tetragynus</i>	Poverty Raspwort	Native
<i>Goodenia pinnatifida</i>	Scrambles Eggs	Native
<i>Haloragis heterophylla</i>	Variable Raspwort	Native
<i>Heliotropium europaeum</i>	Potato Weed	Exotic
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	Native
<i>Hypericum gramineum</i>	Small St John's Wort	Native
<i>Hypericum perforatum</i>	St Johns Wort	Exotic
<i>Hypochaeris radicata</i>	Catsear	Exotic
<i>Juncus subsecundus</i>	Finger Rush	Native
<i>Lachnagrostis filiformis</i>	Blown Grass	Native
<i>Lactuca serriola</i>	Prickly Lettuce	Exotic
<i>Lepidium africanum</i>	Common Peppergrass	Exotic
<i>Lomandra filiformis</i>	Wattle Matt-rush	Native
<i>Lysimachia arvensis</i>	Scarlet Pimpernel	Exotic
<i>Maireana enchylaenoides</i>	Wingless Fissure-weed	Native
<i>Malva parviflora</i>	Small-flowered Mallow	Exotic
<i>Marrubium vulgare</i>	White Horehound	Exotic
<i>Medicago arabica</i>	Spotted Burr Medic	Exotic
<i>Microlaena stipoides</i>	Weeping Grass	Native
<i>Modiola caroliniana</i>	Red-flowered Mallow	Exotic
<i>Oxalis pes-caprae</i>	Soursob	Exotic
<i>Panicum effusum</i>	Hairy Panic	Native
<i>Paspalum dilatatum</i>	Paspalum	Exotic
<i>Pennisetum</i> spp.	Fountain Grass	Exotic
<i>Persicaria</i> sp.	Knotweed sp.	Native
<i>Phalaris aquatica</i>	Phalaris	Exotic



**Table C.1 Flora species recorded in the study area (EcoLink)**

Scientific Name	Common Name	Origin
<i>Pinus radiata</i>	Radiata Pine	Exotic
<i>Plantago lanceolata</i>	Lamb's Tongues	Exotic
<i>Poa annua</i>	Winter Grass	Exotic
<i>Poa sieberiana</i>	Snowgrass	Native
<i>Portulaca oleracea</i>	Pigweed	Native
<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed	Native
<i>Ranunculus spp.</i>	Buttercup	Native
<i>Reseda luteola</i>	Weld	Exotic
<i>Rubus fruticosus</i> sp. agg.	Blackberry	Exotic
<i>Rumex brownii</i>	Swamp Dock	Native
<i>Rumex crispus</i>	Curled Dock	Exotic
<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass	Native
<i>Rytidosperma duttonianum</i>	Brown-back Wallaby Grass	Native
<i>Rytidosperma racemosum</i>	Wallaby Grass	Native
<i>Rytidosperma setaceum</i>	Small-flowered Wallaby-grass	Native
<i>Rytidosperma spp.</i>	Wallaby Grass	Native
<i>Schoenus apogon</i>	Fluke Bogrush	Native
<i>Scientific Name</i>	<i>Common Name</i>	Native
<i>Senecio quadridentatus</i>	Cotton Fireweed	Native
<i>Sida corrugata</i>	Corrugated Sida	Native
<i>Solanum nigrum</i>	Black-berry Nightshade	Exotic
<i>Sonchus oleraceus</i>	Common Sow-thistle	Exotic
<i>Typha domingensis</i>	Narrow-leaved Cumbungi	Native
<i>Vittadinia cuneata</i>	Fuzzy New Holland Daisy	Native
<i>Vittadinia gracilis</i>	Woolly New Holland Daisy	Native
<i>Vittadinia muelleri</i>	Narrow-leaf New Holland Daisy	Native
<i>Wahlenbergia communis</i>	Tufted Bluebell	Native
<i>Wahlenbergia stricta</i>	Tall Bluebell	Native
<i>Xerochrysum viscosum</i>	Sticky Everlasting	Native

## C.2 Plot data

**Table C.2** Plot data

Scientific name	Common Name	Native/exotic	Growth form	Plot 1 - PCT 267 (Moderate) (% cover)	Plot 2 -PCT 267 (High) (% cover)	Plot 3 -PCT 110 (Moderate)(% cover)	Plot 4 - PCT 110 (High) (% cover)
<i>Acacia linearifolia</i>	Narrow-leaved Wattle	Native	Tree	r	r		
<i>Acacia pycnantha</i>	Golden Wattle	Native	Tree			r	
<i>Agrostis sp.</i>	Bent Grass	Exotic				r	
<i>Anthosachne scabra</i>	Wheatgrass, Common Wheatgrass	Native	Tussock Grass	r	r		
<i>Arctotheca calendula</i>	Capeweed	Exotic					r
<i>Aristida behriana</i>	Bunch Wiregrass	Native	Tussock Grass				r
<i>Austrostipa bigeniculata</i>	Yanganbil	Native	Tussock Grass	r	2		1
<i>Austrostipa densiflora</i>	Foxtail Spear-grass	Native	Tussock Grass		r		
<i>Austrostipa scabra</i> subsp. <i>falcata</i>	Rough Spear-grass	Native	Tussock Grass	r	3		2
<i>Austrostipa</i> spp.	Spear Grass	Native	Tussock Grass	r			
<i>Bothriochloa macra</i>	Red Grass	Native	Tussock Grass	r	r	2	r
<i>Bromus diandrus</i>	Great Brome	Exotic				r	
<i>Carthamus lanatus</i>	Saffron Thistle	Exotic		r			
<i>Cenchrus clandestinus</i>	Kikuyu Grass	Exotic		r		2	r
<i>Centaureum erythraea</i>	Common Centaury	Exotic			r	r	
<i>Cheilanthes sieberi</i>	Cloak-fern	Native	Fern and fern allies				r
<i>Chloris truncata</i>	Windmill Grass	Native	Tussock Grass		r	1	

**Table C.2** Plot data

Scientific name	Common Name	Native/exotic	Growth form	Plot 1 - PCT 267 (Moderate) (% cover)	Plot 2 -PCT 267 (High) (% cover)	Plot 3 -PCT 110 (Moderate)(% cover)	Plot 4 - PCT 110 (High) (% cover)
<i>Cirsium vulgare</i>	Spear Thistle	Exotic		1		r	
<i>Conyza bonariensis</i>	Flaxleaf Fleabane	Exotic		1	r	r	
<i>Cynodon dactylon</i>	Common Couch	Native	Other Grass	r		r	
<i>Cyperus eragrostis</i>	Umbrella Sedge	Exotic		r	r		
<i>Dactylis glomerata</i>	Cocksfoot	Exotic		r		r	
<i>Dittrichia graveolens</i>	Stinkwort	Exotic		r			
<i>Echium plantagineum</i>	Patterson's Curse	Exotic		r			
<i>Ehrharta erecta</i>	Panic Veldt-grass	Exotic		1	r	r	
<i>Einadia hastata</i>	Berry Saltbush	Native	Forb				r
<i>Einadia nutans</i>	Climbing Saltbush	Native	Forb	r	r	r	r
<i>Enteropogon acicularis</i>	Curly Windmill Grass	Native	Tussock Grass				r
<i>Eragrostis brownii</i>	Brown's Lovegrass	Native	Tussock Grass		r		
<i>Erodium botrys</i>	Long Storksbill	Exotic		r			
<i>Erodium cicutarium</i>	Common Crowfoot	Exotic					r
<i>Erodium crinitum</i>	Blue Crowfoot	Native	Forb		r		r
<i>Eucalyptus albens</i>	White Box	Native	Tree	2	3	2	2
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	Native	Tree			1	2
<i>Eucalyptus melliodora</i>	Yellow Box	Native	Tree				1
<i>Eucalyptus microcarpa</i>	Western Grey Box	Native	Tree				2

**Table C.2** Plot data

Scientific name	Common Name	Native/exotic	Growth form	Plot 1 - PCT 267 (Moderate) (% cover)	Plot 2 -PCT 267 (High) (% cover)	Plot 3 -PCT 110 (Moderate)(% cover)	Plot 4 - PCT 110 (High) (% cover)
<i>Euchiton sphaericus</i>	Star Cudweed	Native	Forb	r	r		
<i>Geranium molle subsp. molle</i>	Cranesbill Geranium	Exotic		r			
<i>Geranium solanderi</i>	Native Geranium	Native	Forb	r			r
<i>Gonocarpus elatus</i>	Raspwort	Native	Forb				r
<i>Gonocarpus tetragynus</i>	Poverty Raspwort	Native	Forb		r		r
<i>Haloragis heterophylla</i>	Variable Raspwort	Native	Forb				r
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	Native	Forb		r		r
<i>Hypericum gramineum</i>	Small St John's Wort	Native	Forb		r		r
<i>Hypericum perforatum</i>	St Johns Wort	Exotic		2	r	r	r
<i>Hypochaeris radicata</i>	Catsear	Exotic		r		r	r
<i>Juncus subsecundus</i>	Finger Rush	Native	Rush		r	r	r
<i>Lepidium africanum</i>	Common Peppercross	Exotic		r	r		r
<i>Lomandra filiformis</i>	Wattle Matt-rush	Native	Rush		r		r
<i>Lysimachia arvensis</i>	Scarlet Pimpernel	Exotic		r		r	
<i>Maireana enchylaenoides</i>	Wingless Fissure-weed	Native	Forb		r		
<i>Malva parviflora</i>	Small-flowered Mallow	Exotic				r	
<i>Marrubium vulgare</i>	White Horehound	Exotic			r		
<i>Microlaena stipoides</i>	Weeping Grass	Native	Tussock Grass		r		
<i>Modiola caroliniana</i>	Red-flowered Mallow	Exotic				r	

**Table C.2** Plot data

Scientific name	Common Name	Native/exotic	Growth form	Plot 1 - PCT 267 (Moderate) (% cover)	Plot 2 -PCT 267 (High) (% cover)	Plot 3 -PCT 110 (Moderate)(% cover)	Plot 4 - PCT 110 (High) (% cover)
<i>Oxalis pes-caprae</i>	Soursob	Exotic		r	r		r
<i>Panicum effusum</i>	Hairy Panic	Native	Tussock Grass				r
<i>Paspalum dilatatum</i>	Paspalum	Exotic				r	
<i>Pennisetum</i> spp.	Fountain Grass	Exotic		r			
<i>Phalaris aquatica</i>	Phalaris	Exotic		r		r	
<i>Plantago lanceolata</i>	Lamb's Tongues	Exotic		r			
<i>Poa annua</i>	Winter Grass	Exotic		r			
<i>Poa sieberiana</i>	Snowgrass	Native	Tussock Grass		r		r
<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed	Native	Forb			r	
<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass	Native	Tussock Grass	r	r		
<i>Rytidosperma racemosum</i>	Wallaby Grass	Native	Tussock Grass	r	2	r	1
<i>Senecio quadridentatus</i>	Cotton Fireweed	Native	Forb				r
<i>Solanum nigrum</i>	Black-berry Nightshade	Exotic		r	r		r
<i>Sonchus oleraceus</i>	Common Sow-thistle	Exotic		r			r
<i>Vittadinia cuneata</i>	Fuzzy New Holland Daisy	Native	Forb		r		r
<i>Vittadinia gracilis</i>	Woolly New Holland Daisy	Native	Forb		r		r
<i>Vittadinia muelleri</i>	Narrow-leaf New Holland Daisy	Native	Forb				r
<i>Wahlenbergia stricta</i>	Tall Bluebell	Native	Forb		r		r
<i>Xerochrysum viscosum</i>	Sticky Everlasting	Native	Forb	r	r	r	1

Notes: R = Rare, <1% cover of taxa  
1 = 1-5% cover of taxa  
2 = 6-25% cover of taxa  
3 = 26-50% cover of taxa  
4 = 51-75% cover of taxa

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# Appendix D

## Significant impact criteria assessments

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## D.1 Threatened ecological communities

### D.1.1 Critically endangered ecological communities

#### i White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

**Table D.1 Significant impact criteria assessment - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland**

Criterion	Assessment
An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:	
<ul style="list-style-type: none"><li>reduce the extent of an ecological community</li></ul>	<p><b>No.</b></p> <p><i>Direct clearing</i></p> <p>The project will directly remove 1.39 hectares (ha) of the TEC and as such will reduce the extent of the ecological community.</p> <p><i>Local extent of the ecological community</i></p> <p>The BBK area and Wagga Wagga region are known to support large areas of the ecological community. The listed ecological community comprises various woodland types broadly representing a White Box Woodland complex and a Yellow Box - Blakely's Red Gum Woodland complex.</p> <p>The extent of the ecological community within the Wagga Wagga Local Government Area was estimated in 2004 to be 10,460 ha (Threatened Species Scientific Committee, 2006); this includes White Box and Yellow Box Woodland expressions of the ecological community, as well as White Cypress Pine-Grey Box woodland expressions (Threatened Species Scientific Committee, 2006).</p> <p>With reference to contemporary datasets, the NSW State Vegetation Types Map (SVTM) vC1.1.M1.1 (DPE, 2022) maps approximately 1,557 ha of the TEC in the locality. The BBK area and Wagga Wagga is known to support large areas of White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland with 433 ha mapped within the area (EcoLogical, 2010).</p> <p><i>Reduction in extent of the ecological community</i></p> <p>Based on the available information, the most conservative estimate of community loss is a 0.32% reduction in the extent of the ecological community within the BBK area.</p> <p>Within the LGA, the project is estimated to result in a 0.01% reduction using estimates from 2004 (Threatened Species Scientific Committee, 2006) and a 0.09% reduction with reference to the SVTM mapping dataset (DPE, 2022).</p> <p>These percentages vary depending on the scale at which the occurrence is considered and also on whether PCT 267 is considered in isolation or all associated PCTs are taken into account. However, what is evident is that the reduction in the extent of the ecological community as a result of the project is small.</p>
<ul style="list-style-type: none"><li>fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines</li></ul>	<p><b>No.</b></p> <p>This ecological community is heavily cleared across its range and the remaining extent of the community is recognised as being highly fragmented, occurring as isolated patches or within a matrix with other disturbed woodland types (Threatened Species Scientific Committee, 2006).</p> <p>The occurrence of PCT 267 within the study area is typical of this, being represented by discrete patches that are broadly connected by other vegetation types. The occurrence of PCT 267 within the study area currently forms a larger patch of woodland with other vegetation types on the low hills to the west of the BBK area. It is noted that there is an existing network of tracks extending from existing buildings to the west into the occurrence of PCT 267.</p> <p>The access road will further fragment approximately 1.17 ha of the ecological community at the edge of existing clearing. However, it is noted that the effect of the project is unlikely to:</p> <ul style="list-style-type: none"><li>obstruct or restrict movement of faunal or insect pollinators that support the ecological community</li><li>create a hostile barrier that would impede wind pollination or seed dispersal for tree species</li><li>impede movement of functionally important fauna species.</li></ul>



**Table D.1 Significant impact criteria assessment - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland**

Criterion	Assessment
<ul style="list-style-type: none"> <li>adversely affect habitat critical to the survival of an ecological community</li> </ul>	<p><b>No.</b></p> <p>In recognition of the ongoing pressures on a highly fragmented and over-cleared ecological community, habitat critical to the survival of the ecological community is regarded as areas that meets the minimum thresholds to be included as the listed community (DECCW, 2010).</p> <p>The project proposes to remove 1.39 ha and fragment 1.17 ha of the ecological community. These areas represent critical habitat for the ecological community. In isolation, these impacts on critical habitat are not likely to affect the persistence of the ecological community in the study area, although it is recognised that cumulative loss from clearing is a key threat to the long-term survival of the ecological community (DECCW, 2010).</p>
<ul style="list-style-type: none"> <li>modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns</li> </ul>	<p><b>No.</b></p> <p>The project will not involve deep excavation, removal or importation of soils, changes to soil nutrient status (such as through the application of fertilisers, chemicals or waste disposal), or require significant modifications to surface hydrology. As such, there is unlikely to be an adverse impact on abiotic factors such as water and soil supporting the persistence of the ecological community.</p>
<ul style="list-style-type: none"> <li>cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting</li> </ul>	<p><b>No.</b></p> <p>The project will not involve flora harvesting activities such as those associated with agriculture and horticulture, firewood collection, or seed harvesting for re-vegetation projects.</p> <p>The project will not remove critical habitat for fauna species that constitute a functionally important species.</p> <p>The project also will not involve regular burning activities that may shift the species composition towards a more fire-tolerant assemblage.</p> <p>As such the project is not expected to cause a substantial change in the species composition of the ecological community within the study area.</p>
<ul style="list-style-type: none"> <li>cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: <ul style="list-style-type: none"> <li>assisting invasive species, that are harmful to the listed ecological community, to become established, or</li> <li>causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community</li> </ul> </li> </ul>	<p><b>No.</b></p> <p>The project may cause a decline in the quality or integrity of the ecological community in the study area by:</p> <ul style="list-style-type: none"> <li>ongoing reduction in the quality of retained vegetation</li> <li>redirecting surface water from the road into adjacent vegetation, which may increase moisture levels and facilitate establishment of weed species</li> <li>facilitate the spread of any high threat weeds via grading, ripping or topsoil stockpiling during construction</li> <li>exacerbate existing feral fauna impacts by increasing accessibility along the road.</li> </ul> <p>These impacts will be managed through the design and implementation of appropriate drainage infrastructure, weed and pest management under a CEMP (see Section 4.1.2) and ongoing weed and pest management as part of a site management plan.</p> <p>With appropriate control measures in place the project has potential to avoid causing a substantial decline in the quality of the ecological community in the study area.</p>

**Table D.1 Significant impact criteria assessment - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland**

Criterion	Assessment
which kill or inhibit the growth of species in the ecological community, or	
<ul style="list-style-type: none"> <li>interfere with the recovery of an ecological community.</li> </ul>	<p><b>No.</b></p> <p>The recovery objective for the ecological community is to minimise risk of extinction through:</p> <ul style="list-style-type: none"> <li>achieving no net loss throughout its geographic distribution</li> <li>increasing the protection of sites with high recovery potential</li> <li>increasing landscape functionality of the ecological community through management and restoration of degraded sites</li> <li>increasing transitional areas around remnants and linkages between remnants</li> <li>bringing about enduring changes in participating land manager attitudes and behaviours towards environmental protection and sustainable land management practices to increase extent, integrity and function of the ecological community (DECCW, 2010).</li> </ul> <p>The project will include landscaping within constructed areas using species indigenous to the locality and TEC. The project is not entirely consistent with the recovery objectives for the ecological community.</p>
Conclusion	<p>The project is considered is unlikely to have a significant impact on the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC as:</p> <ul style="list-style-type: none"> <li>the project will result in direct impacts to a small area of the community (1.39 ha) at the edge of existing impacts</li> <li>this impact represents an insignificant portion of the occurrence of the CEEC (0.01% to 0.09% within the locality) even within BBK (0.32% of the CEC within BBK)</li> <li>impacts are occurring at the edges of existing clearing and will not result in further fragmentation of the TEC</li> <li>the project will not modify or destroy abiotic factors necessary for the survival of the TEC</li> <li>the project will not cause a substantial change in the species composition or reduction in the quality or integrity</li> <li>substantial effort has been placed into refinement of the design to avoid and minimise impacts to the TEC, particularly impacts arising from fragmentation, resulting in a reduction of impacts to the TEC from ~16 ha at CDR to 1.39 ha direct impact and 1.17 ha of indirect impacts.</li> </ul>

### D.1.2 Endangered ecological communities

#### i Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia

**Table D.2 Significant impact criteria assessment - Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia**

Criterion	Assessment
An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:	
<ul style="list-style-type: none"> <li>reduce the extent of an ecological community</li> </ul>	<p><b>No.</b></p> <p><i>Direct clearing</i></p> <p>The project will directly remove 0.01 hectares (ha) of the TEC and as such will reduce the extent of the</p>

**Table D.2 Significant impact criteria assessment - Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia**

Criterion	Assessment
	<p>ecological community.</p> <p><i>Local extent of the ecological community</i></p> <p>The BBK area and Wagga Wagga region are known to support large areas of the ecological community, with the region referenced in the <i>Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia - EPBC Act policy statement</i> (DSEWPaC, 2012).</p> <p>The extent of the ecological community across NSW is estimated 534,500 ha nationally and 332,000 ha in NSW. No reference is provided for the NSW South Western Slopes IBRA region or Wagga Wagga locality. With reference to contemporary datasets, the NSW State Vegetation Types Map (SVTM) vC1.1.M1.1 (DPE, 2022) maps approximately 422 ha of the TEC in the locality. The BBK area and Wagga Wagga is known to support large areas of Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands with 95 ha mapped within the BBK area (EcoLogical, 2010).</p> <p><i>Reduction in extent of the ecological community</i></p> <p>Based on the available information, the most conservative estimate of community loss is a 0.01% reduction in the extent of the ecological community within the BBK area.</p> <p>Within the locality, the project is estimated to result in a 0.002% reduction with reference to the SVTM mapping dataset (DPE, 2022).</p> <p>These percentages vary depending on the scale at which the occurrence is considered. However, what is evident is that the reduction in the extent of the ecological community as a result of the project is negligible.</p>
<ul style="list-style-type: none"> <li>fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines</li> </ul>	<p><b>No.</b></p> <p>This ecological community has suffered extensive clearing, largely due to pastoral and agricultural purposes (DEWHA, 2010) and remnants are considered to occur in degraded and fragmented state (Threatened Species Scientific Committee, 2010).</p> <p>The occurrence of PCT 110 within the study area is typical of this, being represented by discrete patches that are broadly connected by other vegetation types. The occurrence of PCT 110 within the study area currently forms a larger patch of woodland with other vegetation types on the low hills to the west of the BBK area. It is noted that there is an existing network of tracks extending from existing buildings to the west into the occurrence of PCT 110.</p> <p>The project, including construction of the access road, will not result in further fragment of the ecological community as the vegetation occurs at the edge of a larger patch of the PCT and TEC and impacts will occur right at the edge of this patch.</p>
<ul style="list-style-type: none"> <li>adversely affect habitat critical to the survival of an ecological community</li> </ul>	<p><b>No.</b></p> <p>Habitat critical to the survival of the TEC is not identified in the listing advice (Threatened Species Scientific Committee, 2010) or conservation advice (DEWHA, 2010).</p> <p>The project proposes to remove 0.01 ha of the ecological community at the very edge of a large existing patch. It is considered unlikely that this vegetation is necessary for the long-term maintenance of the ecological community, to maintain genetic diversity and long term evolutionary development, or for the recovery of the ecological community. As such, the area to be impacted cannot be considered critical to the survival of the TEC.</p>
<ul style="list-style-type: none"> <li>modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns</li> </ul>	<p><b>No.</b></p> <p>The project will not involve deep excavation, removal or importation of soils, changes to soil nutrient status (such as through the application of fertilisers, chemicals or waste disposal), or require significant modifications to surface hydrology. As such, there is unlikely to be an adverse impact on abiotic factors such as water and soil supporting the persistence of the ecological community.</p>

**Table D.2 Significant impact criteria assessment - Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia**

Criterion	Assessment
<ul style="list-style-type: none"> <li>cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting</li> </ul>	<p><b>No.</b></p> <p>The project will not involve flora harvesting activities such as those associated with agriculture and horticulture, firewood collection, or seed harvesting for re-vegetation projects.</p> <p>The project will not remove critical habitat for fauna species that constitute a functionally important species.</p> <p>The project also will not involve regular burning activities that may shift the species composition towards a more fire-tolerant assemblage.</p> <p>The project will result in removal of an area of the TEC at the edge of an existing patch, in an area subject to disturbance.</p> <p>Based on the above, the project is not expected to cause a substantial change in the species composition of the ecological community within the study area.</p>
<ul style="list-style-type: none"> <li>cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: <ul style="list-style-type: none"> <li>– assisting invasive species, that are harmful to the listed ecological community, to become established, or</li> <li>– causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or</li> </ul> </li> </ul>	<p><b>No.</b></p> <p>The project is unlikely to cause a significant reduction in the quality or integrity of the ecological community in the study area given the small area of impact (0.01 ha) and that the impact is occurring at the very edge of an existing patch.</p> <p>However, some minor impacts may occur due to:</p> <ul style="list-style-type: none"> <li>• redirection of surface water from the road into adjacent vegetation, which may increase moisture levels and facilitate establishment of weed species</li> <li>• facilitating the spread of any high threat weeds via grading, ripping or topsoil stockpiling during construction.</li> </ul> <p>These impacts will be managed through the design and implementation of appropriate drainage infrastructure, weed and pest management under a CEMP (see Section 4.1.2) and ongoing weed and pest management as part of a site management plan.</p> <p>With appropriate control measures in place the project has potential to avoid causing a substantial decline in the quality of the ecological community in the study area.</p>
<ul style="list-style-type: none"> <li>interfere with the recovery of an ecological community.</li> </ul>	<p><b>No.</b></p> <p>A recovery plan is not required for this TEC. A number of priority actions are outlined in the conservation advice (DEWHA, 2010). Relevant actions include:</p> <ul style="list-style-type: none"> <li>• Ensure that remnants that are of particularly high quality or important in a landscape context are considered for inclusion in reserve tenure, where possible.</li> <li>• Manage sites to prevent introduction or further spread of new invasive exotic weeds, and targeted control of existing key weeds.</li> <li>• Ensure that any revegetation is undertaken in an appropriate manner.</li> </ul> <p>The project will include landscaping within constructed areas using species indigenous to the locality and TEC. The project will not interfere with the recovery of the ecological community.</p>
Conclusion	<p>The project is considered is unlikely to have a significant impact on the Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands EEC as:</p> <ul style="list-style-type: none"> <li>• the project will result in direct impacts to a very small area of the community (0.01 ha) at the edge of existing impacts</li> <li>• this impact represents an insignificant portion of the occurrence of the EEC at a regional scale (0.002% within the locality) or even within BBK (0.01% of the EEC within BBK)</li> </ul>

**Table D.2 Significant impact criteria assessment - Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia**

Criterion	Assessment
	<ul style="list-style-type: none"> <li>impacts are occurring at the very edge of existing clearing and will not result in any further fragmentation of the TEC</li> <li>the project will not modify or destroy abiotic factors necessary for the survival of the TEC</li> <li>the project will not cause a substantial change in the species composition or reduction in the quality or integrity</li> <li>the project will not interfere with the recovery of the TEC</li> <li>substantial effort has been placed into refinement of the design to avoid and minimise impacts to the TEC, resulting in very minor impacts at the very edge of an existing patch, ensuring no further fragmentation.</li> </ul>

## D.2 Threatened species

### D.2.1 Critically endangered and endangered species

#### i Regent Honeyeater (*Anthochaera phrygia*)

**Table D.3 Significant impact criteria assessment – Regent Honeyeater**

Criterion	Assessment
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	
<ul style="list-style-type: none"> <li>lead to a long-term decrease in the size of a population</li> </ul>	<p><b>No.</b></p> <p>It is thought that the Regent Honeyeater comprises a single population (Garnett, Szabo, &amp; Dutson, 2010) with four known key breeding areas (the Bundarra-Barraba, Capertee Valley and Hunter Valley districts in New South Wales, and the Chiltern area in north-east Victoria (DoE, 2016)). The project is located outside of these breeding areas and is not in mapped important areas for the species. The project is highly unlikely to result in the loss of any individuals. Therefore, the project is unlikely to lead to a long-term decrease in the size of the population.</p>
<ul style="list-style-type: none"> <li>reduce the area of occupancy of the species</li> </ul>	<p><b>No.</b></p> <p>The area of occupancy for the Regent Honeyeater is estimated at 300 km<sup>2</sup> (DoE, 2015). The project would result in a loss of up to 2.56 ha of suitable habitat for the species; however suitable habitat would remain within the immediate area and no records of the Regent Honeyeater would be impacted. Based on the grid sizes used in the area of occupancy estimates, the project would not result in any reduction in the area of occupancy for the species.</p>
<ul style="list-style-type: none"> <li>fragment an existing population into two or more populations</li> </ul>	<p><b>No.</b></p> <p>The Regent Honeyeater is a highly mobile species and occurs irregularly across its range (DoE, 2015). The removal of 2.56 ha of habitat within the species' broad range, occurring at the edge of existing clearing associated with the BBK area, is unlikely to fragment an existing population into two or more populations.</p>
<ul style="list-style-type: none"> <li>adversely affect habitat critical to the survival of a species</li> </ul>	<p><b>No.</b></p> <p>The Recovery Plan (DoE, 2016) identifies the following as habitat critical for the survival of the Regent Honeyeater:</p> <ul style="list-style-type: none"> <li>Any breeding or foraging areas where the species is likely to occur.</li> <li>Any newly discovered breeding or foraging locations.</li> </ul> <p>The study area does not support any known breeding habitat but may support foraging habitat.</p>

**Table D.3 Significant impact criteria assessment – Regent Honeyeater**

Criterion	Assessment
<ul style="list-style-type: none"> <li>disrupt the breeding cycle of a population</li> </ul>	<p><b>No.</b></p> <p>The project is not located within the four known key breeding areas identified in the Recovery Plan (DoE, 2016) (Bundarra-Barraba, Capertee Valley and Hunter Valley districts in New South Wales, and the Chiltern area in north-east Victoria). The project therefore will not disrupt breeding cycle of the population.</p>
<ul style="list-style-type: none"> <li>modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</li> </ul>	<p><b>No.</b></p> <p>The project will impact 2.56 ha of potential foraging habitat for the species. There are no records of Regent Honeyeater in the study area and the project is located on the edge of a large area of contiguous woodland in the BBK area totalling approximately 825 ha (EcoLogical, 2010). Impacted habitat represents 0.31% of the suitable connected habitat available to the species. This degree of habitat loss is considered unlikely to cause the species to decline, even at a local scale.</p>
<ul style="list-style-type: none"> <li>result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat</li> </ul>	<p><b>No.</b></p> <p>The Recovery Plan (DoE, 2016) does not identify invasive species as a key threat to the Regent Honeyeater. The project is unlikely to result in the introduction of any invasive plant or animal species which would impact on the species.</p>
<ul style="list-style-type: none"> <li>introduce disease that may cause the species to decline, or</li> </ul>	<p><b>No.</b></p> <p>The Conservation Advice (DoE, 2015) or Recovery Plan (DoE, 2016) for the Regent Honeyeater do not identify any diseases affecting the species. The project is unlikely to result in the introduction of new diseases.</p>
<ul style="list-style-type: none"> <li>interfere with the recovery of the species.</li> </ul>	<p><b>No.</b></p> <p>Recovery Plan for the Regent Honeyeater (DoE, 2016) identifies a number of recovery strategies to help recover the species. These strategies are not relevant to the project and the project will not interfere with any of these strategies.</p>
Conclusion	<p>The project is considered is unlikely to have a significant impact on the Regent Honeyeater as:</p> <ul style="list-style-type: none"> <li>only minor impacts will occur to 2.56 ha of potential foraging habitat for the species, with large areas of contiguous habitat remaining unimpacted</li> <li>as impacts ill occur edge of existing clearing, the project will not result in fragmentation of the population</li> <li>it will not lead to impact on breeding habitat which could disrupt the life cycle of the species and lead to a decrease in the size of the population</li> <li>the project will not result in the introduction of harmful invasive species or diseases and will not interfere with the recovery actions identified for the species.</li> </ul>

**Table D.4 Significant impact criteria assessment – Swift Parrot**

Criterion	Assessment
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	
<ul style="list-style-type: none"> <li>lead to a long-term decrease in the size of a population</li> </ul>	<p><b>No.</b></p> <p>The Swift Parrot consists of a single migratory population of less than 2,000 birds (Garnett, Szabo, &amp; Dutson, 2010) and is continuing to decline largely due to loss of habitat in both their breeding range (eastern Tasmania) and non-breeding range in south-eastern mainland Australia (Commonwealth of Australia, 2019; Threatened Species Scientific Committee, 2016). The project will not result in the loss of any individuals and will not impact on breeding habitat for the species. The project is unlikely to lead to a long-term decrease in the size of the population.</p>
<ul style="list-style-type: none"> <li>reduce the area of occupancy of the species</li> </ul>	<p><b>No.</b></p> <p>The area of occupancy for the Swift Parrot is difficult to estimate, with estimates for foraging habitat ranging from 18.5 km<sup>2</sup> to 355 km<sup>2</sup> between 2009 and 2014 (Threatened Species Scientific Committee, 2016). The project would result in a loss of up to 2.56 ha of suitable habitat for the species; however suitable habitat would remain within the immediate area. Whilst the project may result in a very minor reduction of the area of occupancy, in the context of how this has been determined (see (Threatened Species Scientific Committee, 2016) this would be considered insignificant.</p>
<ul style="list-style-type: none"> <li>fragment an existing population into two or more populations</li> </ul>	<p><b>No.</b></p> <p>The population is one single migratory population (Threatened Species Scientific Committee, 2016). The project does not have the potential to fragment the population.</p>
<ul style="list-style-type: none"> <li>adversely affect habitat critical to the survival of a species</li> </ul>	<p><b>No.</b></p> <p>The Draft Recovery Plan (Commonwealth of Australia, 2019) identifies the following as habitat critical for the survival of the Swift Parrot:</p> <ul style="list-style-type: none"> <li>Any nesting sites or foraging areas where the species is known or likely to occur (as shown in Figure 1).</li> <li>Any newly discovered breeding or important foraging areas.</li> </ul> <p>The study area does not support any known breeding habitat but supports known foraging habitat for the species.</p>
<ul style="list-style-type: none"> <li>disrupt the breeding cycle of a population</li> </ul>	<p><b>No.</b></p> <p>Breeding occurs in Tasmania. The project will not impact the breeding cycle of the Swift Parrot.</p>
<ul style="list-style-type: none"> <li>modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</li> </ul>	<p><b>No.</b></p> <p>The project will impact 2.56 ha of foraging habitat for the species. The project is located on the edge of a large area of contiguous woodland in the BBK area totalling approximately 825 ha (EcoLogical, 2010). Impacted habitat represents 0.31% of the suitable connected habitat available to the species within the BBK area. This degree of habitat loss is considered unlikely to cause the species to decline, even at a local scale.</p>
<ul style="list-style-type: none"> <li>result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat</li> </ul>	<p><b>No.</b></p> <p>The Draft Recovery Plan (Commonwealth of Australia, 2019) identifies the Sugar Glider (<i>Petaurus breviceps</i>) as threat to the species in breeding areas in Tasmania. No other invasive species are identified as a key threat to the Swift Parrot. The project is unlikely to result in the introduction of any invasive plant or animal species which would impact on the species.</p>

**Table D.4 Significant impact criteria assessment – Swift Parrot**

Criterion	Assessment
<ul style="list-style-type: none"> <li>introduce disease that may cause the species to decline, or</li> </ul>	<p><b>No.</b></p> <p>The Draft Recovery Plan (Commonwealth of Australia, 2019) identifies Psittacine Beak and Feather Disease as a threat to the species. The project will not result in the spread of this disease. The project is unlikely to result in the introduction of new diseases.</p>
<ul style="list-style-type: none"> <li>interfere with the recovery of the species.</li> </ul>	<p><b>No.</b></p> <p>The Draft Recovery Plan (Commonwealth of Australia, 2019) identifies seven recovery strategies to help recover the species. Only one is considered relevant to the project:</p> <ul style="list-style-type: none"> <li>Manage and protect known Swift Parrot breeding and foraging habitat at the landscape scale.</li> </ul> <p>The project will result in the removal of 2.56 ha of foraging habitat, representing 0.31% of the suitable connected habitat available to the species. Remaining strategies are not relevant to the project and the project will not interfere with any of these strategies.</p>
Conclusion	<p>The project is considered is unlikely to have a significant impact on the Swift Parrot as:</p> <ul style="list-style-type: none"> <li>the project will impact on a small area of suitable habitat at the edge of existing cleared area</li> <li>impacted habitat represents 0.31% of the suitable connected habitat available to the species within the BBK area</li> <li>the project will not disrupt the breeding cycle of the species, reduce the area of occupancy for the species, fragment the population or significantly interfere with the recovery of the species.</li> </ul>

iii Hooded Robin (south-eastern form) (*Melanodryas cucullata cucullata*)

**Table D.5 Significant impact criteria assessment – Hooded Robin**

Criterion	Assessment
<p>An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:</p>	
<ul style="list-style-type: none"> <li>lead to a long-term decrease in the size of a population</li> </ul>	<p><b>No.</b></p> <p>The Conservation Advice for the Hooded Robin (south-eastern) (DCCEEW, 2023) estimated the number of mature individuals to be 68,000 individuals (range 36,000 – 113,000), for the purpose of assessment for listing and states that the population has declined by &gt;50% over the last ten years (one generation is 3 years). Studies by Ford and others (Ford, et al., 2021) have shown that Hooded Robins tend to persist only in substantial areas of remnant habitat, so it is assumed that, if they are present, there must have been at least 20 ha of suitable habitat within the patch where they were observed (DCCEEW, 2023). However, the reliability of this population estimate is low (DCCEEW 2023d, Ford et al. 2021).</p> <p>No records of the species exist within the study area and a conservative assessment has been undertaken based on assuming presence. The proposal would remove 2.56 ha of habitat at the edge of existing cleared areas, with large areas of contiguous woodland habitat in the BBK area to be retained. Given that the Conservation Advice (DCCEEW, 2023) indicates that the Hooded Robin tends to persist in substantial areas of remnant habitat of at least 20 ha, the proposed development area represents a small peripheral area of habitat. Therefore, the proposed development is considered unlikely to lead to a long-term decrease in the size of the population assumed present.</p>
<ul style="list-style-type: none"> <li>reduce the area of occupancy of the species</li> </ul>	<p><b>No.</b></p> <p>The area of occupancy for the Hooded Robin is conservatively estimated at 30,000 km<sup>2</sup> (based on 2 x 2 km grid squares) but is assumed to be at least twice this (DCCEEW, 2023; Ford, et al., 2021).</p> <p>The project would result in a loss of up to 2.56 ha of suitable habitat for the species; however suitable habitat would remain within the immediate area and no records of the Hooded Robin would be impacted. Based on the grid sizes used in the area of occupancy estimates, the project would not result in any reduction in the area of occupancy for the species.</p>



**Table D.5 Significant impact criteria assessment – Hooded Robin**

Criterion	Assessment
<ul style="list-style-type: none"> <li>fragment an existing population into two or more populations</li> </ul>	<p>The Hooded Robin is a mobile species, and occurs across south-eastern Australia from far south-east Queensland, through the slopes of the Great Dividing Range, central NSW, inland Victoria, to Yorke Peninsula, South Australia (DCCEEW, 2023). The removal of 2.56 ha of habitat within the species’ broad range is unlikely to fragment an existing population into two or more populations.</p>
<ul style="list-style-type: none"> <li>adversely affect habitat critical to the survival of a species</li> </ul>	<p><b>No.</b></p> <p>The Conservation Advice (DCCEEW, 2023) specifies that habitat critical to the survival of the Hooded Robin (south-eastern) includes areas that have:</p> <ul style="list-style-type: none"> <li>dry eucalypt and acacia woodlands and shrublands remnants with an open understorey, some grassy areas and a complex ground layer, often in or near clearings or open areas</li> <li>structurally diverse habitats featuring: mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses</li> <li>standing dead or live trees and tree stumps are also essential for nesting, roosting and foraging</li> <li>moderately deep to deep soils, rocks and fallen timber which provides essential foraging habitat.</li> </ul> <p>Further, the Conservation Advice (DCCEEW, 2023) states that any known or likely habitat as shown in Map 1 should be considered habitat critical to the survival of the subspecies. This mapping encompasses most of south-eastern Australia, including most of NSW and Victoria, and south-east South Australia.</p> <p>The study area is located in an area where species habitat is known to occur in Map 1 of DCCEEW (2023). Habitat within the study area consists of dry Eucalypt forests with an open understorey and is structurally diverse, supporting mature trees, saplings and a ground layer of tall native grasses. However, the ground layer may not be considered ‘complex’ lacking structure derived from rocks, coarse woody debris or tree stumps.</p> <p>Given the above, and the lack of records from the study area or locality, habitat within the study area is not considered critical to the survival of the species.</p>
<ul style="list-style-type: none"> <li>disrupt the breeding cycle of a population</li> </ul>	<p><b>No.</b></p> <p>Hooded Robins return to the same breeding site where they typically rear several broods each season. Nests comprise small, open cups of bark and grasses, sometimes with lichens and cobwebs (DCCEEW, 2023; Fitri &amp; Ford, 2003; Higgins &amp; Peter, 2002), and are known to be situated in a tree fork or crevice, from less than 1 m to 5 m above the ground (DCCEEW, 2023). While the 2.56 ha of habitat within the subject land represents potential breeding habitat, no Hooded Robins, or potential Hooded Robin nests were identified within the subject land. The project is considered unlikely to disrupt the breeding cycle of a population.</p>
<ul style="list-style-type: none"> <li>modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</li> </ul>	<p><b>No.</b></p> <p>The study area supports 2.56 ha of potential habitat, on the periphery of a large area of contiguous woodland in the BBK area totalling approximately 825 ha (EcoLogical, 2010). This represents 0.31% of the suitable connected habitat available to the species. This degree of habitat loss is considered unlikely to cause the species to decline, even at a local scale.</p>
<ul style="list-style-type: none"> <li>result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species’ habitat</li> </ul>	<p><b>No.</b></p> <p>Hooded Robins are threatened by predation by feral cats and foxes, well as over-grazing by introduced Rabbits (<i>Oryctolagus cuniculus</i>) and domestic stock, and invasive weeds resulting in floristic and structural changes to habitat (DCCEEW, 2023).</p> <p>The project will not result in increased potential for predation or changes in grazing regimes. Unmitigated, the project has potential to result in an increase in weed cover. These impacts will be managed through the design and implementation of appropriate drainage infrastructure, weed and pest management under a CEMP (see Section 4.1.2) and ongoing weed and pest management as part of a site management plan.</p> <p>With appropriate control measures in place the project has potential to avoid the introduction of invasive species that may be harmful.</p>

**Table D.5 Significant impact criteria assessment – Hooded Robin**

Criterion	Assessment
<ul style="list-style-type: none"> <li>introduce disease that may cause the species to decline, or</li> </ul>	<p><b>No.</b></p> <p>The Conservation Advice for the Hooded Robin (south-eastern) (DCCEEW, 2023) does not identify any diseases affecting the species. The proposal is unlikely to result in the introduction of new diseases.</p>
<ul style="list-style-type: none"> <li>interfere with the recovery of the species.</li> </ul>	<p><b>No.</b></p> <p>No recovery plan has been prepared for the Hooded Robin. The Conservation Advice (DCCEEW, 2023) identifies a number of recovery actions. The actions in the plan of relevance to the project include:</p> <ul style="list-style-type: none"> <li>Cease all land clearing of habitat critical for the survival of Hooded Robin (south-eastern).</li> <li>Retain and restore all remnant woodland patches in areas of habitat critical for the survival of Hooded Robin (south-eastern).</li> <li>Ensure populations remain connected by avoiding gaps greater than 100 m between habitat patches and along linear remnants. Eliminate gaps through revegetation (either corridors or stepping stone plantings), focusing on important movement pathways.</li> </ul> <p>Given habitat is not considered critical habitat and the project will not result in gaps being created greater than 100 m between patches, the project is considered unlikely to interfere with the recovery of the species.</p>
Conclusion	<p>The project is considered is unlikely to have a significant impact on the Hooded Robin (south-eastern) as:</p> <ul style="list-style-type: none"> <li>the species tends to persist in substantial areas of remnant habitat of at least 20 ha, and large areas of habitat contiguous with the study area will be retained</li> <li>the project will not impact on habitat critical to the survival of the species</li> <li>the project is unlikely to significantly reduce the area of occupancy of the species</li> <li>fragmenting an existing population into two or more populations is unlikely</li> <li>disruptions on the breeding cycle of a population are unlikely</li> <li>the proposal is unlikely to interfere with the recovery of the species.</li> </ul>

iv **Koala (*Phascolarctos cinereus*)**

**Table D.6 Significant impact criteria assessment – Koala**

Criterion	Assessment
<p>An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:</p>	
<ul style="list-style-type: none"> <li>lead to a long-term decrease in the size of a population</li> </ul>	<p><b>No.</b></p> <p>The proposal will result in the removal of 2.56 ha of potential Koala habitat. There are few Koala sightings in the locality, with a total of four Koala records within the locality, from 1965 to the most recent records being in 2006. Koala habitat in the Wagga Wagga area is generally fragmented, though there is the potential for connection through to vegetation and habitat along the Murrumbidgee River to the north of the study area.</p> <p>The vegetation is part of a larger vegetated area which is approximately 725 ha in size, south of the Sturt Highway and west of the Olympic Highway. The proposed removal of 2.56 ha of potential Koala habitat will remove 0.35% of the available in this area. All indications from the paucity of sightings is that Koalas in this area occur at low density, with individuals utilising large areas. Given this, it is considered that the proposal is considered unlikely to lead to a long-term decrease in the size of a population of the Koala.</p>

**Table D.6 Significant impact criteria assessment – Koala**

Criterion	Assessment
<ul style="list-style-type: none"> <li>reduce the area of occupancy of the species</li> </ul>	<p><b>No.</b></p> <p>The area of occupancy for the Koala is estimated at 19,400 km<sup>2</sup> (DAWE, 2022). The project would result in a loss of Koala habitat by up to 2.56 ha; however suitable habitat would remain within the immediate area and no records of the Koala would be impacted. Thus, the project could result in a minor reduction in the area of occupancy of the species. However, the impact on this measure would be so low and is unlikely to lead to a significant loss for the species.</p>
<ul style="list-style-type: none"> <li>fragment an existing population into two or more populations</li> </ul>	<p><b>No.</b></p> <p>Given its location at an existing edge of existing clearing associated with the BBK area, and retention of vegetated lands to the west, it is considered that the proposal will not fragment an existing Koala population.</p>
<ul style="list-style-type: none"> <li>adversely affect habitat critical to the survival of a species</li> </ul>	<p><b>No.</b></p> <p>Commonwealth impact guidelines (DoE, 2013) identify that critical habitat refers to areas that are necessary:</p> <ul style="list-style-type: none"> <li>for activities such as foraging, breeding, roosting, or dispersal</li> <li>for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)</li> <li>to maintain genetic diversity and long-term evolutionary development</li> <li>for the reintroduction of populations or recovery of the species or ecological community.</li> </ul> <p>The conservation advice (DAWE, 2022) and Recovery Plan (DAWE, 2022) for the Koala attempt to identify habitat critical to the survival of the Koala, but state that knowledge of the species is evolving and focus on a number of attributes useful in evaluating Koala habitat.</p> <p>Habitat within the study area includes Yellow Box and Grey Box, which are identified as locally important Koala trees, while White Box is identified as an ancillary tree (Youngentob, Marsh, &amp; Skewes, 2021). White Box is the dominant tree within the vegetation communities present in the study area. Therefore, habitat quality is likely to be lower than other areas and unlikely to provide key features such as habitat during of stress. Habitat to be removed is on the edge of existing clearing, and therefore does not provide significant movement corridors or dispersal area important for maintaining genetic diversity.</p> <p>Based on the above, habitat is unlikely to be considered critical to the survival of the Koala population.</p>
<ul style="list-style-type: none"> <li>disrupt the breeding cycle of a population</li> </ul>	<p><b>No.</b></p> <p>The disturbance associated with the project may disrupt the breeding cycle of the individual Koalas within the vegetation to be cleared. However, it will not disrupt the overall breeding cycle of the population given the much larger area covered by the local Koala population.</p>
<ul style="list-style-type: none"> <li>modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</li> </ul>	<p><b>No.</b></p> <p>The project will reduce potential Koala habitat by up to 2.56 ha at the edge of existing clearing. This represents 0.35% of the suitable connected habitat available to the species (see above). This degree of habitat loss is considered unlikely to cause the species to decline, even at a local scale.</p>
<ul style="list-style-type: none"> <li>result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat</li> </ul>	<p><b>No.</b></p> <p>The proposal is unlikely to result in the invasion of weed species due to management measures proposed (see Section 4.1.2). Dogs, which are an invasive species which is a threat to Koalas, will be prohibited on site. Overall, the proposal is unlikely to result in invasive species harmful to the Koala becoming established in the Koala's habitat.</p>

**Table D.6 Significant impact criteria assessment – Koala**

Criterion	Assessment
<ul style="list-style-type: none"> <li>introduce disease that may cause the species to decline, or</li> </ul>	<p><b>No.</b></p> <p>Chlamydia and Koala retrovirus are diseases known to affect and to contribute to the decline of the Koala (DAWE, 2022). The proposal is unlikely to result in the introduction of new diseases, or to exacerbate the two diseases mentioned if these are currently present within the site.</p>
<ul style="list-style-type: none"> <li>interfere with the recovery of the species.</li> </ul>	<p><b>No.</b></p> <p>The Recovery Plan (DAWE, 2022) identifies a number of recovery strategies for the species:</p> <ul style="list-style-type: none"> <li>Build and share knowledge.</li> <li>Engage and partner with the community in listed Koala conservation</li> <li>Increase the area of protected habitat for the listed Koala</li> <li>Integrate listed Koala conservation into policy, statutory and land use plans</li> <li>Strategically restore listed Koala habitat</li> <li>Actively manage listed Koala metapopulations</li> </ul> <p>There are no relevant statutory obligations identified in the Recovery Plan that have requirements for Defence and the proposed action does not contravene the approved recovery plan for the species.</p>
Conclusion	<p>The project is considered is unlikely to have a significant impact on the Koala as:</p> <ul style="list-style-type: none"> <li>the project will result in impacts to a very small area of habitat, which represents 0.35% of the available connected habitat</li> <li>the project will result in a very minor reduction in the area of occupancy for the species</li> <li>impacts will occur at the edge of existing clearing and will not fragment an existing population of the species</li> <li>habitat to be impacted is unlikely to constitute habitat critical to the survival of the species</li> <li>the project will not disrupt the breeding cycle for the species, introduce invasive species or diseases or interfere with the recovery of the species.</li> </ul>

## D.2.2 Vulnerable species

### i Grey-headed Flying-fox (*Pteropus poliocephalus*)

**Table D.7 Significant impact criteria assessment – Grey-headed Flying-fox**

Criterion	Assessment
<p>An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:</p>	
<ul style="list-style-type: none"> <li>lead to a long-term decrease in the size of an important population of a species</li> </ul>	<p><b>No.</b></p> <p>The Grey-headed Flying-fox (GHFF) is considered to be a single, mobile population with individuals distributed across Queensland, New South Wales, Victoria, South Australia, Tasmania and the ACT (DAWE, 2021). Nationally important camps of the single, mobile population are those that have contained ≥ 10,000 Grey-headed Flying-foxes in more than one year in the last 10 years, or have been occupied by more than 2,500 Grey-headed Flying-foxes permanently or seasonally every year for the last 10 years (DAWE, 2021; DoE, 2015). One Flying-fox camp is known east of Wagga Wagga, along the Murrumbidgee River, approximately 10km north-east of the subject land, which is also known to have been utilised by Little-red Flying-fox (<i>Pteropus scapulatus</i>) (DCCEEW, 2023).</p> <p>The project will not result in the loss of any individuals and will not impact on nationally important camps of the species. The project is unlikely to lead to a long-term decrease in the size of the population.</p>

**Table D.7 Significant impact criteria assessment – Grey-headed Flying-fox**

Criterion	Assessment
<ul style="list-style-type: none"> <li>reduce the area of occupancy of an important population</li> </ul>	<p><b>No.</b></p> <p>The GHFF has a broad distribution across Queensland, New South Wales, Victoria, South Australia, Tasmania and the ACT ranging from the on the coastal lowlands and slopes of eastern Australia (DAWE, 2021). However, the area of occupancy is not documented.</p> <p>The project will result in impacts to 2.56 ha of foraging habitat, on the periphery of over 500 ha of contiguous woodland habitat to be retained in the BBK area. Given this, the proposal is unlikely to reduce the area of occupancy of the single population.</p>
<ul style="list-style-type: none"> <li>fragment an existing important population into two or more populations</li> </ul>	<p><b>No.</b></p> <p>The population is one single migratory population (DAWE, 2021). The project does not have the potential to fragment the population.</p>
<ul style="list-style-type: none"> <li>adversely affect habitat critical to the survival of a species</li> </ul>	<p><b>No.</b></p> <p>Where the existence of important winter and spring flowering feed tree species are verified in the field, they are considered habitat critical to the survival of the Grey-headed Flying-fox (DAWE 2021). Two species as listed in the <i>National Recovery Plan</i> (DAWE 2021) are present in the subject land, being <i>Eucalyptus albens</i> (White Box) and <i>E. sideroxylon</i> (Mugga Ironbark).</p> <p>The Recovery Plan (DAWE, 2021) identifies the following as habitat critical for the survival of the Grey-headed Flying-fox:</p> <ul style="list-style-type: none"> <li>vegetation communities containing important winter and spring flowering species, including White Box and Yellow Box or</li> <li>vegetation communities containing native species that are known to be productive as foraging habitat during the final weeks of gestation, and during the weeks of birth, lactation and conception (August to May)</li> <li>vegetation communities containing native species used for foraging and occur within 20 km of a nationally important camp as identified on the Department’s interactive flying-fox web viewer, or</li> <li>vegetation communities containing native and or exotic species used for roosting at the site of a nationally important Grey-Headed Flying-Fox camp as identified on the Department’s interactive flying-fox web viewer.</li> </ul> <p>The study area supports 2.56 ha of foraging habitat containing important winter and spring flowering species. This habitat occurs on the periphery of over 500 ha of contiguous woodland habitat to be retained in the BBK area. These woodlands are known to support important winter and spring flowering feed trees such as White Box, Yellow Box and Mugga Ironbark (EcoLogical, 2010).</p>
<ul style="list-style-type: none"> <li>disrupt the breeding cycle of an important population</li> </ul>	<p><b>No.</b></p> <p>Given the GHFF occurs as a single, mobile population, no nationally important camps occur within at least 250 km from the subject land, and no camps occur in the subject land (DCCEEW, 2023), the proposed removal of 2.56 ha of foraging habitat is unlikely to disrupt the breeding cycle of an important population.</p>
<ul style="list-style-type: none"> <li>modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</li> </ul>	<p><b>No.</b></p> <p>The project will impact 2.56 ha of foraging habitat for the species. The project is located on the edge of a large area of contiguous woodland in the BBK area totalling approximately 825 ha (EcoLogical, 2010). Impacted habitat represents 0.31% of the suitable connected habitat available to the species within the BBK area. This degree of habitat loss is considered unlikely to cause the species to decline, even at a local scale.</p>
<ul style="list-style-type: none"> <li>result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species’ habitat</li> </ul>	<p><b>No.</b></p> <p>The Recovery Plan (DAWE, 2021) does not identify invasive species as a key threat to the Grey-headed Flying-fox. The project is unlikely to result in the introduction of any invasive plant or animal species which would impact on the species.</p>

**Table D.7 Significant impact criteria assessment – Grey-headed Flying-fox**

Criterion	Assessment
<ul style="list-style-type: none"> <li>introduce disease that may cause the species to decline, or</li> </ul>	<p><b>No.</b></p> <p>While Grey-headed Flying-foxes are natural reservoirs for at least three zoonotic diseases (DAWE, 2021), the Recovery Plan for the species (DAWE, 2021) does not identify any diseases affecting the species. The project is unlikely to result in the introduction of new diseases.</p>
<ul style="list-style-type: none"> <li>interfere substantially with the recovery of the species.</li> </ul>	<p><b>No.</b></p> <p>The Recovery Plan (DAWE, 2021) identifies nine recovery objectives to help recover the species. Only one is considered relevant to the project:</p> <ul style="list-style-type: none"> <li>Identify, protect and increase native foraging habitat that is critical to the survival of the Grey-headed Flying-fox.</li> </ul> <p>The project will result in the removal of 2.56 ha of foraging habitat, representing 0.31% of the suitable connected habitat available to the species. Remaining strategies are not relevant to the project and the project will not interfere with any of these strategies.</p>
Conclusion	<p>The project is considered is unlikely to have a significant impact on the Grey-headed Flying-fox as:</p> <ul style="list-style-type: none"> <li>the project will result in minor and insignificant impacts to the species habitat at either a local or national scale</li> <li>no nationally important camps will be disrupted</li> <li>the project will not disrupt the breeding cycle of the species, will not lead to a decrease in the single mobile population of the species and will not fragment the population</li> <li>the project will not introduce invasive species or diseases or interfere with the recovery of the species.</li> </ul>

ii Southern Whiteface (*Aphelocephala leucopsis*)

**Table D.8 Significant impact criteria assessment –Southern Whiteface**

Criterion	Assessment
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
<ul style="list-style-type: none"> <li>lead to a long-term decrease in the size of an important population of a species</li> </ul>	<p><b>No.</b></p> <p>Southern Whiteface is known to occur across most of mainland Australia south of the tropics. Within New South Wales, the species occurs west of the Great Dividing Range (DCCEEW, 2023)). The species is generally sedentary, occurring in groups of 2-8 individuals; however, the species has been known to congregate in groups of up to 70 individuals during the non-breeding season (DCCEEW, 2023). The project is highly unlikely to result in the loss of any individuals. Based on the above, the project is unlikely to lead to a long-term decrease in the size of an important population.</p>
<ul style="list-style-type: none"> <li>reduce the area of occupancy of an important population</li> </ul>	<p><b>No.</b></p> <p>The area of occupancy for the Southern Whiteface is estimated at 80,000 km<sup>2</sup> (based on 2 x 2 km grid squares). The project would result in a loss of up to 2.56 ha of suitable habitat for the species; however suitable habitat would remain within the immediate area and no records of the Southern Whiteface would be impacted. Based on the grid sizes used in the area of occupancy estimates, the project would not result in any reduction in the area of occupancy for the species.</p>
<ul style="list-style-type: none"> <li>fragment an existing important population into two or more populations</li> </ul>	<p><b>No.</b></p> <p>Several records of Southern Whiteface occur within the locality, most recently in 2021 and the species is known to occur in groups of 2-8 individuals (DCCEEW, 2023), potentially representing discrete populations. Impacts will occur at the edge of existing clearing and is therefore unlikely to fragment any population into two or more populations.</p>

**Table D.8 Significant impact criteria assessment –Southern Whiteface**

Criterion	Assessment
<ul style="list-style-type: none"> <li>adversely affect habitat critical to the survival of a species</li> </ul>	<p><b>No.</b></p> <p>Habitat critical to the survival of the Southern Whiteface is identified in the Conservation Advice (DCCEEW, 2023) as areas of:</p> <ul style="list-style-type: none"> <li>relatively undisturbed open woodlands and shrublands with an understorey of grasses or shrubs</li> <li>habitat with low tree densities and an herbaceous understorey litter cover which provides essential foraging habitat</li> <li>living and dead trees with hollows and crevices which are essential for roosting and nesting.</li> </ul> <p>Suitable open woodland habitat is present with a number of records from the locality. Habitat may be more marginal as tree densities are moderate to high, but the potential for the species to occur cannot be ruled out.</p>
<ul style="list-style-type: none"> <li>disrupt the breeding cycle of an important population</li> </ul>	<p><b>No.</b></p> <p>The project is not located within any known important breeding areas for Southern Whiteface therefore, the project is unlikely to disrupt the breeding cycle of an important population.</p>
<ul style="list-style-type: none"> <li>modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</li> </ul>	<p>The project will impact 2.56 ha of foraging habitat for the species. The project is located on the edge of a large area of contiguous woodland in the BBK area totalling approximately 825 ha (EcoLogical, 2010). Impacted habitat represents 0.31% of the suitable connected habitat available to the species within BBK area. This degree of habitat loss is considered unlikely to cause the species to decline, even at a local scale.</p>
<ul style="list-style-type: none"> <li>result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</li> </ul>	<p><b>No.</b></p> <p>The Conservation Advice (DCCEEW, 2023) does not identify invasive species as a key threat to the Southern Whiteface. The project is unlikely to result in the introduction of any invasive plant or animal species which would impact on the species.</p>
<ul style="list-style-type: none"> <li>introduce disease that may cause the species to decline, or</li> </ul>	<p><b>No.</b></p> <p>The Conservation Advice (DCCEEW, 2023) for the Southern Whiteface does not identify any diseases affecting the species. The project is unlikely to result in the introduction of new diseases.</p>
<ul style="list-style-type: none"> <li>interfere substantially with the recovery of the species.</li> </ul>	<p><b>No.</b></p> <p>The Conservation Advice (DCCEEW, 2023) for the Southern Whiteface outlines several recovery actions, including:</p> <ul style="list-style-type: none"> <li>ceasing clearing of habitat critical to the survival of the species</li> <li>protecting occupied habitat patches from further degradation and loss</li> <li>undertaking revegetation works</li> </ul> <p>The project will result in the removal of 2.56 ha of foraging habitat, representing 0.31% of the suitable connected habitat available to the species. Remaining recovery actions are not relevant to the project and the project will not interfere with any of these strategies.</p>
Conclusion	<p>The project is considered is unlikely to have a significant impact on the Southern Whiteface as:</p> <ul style="list-style-type: none"> <li>the project will result in minor and insignificant impacts to the species habitat at either a local or national scale</li> <li>impacts will occur at the edge of existing clearing, with large area of contiguous habitat to be retained, thus avoiding fragmentation</li> <li>the project is unlikely to result in the loss of any animals and is therefore unlikely to lead to a long-term decrease in an important population or reduce the area of occupancy</li> <li>the project will not result in the introduction of invasive species or diseases.</li> </ul>

**Table D.9 Significant impact criteria assessment – Superb Parrot**

Criterion	Assessment
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
<ul style="list-style-type: none"> <li>lead to a long-term decrease in the size of an important population of a species</li> </ul>	<p><b>No.</b></p> <p>While important populations for the species have not currently been identified, the South-west Slopes of NSW are identified as a key biodiversity area supporting the core distribution of the Superb Parrot (DAWE, 2021). This area includes the area around Wagga Wagga, including the BBK area, and this is likely to constitute an important population of the species under the definitions in DoE (2013).</p> <p>The project area provides known foraging and roosting habitat for Superb Parrot, as the species has previously been recorded within the project area. The project will result in removal of 2.56 ha of foraging habitat as well as five HBTs which provide potential roosting and breeding habitat. These impacts will occur at the edge of a large area of suitable habitat contiguous with the study area, with impacts representing than 0.31% of available habitat within the BBK area. This area contains significant number of breeding resources due to these areas being largely uncleared historically. Based on these factors the project is unlikely to lead to a long-term decrease in this important population.</p>
<ul style="list-style-type: none"> <li>reduce the area of occupancy of an important population</li> </ul>	<p><b>No.</b></p> <p>The area of occupancy for the Superb Parrot is estimated at 5,360 km<sup>2</sup> (based on 2 x 2 km grid squares). The project would result in a loss of up to 2.56 ha of suitable habitat for the species; however suitable habitat would remain within the immediate area. Based on the grid sizes used in the area of occupancy estimates, the project would not result in any reduction in the area of occupancy for the species.</p>
<ul style="list-style-type: none"> <li>fragment an existing important population into two or more populations</li> </ul>	<p><b>No.</b></p> <p>Several records of Superb Parrot occur within the locality, including within the study area. Impacts to habitat for the species will occur at the edge of existing clearing. Given this, and the high mobility of the species, the project is unlikely to fragment any existing population into two or more populations.</p>
<ul style="list-style-type: none"> <li>adversely affect habitat critical to the survival of a species</li> </ul>	<p><b>No.</b></p> <p>The Recovery Plan for Superb Parrot (DAWE, 2021) identifies habitat critical to the survival of the species as areas that are necessary:</p> <ul style="list-style-type: none"> <li>for activities such as foraging, breeding, roosting or dispersal</li> <li>for the long-term maintenance of the species or ecological community (such as Key Biodiversity Areas)</li> <li>to maintain genetic diversity and long-term evolutionary potential</li> <li>for the re-introduction of populations or recovery of the species or ecological community</li> </ul> <p>The project area provides known foraging and potential breeding habitat for Superb Parrot. Impacts will occur at the edge of large areas of contiguous habitat for the species.</p>
<ul style="list-style-type: none"> <li>disrupt the breeding cycle of an important population</li> </ul>	<p><b>No.</b></p> <p>The project area is located within one of the key breeding areas for the Superb Parrot, and suitable nesting hollows are present within the project area. As Superb Parrots tend to utilise the same hollows for nesting from year to year (DAWE, 2021) it is possible that the project will disrupt the breeding cycle of an important population. Large numbers of suitable breeding hollows will remain in connected and contiguous habitats.</p>
<ul style="list-style-type: none"> <li>modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</li> </ul>	<p><b>No.</b></p> <p>The project will impact 2.56 ha of foraging habitat for the species. The project is located on the edge of a large area of contiguous woodland in the BBK area totalling approximately 825 ha (EcoLogical, 2010). Impacted habitat represents 0.31% of the suitable connected habitat available to the species within the BBK area. This degree of habitat loss is considered unlikely to cause the species to decline, even at a local scale.</p>



**Table D.9 Significant impact criteria assessment – Superb Parrot**

Criterion	Assessment
<ul style="list-style-type: none"> <li>result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</li> </ul>	<p><b>No.</b></p> <p>The Recovery Plan for Superb Parrot (DAWE, 2021) identifies predation by introduced predators as a minor threat to the species. The project is unlikely to result in increased predation. The project is unlikely to result in the introduction of any invasive plant or animal species which would impact on the species.</p>
<ul style="list-style-type: none"> <li>introduce disease that may cause the species to decline, or</li> </ul>	<p><b>No.</b></p> <p>Psittacine Beak and Feather Disease is a potentially fatal avian disease linked to increased stress on individuals (DAWE, 2021). The project will not result in the spread of this disease. The project is unlikely to result in the introduction of new diseases.</p>
<ul style="list-style-type: none"> <li>interfere substantially with the recovery of the species.</li> </ul>	<p><b>No.</b></p> <p>The Recovery Plan for the Superb Parrot (DAWE, 2021) outlines several recovery actions. Only one is considered relevant to the project:</p> <ul style="list-style-type: none"> <li>Identification, protection, management and restoration of Superb Parrot breeding, foraging and movement habitats at the local, regional and landscape scales.</li> </ul> <p>The project will result in the removal of 2.56 ha of foraging habitat, representing 0.31% of the suitable connected habitat available to the species. Remaining strategies are not relevant to the project and the project will not interfere with any of these strategies.</p>
Conclusion	<p>The project is considered is unlikely to have a significant impact on the Superb Parrot as:</p> <ul style="list-style-type: none"> <li>the project will impact on a small area of suitable habitat at the edge of existing cleared area</li> <li>impacted habitat represents 0.31% of the suitable connected habitat available to the species within the BBK area with significant areas of foraging and breeding habitat remaining</li> <li>the project will not result in a reduction in the area of occupancy for the important population or result in fragmentation.</li> </ul>

iv **Diamond Firetail (*Stagonopleura guttata*)**

**Table D.10 Significant impact criteria assessment – Diamond Firetail**

Criterion	Assessment
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
<ul style="list-style-type: none"> <li>lead to a long-term decrease in the size of an important population of a species</li> </ul>	<p><b>No.</b></p> <p>The Diamond Firetail occurs from south-east Queensland through New South Wales, the Australian Capital Territory and Victoria, to South Australia. The species is generally sedentary, occurring in flocks of 5 to 40 individuals (DCCEEW, 2023). The project is highly unlikely to result in the loss of any individuals. Based on the above, the project is unlikely to lead to a long-term decrease in the size of an important population.</p>
<ul style="list-style-type: none"> <li>reduce the area of occupancy of an important population</li> </ul>	<p><b>No.</b></p> <p>The area of occupancy for the Diamond Firetail is estimated at 25,000 km<sup>2</sup> (based on 2 x 2 km grid squares). The project would result in a loss of up to 2.56 ha of suitable habitat for the species; however suitable habitat would remain within the immediate area and no records of the Diamond Firetail would be impacted. Based on the grid sizes used in the area of occupancy estimates, the project would not result in any reduction in the area of occupancy for the species.</p>

**Table D.10 Significant impact criteria assessment – Diamond Firetail**

Criterion	Assessment
<ul style="list-style-type: none"> <li>fragment an existing important population into two or more populations</li> </ul>	<p><b>No.</b></p> <p>Several records of Diamond Firetail occur within the locality, most recently in 2021. Impacts will occur at the edge of existing clearing and is therefore unlikely to fragment any population into two or more populations.</p>
<ul style="list-style-type: none"> <li>adversely affect habitat critical to the survival of a species</li> </ul>	<p><b>No.</b></p> <p>Habitat critical to the survival of the Diamond Firetail is identified in the Conservation Advice (DCCEEW, 2023) as areas of:</p> <ul style="list-style-type: none"> <li>eucalypt, acacia or casuarina woodlands, open forests or other lightly timbered habitats</li> <li>low tree density, few large logs, and little litter cover but high grass cover for foraging, roosting and breeding</li> <li>Drooping she-oak (<i>Allocasuarina verticillata</i>) within the Mt Lofty Ranges.</li> </ul> <p>Suitable Eucalypt woodland habitat is present with a number of records from the locality. Habitat may be more marginal as tree densities are moderate to high, but the potential for the species to occur cannot be ruled out.</p>
<ul style="list-style-type: none"> <li>disrupt the breeding cycle of an important population</li> </ul>	<p><b>No.</b></p> <p>The project is not located within any known important breeding areas for Diamond Firetail therefore, the project is unlikely to disrupt the breeding cycle of an important population.</p>
<ul style="list-style-type: none"> <li>modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</li> </ul>	<p><b>No.</b></p> <p>The project will impact 2.56 ha of foraging habitat for the species. The project is located on the edge of a large area of contiguous woodland in the BBK area totalling approximately 825 ha (EcoLogical, 2010). Impacted habitat represents 0.31% of the suitable connected habitat available to the species within the BBK area. This degree of habitat loss is considered unlikely to cause the species to decline, even at a local scale.</p>
<ul style="list-style-type: none"> <li>result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</li> </ul>	<p><b>No.</b></p> <p>The Conservation Advice (DCCEEW, 2023) identifies weed invasion, particularly by exotic annual grasses, as a key threat to the Diamond Firetail due to increased food insecurity compared to native perennial grasses. These impacts will be managed through the design and implementation of appropriate drainage infrastructure, weed and pest management under a CEMP (see Section 4.1.2) and ongoing weed and pest management as part of a site management plan.</p>
<ul style="list-style-type: none"> <li>introduce disease that may cause the species to decline, or</li> </ul>	<p><b>No.</b></p> <p>The Conservation Advice (DCCEEW, 2023) does not identify any diseases affecting the species. The proposal is unlikely to result in the introduction of new diseases.</p>
<ul style="list-style-type: none"> <li>interfere substantially with the recovery of the species.</li> </ul>	<p><b>No.</b></p> <p>The Conservation Advice (DCCEEW, 2023) outlines several recovery actions, including:</p> <ul style="list-style-type: none"> <li>retaining and protecting woodland, open forest, grassland and mallee habitat from clearing, fragmentation and disturbance (particularly areas of 200 ha or greater within woody vegetation)</li> </ul> <p>The project will result in the removal of 2.56 ha of foraging habitat, representing 0.31% of the suitable connected habitat available to the species. Remaining recovery actions are not relevant to the project and the project will not interfere with any of these strategies.</p>
Conclusion	<p>The project is considered is unlikely to have a significant impact on the Diamond Firetail as:</p> <ul style="list-style-type: none"> <li>the project will result in minor and insignificant impacts to the species habitat at either a local or national scale</li> <li>impacts will occur at the edge of existing clearing, with large area of contiguous habitat to be retained, thus avoiding fragmentation</li> <li>the project is unlikely to result in the loss of any animals and is therefore unlikely to lead to a long-term decrease in an important population or reduce the area of occupancy</li> <li>the project will not result in the introduction of invasive species or diseases.</li> </ul>

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## Appendix F. Defence Environmental Policy



Version 1.0

# Environmental Policy

Image: Exercise Kowari, Northern Australia

## Vision

*Defence will be a leader in sustainable environmental management to support the ADF capability to defend Australia and its national interests.*

The Defence Environmental Vision is underpinned by four pillars: Compliance, Efficiency, Trust and Accountability.

These pillars underpin Defence activities, guide decisions and align behaviours when managing environmental challenges and opportunities.

**Compliance:** Defence complies with its legislative and regulatory obligations regardless of where it operates and complies with the spirit and intent of state and territory environmental management legislation where it does not conflict with Commonwealth legislation.

**Efficiency:** Defence applies efficient and innovative environmental resource management in the delivery of Defence capability and environmental outcomes.

**Trust:** Defence conducts its activities in an environmentally responsible manner that enhances its reputation and fosters the confidence of the community, industry and regulators.

**Accountability:** Defence takes ownership of, and responsibility for, environmental outcomes when performing its activities.

## Context

The Defence mission is to defend Australia and its national interests. Environmental management is a critical enabler to Defence capability and directly supports this mission.

As a custodian of the environment in which it operates, Defence has invested significant resources over many years, building environmental management capability and capacity to support the Defence mission and meet its environmental obligations.

**Dennis Richardson**  
Secretary  
June 2016

Future environmental management requires Defence to capitalise on the knowledge and experience that has been gained to date. Defence will focus on environmental management and sustainability activities that generate the greatest return for Defence capability and the environment, its people and partners, specifically integrating with broader Defence policies and initiatives.

## Strategic aims

Defence has five strategic aims to realise the vision. These strategic aims will ensure Defence applies appropriate resources and effort toward environmental management, relative to risks and constraints.

**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.

## Implementation Framework

The Defence Environmental Policy is supported by the Defence Environmental Strategy and the Defence Environmental Plan. The Defence Environmental Strategy articulates how Defence will achieve its environmental vision. The Defence Environmental Plan outlines specific actions, timeframes and responsibilities for implementing the strategy and reporting on achievements.

**MD Binskin, AC**  
Air Chief Marshal  
Chief of the Defence Force  
June 2016



# Riverina Redevelopment Program

## BBK DDR – Appendix 14 – Contamination WE Validation

EST02036 Blamey Barracks Kapooka Redevelopment

Document issue:	90% DDR Final Issue	1 Dec 2023
Document no.:	RRP-BBK-GLO-EMM-CNT-RPT-0003	



Riverina Redevelopment Joint Venture



# Document Control

Distribution is centralised and controlled by the Contractor's Representative.

## Revision status

Rev	Date	Description	Changes since last revision	Prepared by	Checked by	Approved by
D0	02 Nov 2023	Draft 90% DDR Submission	n/a	Various	Sue Mahon	Katie Malvaso
D1	01 Dec 2023	90% DDR issued to PMCA (Final)		Various - EMM	Sue Mahon	Katie Malvaso



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## Acronyms and Abbreviations

Reference	Definition
ACM	Asbestos Containing material
ASC	Assessment of Site Contamination
ASL	Above Mean Sea Level
AWMA	Albury Wodonga Military Area
BBK	Blamey Barracks Kapooka
CDR	Concept Design Review
CEMP	Construction Environmental Management Plan
CoC	Chain of Custody
CSR	Contaminated Sites Record
DCARM	Directorate of Contamination Assessment, Remediation and Management
DCMM	Defence Contamination Management Manual
DCR	Desktop Contamination Review
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEHPD	Directorate of Environment and Heritage Policy Development
DEECA	Department of Energy, Environment and Climate Action
DFASIM	Directorate of PFAS Remediation
DPPM	Defence Pollution Prevention Management Manual
DoE	Department of the Environment
ENM	Excavated Natural Material
EO	Explosive Ordinance
EOW	Explosive Ordinance Waste
EPA	Environment Protection Agency
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESdat	Environmental data management, analysis and reporting software for environmental and groundwater data
GEMS	Garrison Estate Management System
HMRMT	Heavy Metals Risk Management Tool
LOR	Limit of Reporting
m	Metre(s)
MPFR	Master Plan Feasibility Review
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measures
NSW	New South Wales

Reference	Definition
NWQMS	National Water Quality Management Strategy
PCA	Pre-construction Contamination Assessment
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
PFOS	Perfluorooctane sulfonate
PMAP	PFAS Management Area Plan
RAAF	Royal Australian Air Force
RBW	RAAF Base Wagga
RRJV	Riverina Redevelopment Joint Venture
RRP	Riverina Redevelopment Project
SAQP	Sampling, Analysis and Quality Plan
UPSS	Unidentified underground petroleum storage systems
UXO	Unexploded ordnance
VENM	Virgin Excavated Natural Material
WE	Work Element



# A. Introduction

## A.1 Project Background

1 The Riverina Redevelopment Program (RRP) is one of the largest and most challenging redevelopment projects ever undertaken by Defence. The Program will renew, modernise and sustain capabilities of three major bases for the next 30 years:

- a EST02021 Albury Wodonga Military Area Redevelopment (AWMA).
- b EST02025 RAAF Base Wagga Redevelopment (RBW).
- c EST02036 Blamey Barracks Kapooka Redevelopment (BBK).

2 Each project has a separate Planning and Delivery budget and discrete works. This Contamination report relates to EST02021 Blamey Barracks Kapooka Redevelopment only. Separate reports have been developed for AWMA and RBW.

3 These bases are the ‘front door’ of the Australian Defence Force (ADF) and they deliver the first impression of Army and Air Force life to enlistees and their families. The program of works under the RRP will support Defence by aligning with the step change toward a contemporary Force, providing exemplar facilities and infrastructure with the flexibility in planning to meet the demand on training facilities likely to arise from Defence’s recent Force Structure Plan 2020 (FSP20).

4 Table. 1 summarises the scope addressed in the Detailed Design Report (DDR).

Table. 1: Scope Overview Summary

WE#	Work Element	URB Ref.
1.1	Electrical Infrastructure	S1
1.2	ICT Infrastructure	S2
1.3	Water Infrastructure (Fire, Potable & Irrigation)	S3
1.4	Gas Infrastructure	S4
1.6	Wastewater Infrastructure	S6
1.7	Stormwater Infrastructure	S7
1.8	Demolition (High Priority – EBP), including Consequential Works	S8
1.8	Demolition (Medium Priority – EBP)	S31
1.9	New Footpaths & Pedestrian Access	S27
1.10	New Internal Roads, Carparks and Parade Grounds	S34
2.1	New Multi-Function Centre (Including Retail & Band Facility)	S9
2.2	New EO Facility	S12
2.4	New Contractor’s Precinct	S21
2.5	New Clothing & Q-Store	S22

WE#	Work Element	URB Ref.
2.6	Expanded Chaplaincy and Well-Being Facilities	S23
2.7	New Land Management Compound	S26
3.1	Upgrade Access to Existing Armoury	S10
3.2	New HQ Building	S35
4.1	New LIA, Working & Training Facilities for RDC	S13
4.2	New Recruit LIA, Working, Training for A, B, C, D Coy	S14
6.1	New Recruit Physical Training Facility	S16
6.3	Upgrades to Training Support Company Facilities’	S24
6.4	New Medical Training and TCCC Facilities	S28
7.1	New Weapons Range	S11
7.5	Refurbish Weapons Training Simulation System (WTSS)	<b>BELOW THE LINE (to be fully designed and documented in DDR)</b>

5 At SDR, a Pre-construction Contamination Assessment (PCA) was prepared to present the outcomes of site investigations conducted during 30% Concept Design Review (CDR) within the preferred siting options selected following the Site Selection Board (SSB) workshop.

6 Site investigations were initially divided into two stages:

- a Stage 1A: contamination sampling co-located with geotechnical investigations to provide a preliminary assessment of the contamination status of the various building siting areas.
- b Stage 1B: main contamination investigation addressing building siting areas, supplementing data generated during Stage 1A investigations to address data gaps identified during the desktop contamination review, specifically gaps related to siting options presented in the RRJV 5% Master Plan and Feasibility Review (MPFR).

7 A proposed Stage 1C contamination investigation was not approved, and the data gaps identified in Stage 1A and Stage 1B remain.

8 Contamination issues will be mitigated through the implementation of additional controls during construction, including preparation of a Construction Environmental Management Plan (CEMP), Unexpected Finds Protocol (UFP) and Materials Management Plan (MMP).

## A.2 Objectives and Requirements

9 The objective of this report is to identify the changes to the design at BBK between the SDR and DDR and to determine whether the changes have substantially changed the PCA prepared at SDR.

10 This report is not required to reiterate the information contained in the SDR PCA and should be read in conjunction with the SDR PCA if further information and context is required.

## A.3 Changes since SDR

- 11 No additional contamination sampling has been undertaken during DDR.
- 12 Table 2 identifies where changes to the design have occurred between SDR and DDR. Material changes have been made to WE 1.7. The changes are outlined in Sections A.4 and the contamination impacts reassessed.

Table 2: Summary of changes since SDR

Work element	Description	Changes
1.1	Electrical infrastructure	Minor route realignments – no material changes
1.2	ICT infrastructure	Minor route realignments– no material changes
1.3	Water Infrastructure (Fire, Potable & Irrigation)	Minor route realignments– no material changes
1.4	Gas infrastructure	Minor route realignments– no material changes
1.6	Wastewater infrastructure	Minor route realignments– no material changes
1.7	Stormwater infrastructure	Minor route realignments– no material changes. Addition of a stormwater detention basin – refer to Section A.4
1.8	Demolition	No material change
1.9	New Footpaths & Pedestrian Access	Minor route realignments– no material changes
1.10	New Internal Roads, Carparks and Parade Grounds	Minor route realignments– no material changes
2.1	New Multi-Function Centre (Including Retail & Band Facility)	Finalisation of architectural detailing – no material changes
2.2	New EO Facility	Finalisation of architectural detailing – no material changes
2.4	New Contractor's Precinct	Micro-siting of facility. Finalisation of architectural detailing – no material changes
2.5	New Clothing & Q-Store	Finalisation of architectural detailing – no material changes
2.6	Expanded Chaplaincy and Well-Being Facilities	Finalisation of architectural detailing – no material changes
2.7	New Land Management Compound	Finalisation of architectural detailing – no material changes
2.8	Consolidated retail precinct	Finalisation of architectural detailing – no material changes
2.9	Refurbish Army Band facility	Finalisation of architectural detailing – no material changes
3.1	HQ Facilities (1RTB & Armoury) - Refurb A0364 L1	Finalisation of architectural detailing – no material changes
3.2	Co-locate HQ facility	Finalisation of architectural detailing – no material changes
4.1	New LIA, Working & Training Facilities for RDC	Finalisation of architectural detailing – no material changes
4.2	New LIA, Working, Training for A, B, C, D	Finalisation of architectural detailing – no material changes

Work element	Description	Changes
6.1	New Recruit Physical Training Facilities	Finalisation of architectural detailing – no material changes
6.4	Instructor Training Facilities	Refer to Section A.4
6.4	Medical Training Facilities	Micro-siting of facility. No contamination impacts identified as a result of micro-siting.
7.1	New Weapons Ranges	Realignment of new weapons range to a north-south alignment. No contamination impacts identified as a result of realignment.
7.5	Weapons Training Simulation System (WTSS)	Finalisation of architectural detailing – no material changes

## A.4 Changes in DDR

- 13 Completed Preliminary PFAS Risk Assessment
- 14 Completed Heat Maps
- 15 Completed Contamination Strategy
- 16 Provided locations for WE1.7 PMAP for additional testing locations PFAS.

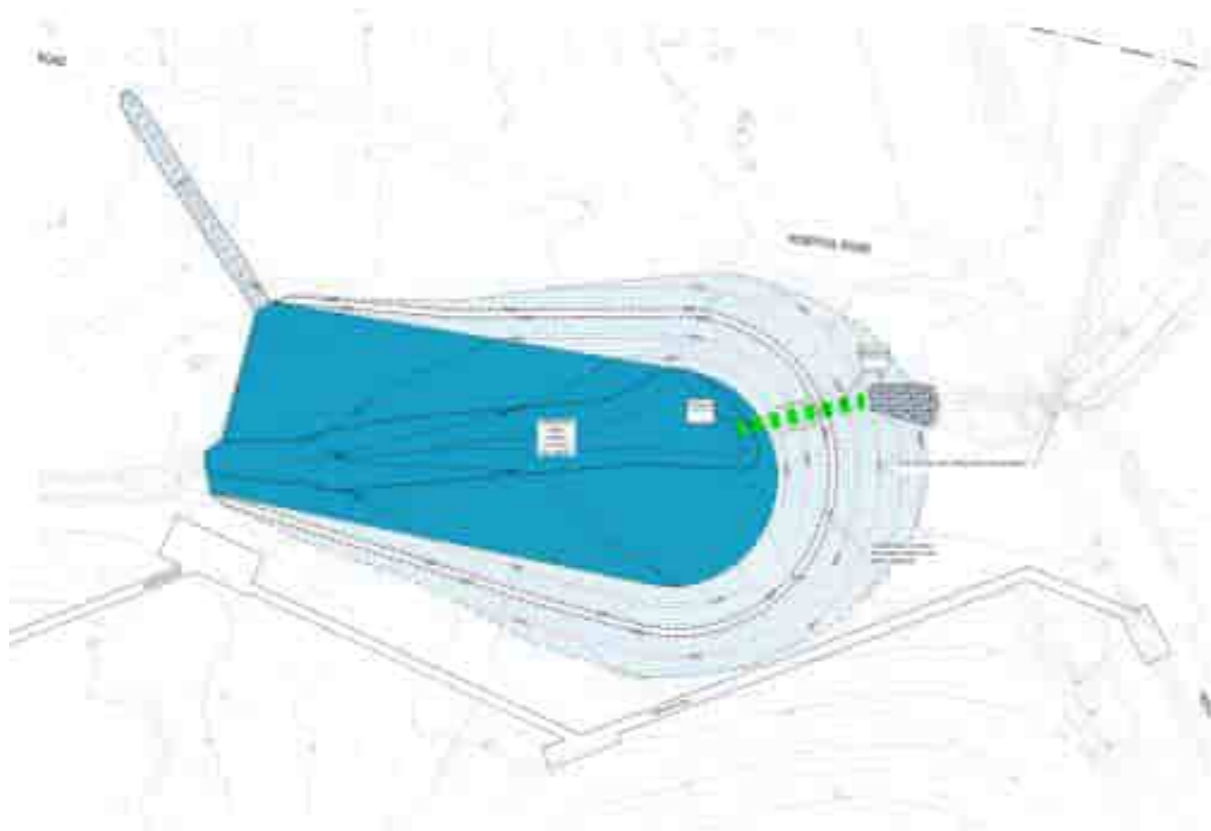
## A.5 Changes Since Draft DDR

- 17 Refined above all documents

## A.6 Stormwater Infrastructure – WE 1.7

- 18 The construction of a stormwater detention basin has been identified during the initial stages of DDR. The proposed stormwater detention basin would be located south of Hospital Road, as shown on Figure 1.
- 19 The basin will provide downstream flood mitigation and will also be landscaped with turf, shrubs and trees which will act to reduce flows and trap sediments and nutrients. Additional strategies to assist with PFAS mitigation are also being investigated.
- 20 No contamination sampling has been undertaken within the proposed detention basin footprint. EMM has provided the Jacobs PMAP team with inductive sampling locations to assist in assessing potential contamination risks prior to construction.

Figure 1: Location of proposed stormwater detention basin



## A.7 New Weapons Range

- 21 The new weapons range is a realignment of the existing Classification Range as shown in Figure 2. Realignment will require clearing of some of the planted medium quality surrounding vegetation.
- 22 Some contamination sampling has been undertaken within the new weapons range as detailed in the PCA. EMM have provided RRJV with additional sampling recommendations to be undertaken pre-construction to confirm contamination risks.



Figure 2: New weapons range alignment

## A.8 Preliminary Risk Assessment

- 23 Due to the likelihood of the RRP generating PFAS-contaminated spoil during proposed construction activities at BBK and RRJV's preference to reuse spoil on Base, a Defence-compliant risk assessment is required to determine whether the human health and/or ecological risk from PFAS contamination would be altered as a direct result of the spoil reuse.
- 24 Table 3 outlines the estimated cut and fill soil volumes associated with each work element.

Table 3: BBK Cut and fill volumes

Area	Work Element Reference	Cut	Fill	Delta	Cut or fill
Medical training	WE 6.4 - Confirm location	1673	879	794	Cut
Northern Ring Road	WE 1.10	4647	27178	-22531	Fill
LIA West		4343	4217	126	Cut
Road between East and West LIA's	WE 1.10	726	217	509	Cut
HQ	WE 3.1/3.2	2698	1010	1688	Cut
LIA carpark 1		949	1198	-249	Fill
LIA carpark 2		663	817	-154	Fill
LIA's A&B (Alpha & Bravo Company)	WE 4.2	24081	9754	14327	Cut
LIA's C&D (Charlie and Delta Company)	WE 4.2	6266	26112	-19846	Fill
LIA carpark 3		182	389	-207	Fill
Clothing Store	WE 2.5	2652	12613	-9961	Fill
Multi Function & nearby roads	WE 2.1	4787	8304	-3517	Fill
WTTS		134	593	-459	Fill
Civil berm 1 Park Drive		101	117	-16	Fill
Civil berm 2 Park Drive		0	105	-105	Fill
Contractors Precinct	WE 2.4	3635	5562	-1927	Fill
Fire tanks		355	84	271	Cut
Land Management	WE 2.7	2	4341	-4339	Fill
Borrow Pit		16466	2031	14435	Cut
Heritage Walk		257	1679	-1422	Fill
Kapooka Drive		0	459	-459	Fill
Fitness Facility	WE 6.1 - Confirm location	1338	2492	-1154	Fill
		0	38	-38	Fill
		0	265	-265	Fill
Range	WE 7.1	25753	72182	-46429	Fill
Range Road	WE 1.10	1111	3244	-2133	Fill
EO		277	58	219	Cut
EO		0	228	-228	Fill
EO		1853	2	1851	Cut
<b>Total</b>		<b>104949</b>	<b>186168</b>	<b>-81219</b>	Fill

Source: RRJV October 2023

- 25 The primary objective of a PFAS risk assessment for Defence is to determine whether the beneficial reuse of soil at a specific location affects the existing human health and/or ecological risk at that location. The assessment requires a comparison of PFOS+PFHxS concentrations and the total mass in the soils to be reused (source soils) and the surface soils at the proposed reuse location.

- 26 PFAS impacted soils on the Defence Estate must be managed in accordance with the Defence PFAS Construction and Maintenance Framework (Version 3.0, 2021). The framework describes beneficial reuse of PFAS contaminated materials as best practice and recommends a need for additional risk assessment depending on the concentration of PFOS+PFHxS in the soils.
- 27 However, given the existing data gaps, the objective of the Preliminary Risk Assessment is to present a preliminary evaluation of the existing data to assess PFAS risk on a work element basis and identify additional requirements to prepare a Defence compliant risk assessment when the data become available.
- 28 A series of PFAS heat maps have been prepared as part of the Preliminary Risk Assessment to assist in managing contaminated soil movement during construction. Located in Contamination Strategy Appendix 14 of the DDR Main Report.
- 29 The Preliminary Risk Assessment is found in Appendix 14 of the DDR Main Report.

## A.9 Contamination Management Strategy

- 30 A Contamination Management Strategy (Strategy) has been prepared during DDR. This overarching Strategy is applicable to each of the three Bases included in the Program (BBK, RBW and AWMA).
- 31 The purpose of the Strategy is to provide an overarching framework to guide decision making with respect to the management of contamination, support the delivery of DDR and inform the development of RRJV's suite of site-specific Delivery Phase management plans which will occur in the next phase of the project.
- 32 It is not intended that the Strategy provides detailed management recommendations. Such recommendations will be developed upon finalisation of the design and will be based on the proposed construction methodology, location specific data, contamination-based risk assessments and will be captured in RRJV's construction phase management plans in line with Defence and regulatory requirements.
- 33 The Contamination Management Strategy is found in Appendix 14 of the DDR Main Report.

## A.10 Contamination Assessment

- 34 The amendments of the design have not substantially changed the assessment provided at SDR. There are no additional contamination implications and the management measures and findings of the SDR PCA are validated.
- 35 The development of the Contamination Management Strategy and Preliminary Risk Assessment provide the management frameworks for the next phase of the study.
- 36 The Preliminary PFAS Risk Assessment identified five potential PFAS risks being from:
- a historic use of PFAS which have created PFAS contamination source areas
  - b Movement of PFAS impacted soil to areas without PFAS
  - c Management of temporary soil stockpiles to control PFAS leaching
  - d Reputational risk associated with PFAS contamination spread
  - e Unexpected finds of interaction with Category 1 PFAS impacted soil/groundwater
- 37 Potential management measures have been identified Preliminary PFAS Risk Assessment which can be incorporated into the construction phase management plans and implemented across the site during construction.

- 38 The amendments of the detention basin and weapons range design have not substantially changed the assessment provided at SDR. There are no significant contamination impacts and the management measures and findings of the SDR PCA are validated.

# Riverina Redevelopment Program

## Preliminary PFAS Risk Assessment

Project(s): EST02025 Blamey Barracks Kapooka Redevelopment

Document issue:	90% DDR Final Issue	1 Dec 2023
Document no.:	RRP-BBK-GLO-EMM-CNT-RPT-0002	



Riverina Redevelopment Joint Venture



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## Revision status

Rev	Date	Description	Changes since last revision	Prepared by	Checked by	Approved by
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2	01/12/2023	90% DDR Final Issue	Minor edits. Updated Heat maps	EMM	Sue Mahon	Katie Malvaso

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## Acronyms and Abbreviations

Reference	Definition
ADF	Australian Defence Force
ASC NEPM	National Environment Protection (Assessment of Contamination) Measure 1999
AWMA	Albury Wodonga Military Area
BBK	Blamey Barracks Kapooka
CDR	Concept Design Report
CoPC	Contaminant of potential concern
EMM	EMM Consulting Pty Limited
EO	Explosive Ordnance
HEPA	Heads of EPAs Australia and New Zealand
LEP	Local Environment Plan
MPFR	Master Plan Feasibility Review
PCA	Pre-construction Contamination Assessment
PFAS	Per- and polyfluoroalkyl substances
RBW	RAAF Base Wagga
RRJV	Riverina Redevelopment Joint Venture
RRP	Riverina Redevelopment Project
SSB	Defence Site Selection Board
UCL	Upper confidence limit
WE	Work element

## A. Introduction

### A.1 Background

1. The Riverina Redevelopment Joint Venture (RRJV) was formed by CPB Contractors and Downer to undertake the Riverina Redevelopment Project (RRP) at three Defence establishments:
  - a East and South Bandiana within the Albury Wodonga Military Area (AWMA)
  - b Blamey Barracks Kapooka (BBK)
  - c RAAF Base Wagga (RBW).
2. The scope of the Riverina Redevelopment Project (RRP) comprises major upgrades and/or replacement of existing infrastructure and facilities at each of these sites. EMM Consulting Pty Limited (EMM) was engaged by RRJV to provide a range of services in support of the RRP, including contamination.
3. A Pre-construction Contamination Assessment (PCA) was prepared to present the outcomes of site investigations conducted during 30% Concept Design Review (CDR) within the preferred siting options selected following the Site Selection Board (SSB) workshop.
4. Site investigations were initially divided into two stages:
  - a Stage 1A: contamination sampling co-located with geotechnical investigations to provide a preliminary assessment of the contamination status of the various building siting areas.
  - b Stage 1B: main contamination investigation addressing building siting areas, supplementing data generated during Stage 1A investigations to address data gaps identified during the desktop contamination review, specifically gaps related to siting options presented in the RRJV 5% Master Plan and Feasibility Review (MPFR).
5. The third stage of contamination investigation (Stage 1C) for each Defence property is yet to be completed but will fill data gaps that were identified following completion of the Stage 1B assessment (EMM 2023). The primary objectives of the proposed Stage 3 investigations will be to:
  - a refine the understanding and assessment of contamination risk at proposed services alignments and new work elements added since the Stage 1B investigation presented in the 30% CDR, utilising both existing data and data generated by the site investigation program
  - b address data gaps identified in the Stage 1A and 1B investigations reported in the 30% CDR.
6. The proposed Stage 1C contamination investigation has not been undertaken at this stage and the data gaps identified in Stage 1A and Stage 1B remain. Consequently, this preliminary assessment of per- and polyfluoroalkyl substances (PFAS) risk associated with the proposed reuse of construction spoil at BBK has been based on the existing available data set. Additional data obtained as part of future contamination investigations would assist in refining this preliminary assessment.

### A.2 PFAS at BBK

7. Previous studies identified PFAS source areas at BBK, with those of highest level of impact at the Fire Station, fire training areas, buried waste areas south of the Wastewater Treatment Plant (WTP) and the fire training pad. Those areas are on the eastern side of BBK where surface water runoff feeds into Kapooka Creek. Leachability testing of soil indicated potential for discharge of PFAS to surface water and groundwater from those areas (Jacobs 2019).

8. Potential risks identified by Jacobs (2019) included:
  - a Human health risks to construction and maintenance workers from direct contact with soil or perched water in impacted source zones.
  - b Human health risks to off Base residents from consumption of home grown produce irrigated with impacted surface water from and near to Kapooka Creek. Preliminary precautionary advice was provided by NSW government agencies to individual properties.
  - c Human health risks for recreational fishers due to consumption of fish and yabbies from Kapooka Creek, Sandy Creek and the Murrumbidgee River.
  - d Direct and indirect exposure of ecological receptors to impacted surface water, sediment and soil.
  - e Exposure of terrestrial groundwater dependant ecosystems to PFAS impacted groundwater and perched water.
9. Potential project risks associated with PFAS contamination at BBK include:
  - a Due to their chemical properties and dispersive behaviour in the environment, PFAS compounds may be detected in soil and laterally widespread from primary PFAS sources (e.g. fire training areas). Works such as the proposed redevelopment at BBK can generate large volumes of spoil which may be impacted by low concentrations of PFAS and will require careful management.
  - b The presence of PFAS narrows the options for reuse or disposal of such spoil. Beneficial re-use on-site may be permissible subject to siting options, a rigorous risk assessment process in accordance with Defence PFAS guidance and approval by the relevant Defence technical authorities.
  - c Options for the management of high PFAS concentrations in spoil (such as disposal, treatment or remediation) are limited and costly.
  - d Low concentrations of PFAS could occur in other areas where data gaps exist, and spoil generated during construction will require management (e.g. beneficial reuse on-site).
10. Due to the likelihood of the RRP generating PFAS-contaminated spoil during proposed construction activities at BBK and RRJV's decision to reuse spoil on Base (based on reputational and budget reasons), a Defence-compliant risk assessment is required to determine whether the human health and/or ecological risk from PFAS contamination would be altered as a direct result of the spoil reuse.
11. Table 1 outlines the estimated cut and fill soil volumes associated with each work element.

Table 1: BBK Cut and fill volumes

Area	Work Element Reference	Cut	Fill	Delta	Cut or fill
Medical training	WE 6.4 - Confirm location	1673	879	794	Cut
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<b>Total</b>		<b>104949</b>	<b>186168</b>	<b>-81219</b>	Fill

Source: RRJV October 2023

### A.3 Relevant guidance

12. Reuse of construction spoil aligns with the following policies and guidance documents:
  - a National Waste Policy 2018 and associated National Waste Hierarchy.
  - b Defence's Environmental Policy, specifically Strategic Aim 1 which states: "Defence will deliver a sustainable estate across Defence maritime, land and aerospace areas, activities and operations".
  - c The objectives of Defence's Waste and Sustainable Procurement Program which include "improve resource recovery".

- d The design and construction sustainability requirements of the Smart Infrastructure Handbook, which include consideration of "strategies to minimise materials consumption, minimise demolition waste and avoid stockpiling through staged planning, adaptive reuse of buildings, infrastructure or assets, and reuse of materials".

13. The management of PFAS contaminated materials on Defence Estate is governed by specific guidance, primarily:
  - a Defence PFAS Construction and Maintenance Framework, Guidance for managing the risks of PFAS contamination for works on the Defence estate (Version 3.0, 2021)
  - b Defence Contamination Management Manual (March 2018, amended June 2021), Annex C – Planning to Minimise and Manage Stockpiling.
  - c PFAS National Environmental Management Plan (Version 2.0, January 2020).
14. A Draft Version 3.0 of the NEMP was released for comment in February 2019 but the finalised version has not been released. Feedback and responses to the Draft NEMP 3.0 are provided in the Ancillary Document to the PFAS National Environmental Management Plan Version 2.0.
15. A PFAS Management Area Plan (PMAP) was developed for BBK in June 2021 "to manage the elevated risks of PFAS contamination on and emanating from Blamey Barracks Kapooka" (Defence 2021).

### A.4 Objective

16. The primary objective of a PFAS risk assessment for Defence is to determine whether the beneficial reuse of soil at a specific location affects the existing human health and/or ecological risk at that location. The assessment requires a comparison of PFOS+PFHxS concentrations and the total mass in the soils to be reused (source soils) and the surface soils at the proposed reuse location.
17. PFAS impacted soils on the Defence Estate must be managed in accordance with the Defence PFAS Construction and Maintenance Framework (Version 3.0, 2021). The framework describes beneficial reuse of PFAS contaminated materials as best practice and recommends a need for additional risk assessment depending on the concentration of PFOS+PFHxS in the soils. Soil contamination is defined in the Defence PFAS Construction and Maintenance Framework by four soil categories (Table 2).
18. However, with the existing data gaps that are discussed in the sections below, the specific objective of this document is to present a preliminary evaluation of the existing data to assess PFAS risk on a work element basis and identify additional requirements to prepare a Defence compliant risk assessment when the data become available.

Table 2: Defence PFAS soil contamination categories

Category	Guideline	Risk and management options
Category 4	Excavated soils with PFOS+PFHxS concentrations less than 0.01 mg/kg	<b>Acceptable risk reuse on site or on base without assessment or mitigation</b> unless: <ul style="list-style-type: none"> <li>• a previous site assessment suggests otherwise</li> <li>• soil volumes &gt;1,500 m<sup>3</sup></li> <li>• reuse is in a high-sensitivity area.</li> </ul>
Category 3	Excavated soils with PFOS+PFHxS concentrations less than 1 mg/kg but greater than 0.01 mg/kg <sup>1</sup>	<b>Moderate risk reuse with assessment and mitigation.</b> Category 3 soil can be reused within the works site with no additional mitigation procedures or on-base (subject to Base approvals) if the risk to human health or the environment, as determined by a suitably qualified person(s), is not increased or otherwise results in unacceptable risk. Some mitigation may be required if potential pathways exist and there are potential high sensitivity receptors. The overall load of PFAS in the total volume of soil should also be considered when assessing the risk.
Category 2	Excavated soils with PFOS+PFHxS concentrations less than 20 mg/kg but greater than 1 mg/kg <sup>2</sup>	<b>High risk treat and/or contain</b> Category 2 soil can be reused within the works site provided that exposure to receptors is minimised. This should consider both direct exposure at the site and the potential for PFAS transport due to leaching. If reuse is not appropriate on the works site, then an assessment of risk should be undertaken by a suitably qualified person(s) to evaluate the following options: off-base disposal to an appropriately licensed landfill, or on-base encapsulation, containment and/or treatment. If treatment is required, this needs to be guided by a RAP.
Category 1	Excavated soils with PFOS+PFHxS concentrations of 20 mg/kg <sup>3</sup> or more	<b>Unacceptable risk offsite (destroy or landfill) or onsite (options identified through a RAP)</b> Category 1 soil must be managed to address the risk. Options may include off-base disposal to an appropriately licenced facility or on-site management guided by a RAP. Soil at concentrations >50 mg/kg should be sent for destruction at a licensed facility. DPFASR can provide advice. If the excavated soil is required to be temporarily stockpiled for later treatment, refer to DCMM Annex C

1 Interim soil – ecological indirect exposure for all land uses (PFAS NEMP 3.0)

2 Human health - direct soil contact for public open space (PFAS NEMP 3.0)

3 Human health - direct soil contact for industrial land use (PFAS NEMP 3.0)

## B. Site details

### B.1 Site setting

19. Blamey Barracks Kapooka (BBK), Property ID 0315, is approximately 5 km east of Wagga Wagga NSW, bordered in the north by the Sturt Highway and in the east and south by the Olympic Highway (Figure 1, Figure 2).
20. BBK is owned by the Commonwealth of Australia and includes the Army Recruit Training Centre (ARTC), which has two training wings:
  - 1st Recruit Training Battalion, for regular and reserve Army units
  - Army Adventurous Training Wing, for training leaders.
21. Over 5,000 Army recruits (Regular and Reserve) are trained at BBK annually. Recruits are housed at Blamey Barracks which has approximately 220 buildings, including accommodation for 1,800 Defence staff.

### B.2 Project redevelopment work elements

22. The RRP scope comprises major upgrades and/or replacement of existing infrastructure and facilities. Specific work elements (WEs) are designated for redevelopment activities at BBK and presented in Figure 3.

### B.3 Surrounding land use

23. BBK is surrounded by a mix of land uses and development including:
  - a Primary production – west and north-west, cleared grassland with farms for cattle and sheep grazing or grain growing.
  - b Residential – adjacent to north-east boundary, large rural residential properties, rural fire station, sports fields and church. Hobby farms – horses, poultry, fruit, vegetables.
  - c Residential – 3.6 km east, suburbs of Wagga Wagga; 1.8 km south, Uranquinty.
  - d Conservation – east, narrow strip of forested areas on ridge.
  - e Recreation – north-east, Pomingalarna Reserve.
  - f Quarrying – 1 km east, Hansons Quarry, active; north-west, minor historical quarry.

### B.4 Geology

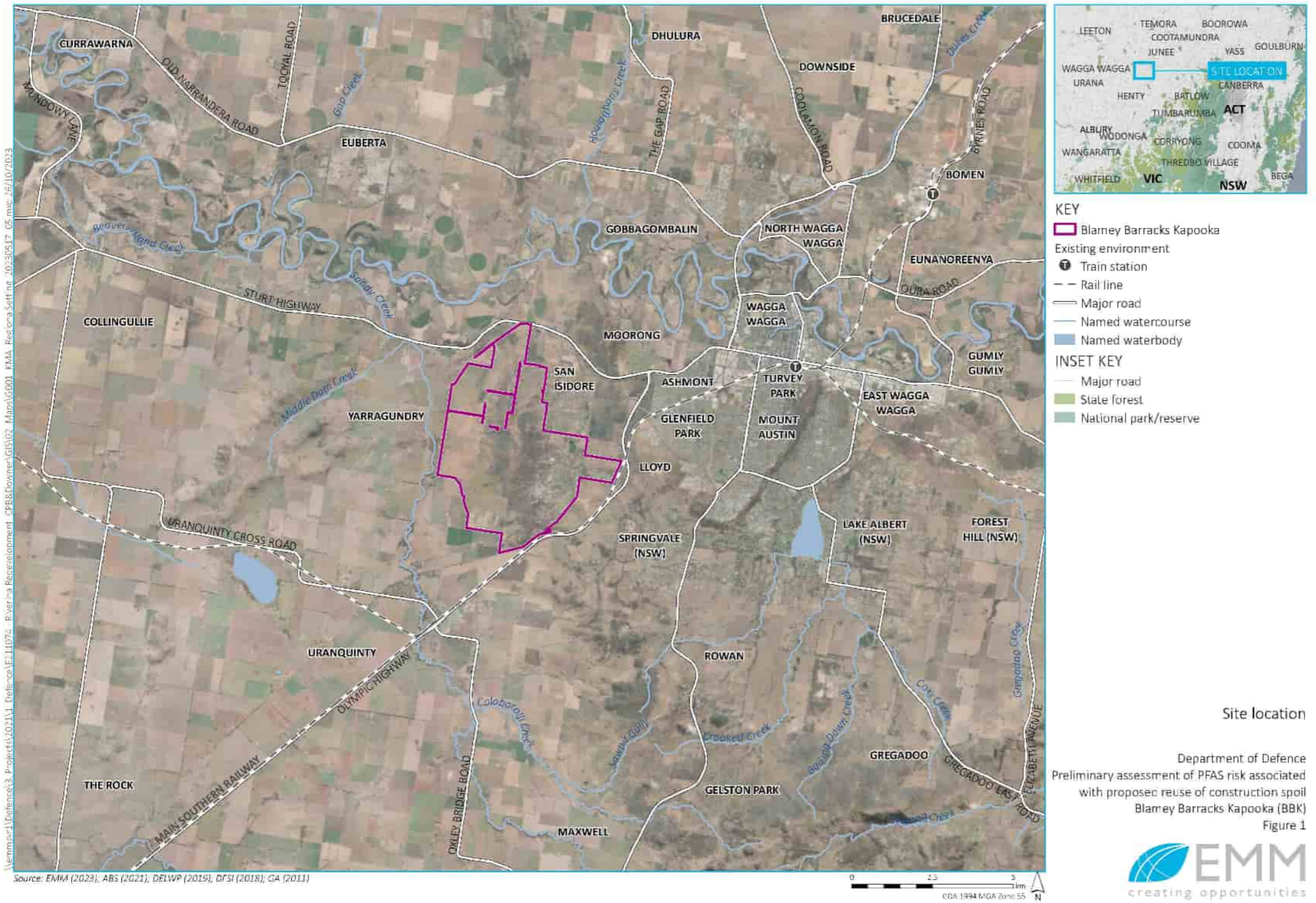
24. The geology underlying the Base consists of Ordovician aged metamorphic and sedimentary rocks that abuts Silurian age granite in the west. Soils on Base are primarily composed of clays with intermixed silt, and some sands and gravel (Jacobs 2019). Colluvial soils are thinner in the north of the Base where the geology is dominated by alluvial deposits associated with the Murrumbidgee River.

### B.5 Hydrology

25. Groundwater has been reported at 3.76–7.5 m below ground level in monitoring bores near the water treatment plant (WTP) effluent ponds; although regional groundwater is at much greater depths and the shallow water encountered near the WTP ponds is inferred to be perched due to the influence of the ponds (Jacobs 2019).
26. BBK is within the Murrumbidgee catchment, approximately 1.3 km south-south-east of the Murrumbidgee River, which flows east to west. Flow in the Murrumbidgee River is regulated by Water NSW through water releases from Blowering and Burrinjuck dams.
27. Surface water from the Cantonment area runs overland and/or through open channels to Kapooka Creek, an unlined channel along the eastern boundary of the Base, which transitions into a series of dams and low-lying areas through the residential areas of San Isidore.
28. Areas west of the ridge, including the former quarry and training areas south and south-west on the Base, drain west towards Sandy Creek. All surface water from the Base ultimately flows north via tributaries to the Murrumbidgee River, although most pathways are ephemeral (Jacobs 2019).

### B.6 Human health and ecological risk assessment (Jacobs 2021)

29. Investigations conducted in the vicinity of the base by Jacobs (2019) detected concentrations of PFAS compounds in soil, sediment, groundwater and surface water, with potential transport of PFAS from source areas, mainly via surface water run-off, to off-Base areas including Kapooka Creek. Jacobs (2021) subsequently conducted a human health and ecological risk assessment (HHERA) to evaluate potential risks to human health and ecosystems in the off-Base study area.
30. The stated objectives of the HHERA were to:
  - a Quantitatively assess the potential risks to human health related to exposure to PFAS within the Study Area as identified in the DSI (Jacobs 2019).
  - b Qualitatively assess the potential for terrestrial and aquatic ecological risks related to exposure to PFAS for receptors within the Study Area as identified in the DSI (Jacobs 2019).
  - c Assist in guiding the remediation and/or risk management measures that may be considered as part of the PFAS Management Area Plan (PMAP).
31. The HHERA addressed human health and environmental risk issues relevant to PFAS in the investigated environmental media, targeting the identified potential and complete source-pathway-receptor linkages through collection of soil, sediment, surface water, groundwater, terrestrial biota (home-grown fruits, vegetables and poultry eggs for human consumption as well as grass and fodder for livestock feed) and aquatic biota (fish and crustaceans used both for human consumption and preyed on by aquatic feeding birds).
32. The HHERA did not consider potential risks of PFAS in spoil from construction during the RRP.



Site location

Department of Defence  
 Preliminary assessment of PFAS risk associated  
 with proposed reuse of construction spoil  
 Blamey Barracks Kapooka (BBK)  
 Figure 1



Figure 1: Site location

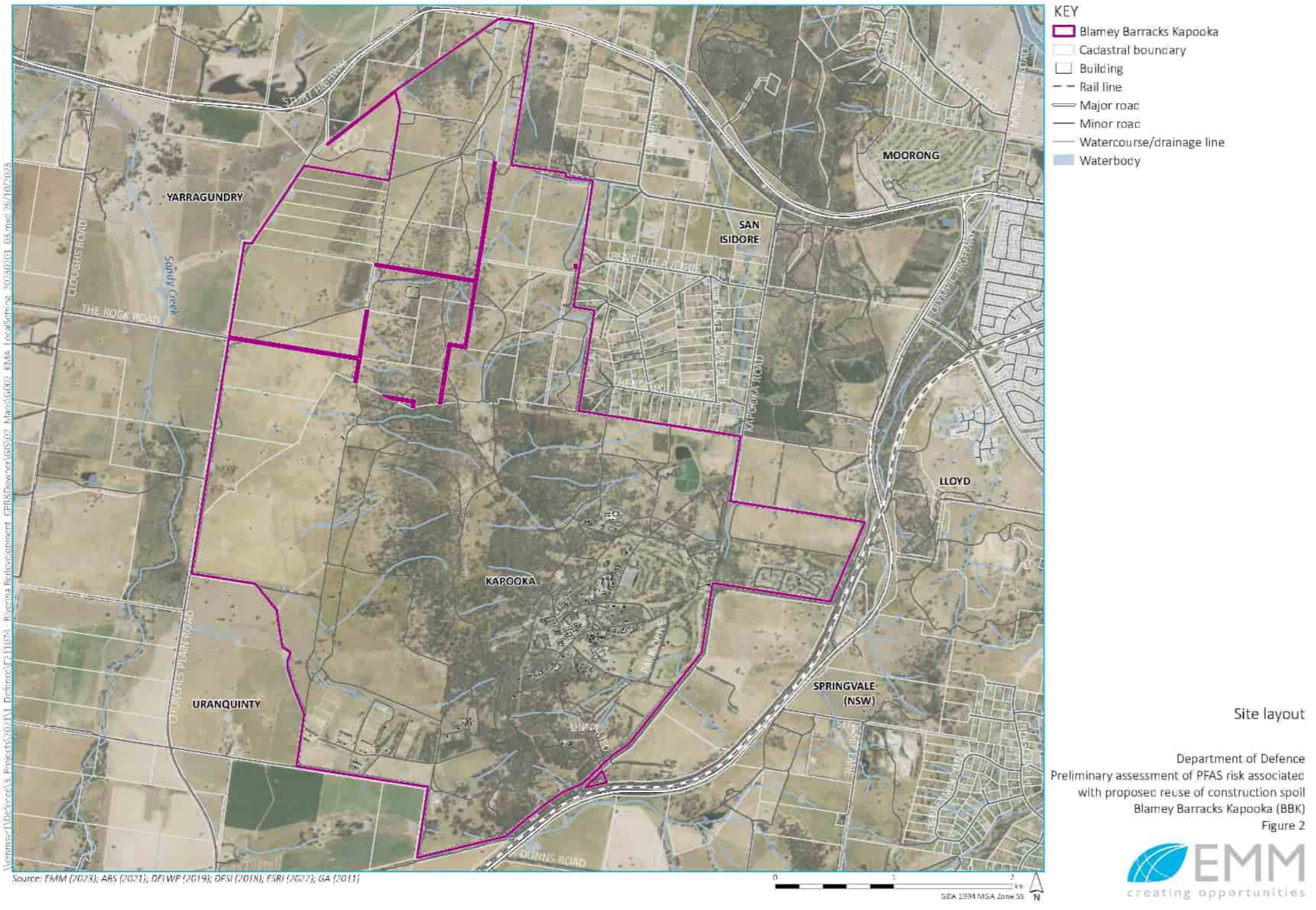


Figure 2: Site layout

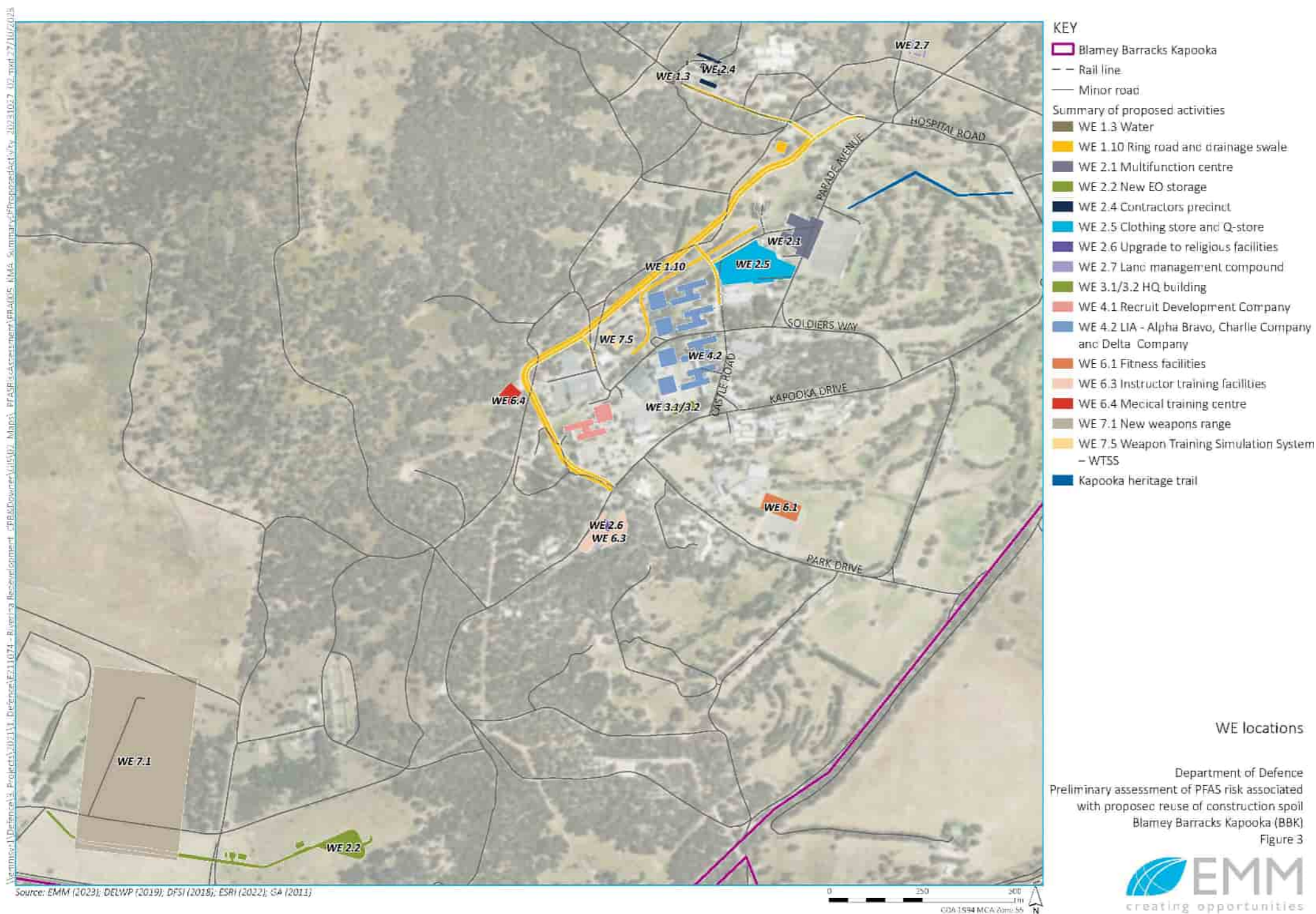


Figure 3: WE locations



## C. PFAS risk profile

33. In accordance with the *Defence Construction and Maintenance Framework - Guidance for managing the risks of PFAS contamination for works on the Defence estate* (version 3.0, August 2021), managing the 'off work site, on Base' beneficial reuse of PFAS-contaminated materials must consider the following:
- a The concentration and total load of PFAS in the materials, especially where large volumes are involved.
  - b Whether the additional PFAS load at the proposed site changes the risk at or from the proposed reuse site.
  - c The characteristics of the reuse site, in particular:
    - i Pre-existing PFAS impacts at the proposed site.
    - ii Site drainage: where does surface water flow or accumulate? Where do stormwater channels drain? In which direction does any groundwater flow? How high is the water table?
    - iii Proximity to the Defence property boundary: What is the risk of any contaminated water, resulting from the reuse, migrating from the Defence site?
  - d The risks to sensitive receptors, including direct and indirect receptors, which may be on and off-Base.
  - e Cumulative effects of discharging or irrigating with PFAS contaminated water over time or from multiple projects.
34. Additional risk assessment is required when the volume of soil to be managed exceeds 1,500 m<sup>3</sup> and based on the four Defence PFAS-based soil categories which were presented in Table 2. These risk assessments should be completed during the construction phase once soil has been excavated and transported to the stockpile locations (once these have been confirmed).
35. A risk assessment is needed to 'demonstrate that any risks from the additional PFAS load at the receiving location are acceptable' (Defence 2021).

### C.1 Source material

#### C.1.1 Soil quality

36. Construction spoil will be generated from various locations during the redevelopment of BBK, with soil sourced from areas excavated for the foundations of new buildings and where the existing subsurface infrastructure, water, power and sewer, will be upgraded or replaced.
37. Specific work elements (WEs) are designated for redevelopment activities at BBK, with spoil potentially generated during construction activities under each WE. Dividing the source of construction spoil between each WE is deemed appropriate to account for the current level of uncertainty around spoil volumes from different construction areas at BBK. The designated WE groups at BBK are:
- a WE 1.3/WE 2.4
  - b WE 1.10
  - c WE 2.1
  - d WE 2.2

- e WE 2.5
- f WE 2.6/6.3
- g WE 2.7
- h WE 4.1
- i WE 4.2/3.1/3.2
- j WE 6.1
- k WE 6.4
- l WE 7.5
- m Kapooka Heritage trail

38. The soil at some of these locations has previously been sampled by consultants during historical investigations between 2017 and 2020 and/or more recently by EMM during the Stage 1A and/or Stage 1B investigations. The historical analytical data considered for this report is presented in Attachment 1. Since soil-based contamination can change over time due to natural processes, there is inherent uncertainty associated with PFAS sample data generated more than a few years ago. For this reason, the data from historical investigations undertaken prior to 2020 have not been used to inform the preliminary risk assessment, and the most recent data generated during the Stage 1A and Stage 1B investigations (2022) are the most relevant.
39. During Stage 1A/1B investigations, soils were sampled from 75 boreholes and surface locations at BBK, with a combined total of 180 primary samples analysed for PFOS+PFHxS concentrations, split between the WE as follows, and presented in Figure 3:
- a WE 1.10: 34 samples (23 non detects)
  - b WE 2.1: 22 samples (0 non detects)
  - c WE 2.2: 12 samples (10 non detects) – too few data points
  - d WE 2.4: 4 samples (4 non detects) – too few data points
  - e WE 2.5: 8 samples (1 non detect) – too few data points
  - f WE 2.6: 9 samples (5 non detects) – too few data points
  - g WE 3.1 / 3.2: 2 samples (0 non detects) – too few data points
  - h WE 4.1: 14 samples (4 non detects)
  - i WE 4.2: 25 samples (6 non detects)
  - j WE 7.1: 44 samples (28 non detects)
  - k Kapooka Heritage Trail: 6 samples (0 non detects) – too few data points

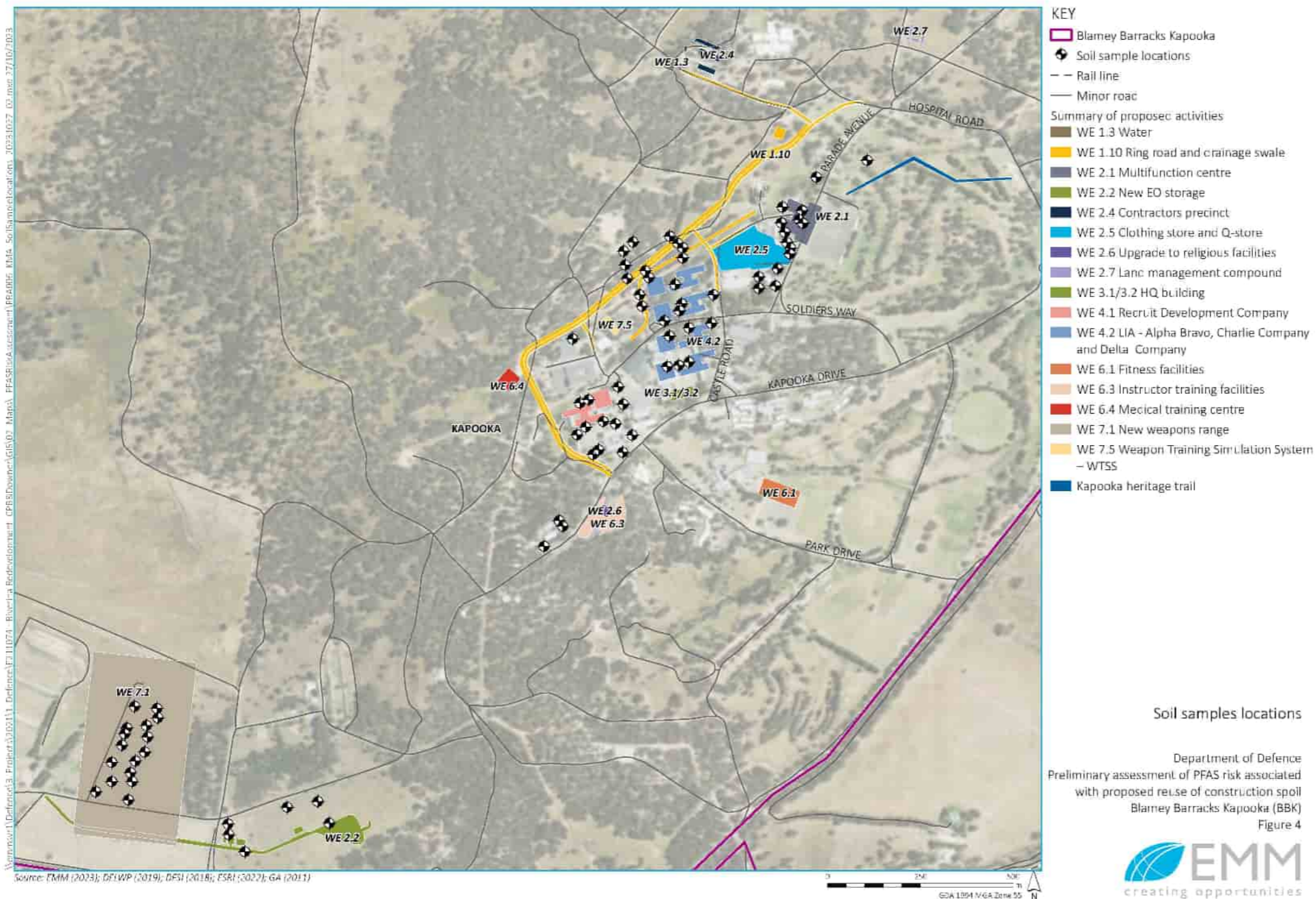


Figure 4: Soil sample locations

40. There were no samples collected since 2020 within the remainder of the WEs, as these WEs were not included on the RRP during the Stage 1A and/or Stage 1B investigation.
41. More than 10 distinct sample data points per group is the minimum required to calculate upper confidence limits (UCLs) within the widely used US EPA's ProUCL software, and more data points provide more accurate UCLs. As indicated above, three of the WE have too few data points to generate a meaningful UCL. The other WE groups have sufficient number of samples to calculate a UCL although there are a high number of non-detects for some WEs which could skew the data outputs. The additional sampling and analysis proposed by EMM for Stage 1C would provide a greater number of data points to calculate meaningful UCLs.
42. In the absence of UCLs, an alternative approach is to use the maximum PFOS+PFHxS concentration reported for each WE group as an indicator of overall PFOS+PFHxS contamination in spoil. This approach provides a conservative concentration based on the worst-case scenario (where the maximum PFOS+PFHxS concentration in each WE is assumed to be representative of the PFOS+PFHxS concentrations within the total volume of spoil generated in each WE area). However, we know that soil contamination data are almost always spatially variable and, in the absence of sufficient sample data to assess the variability by generating strong UCLs, using the maximum PFOS+PFHxS concentration may unknowingly provide an overestimate of the actual PFOS+PFHxS content of the spoil and could lead to a greater level of waste management and/or treatment than is required. Conversely, the maximum PFOS+PFHxS concentration could be an underestimate (if unsampled areas have higher concentrations) and could lead to insufficient management to manage the inherent risk of PFAS concentration in spoil.
43. As an example, the current PFOS+PFHxS concentration data for the WE listed above were used to calculate UCLs (where possible) and maximum concentrations (Table 3). The results for WE 2.1 indicate the benefit of having sufficient sampling data to calculate a robust UCL, whereby the UCL indicates a lower level of PFAS category (3) compared to using the maximum (Category 2). This difference could have major implications for soil management and potential reuse options.

Table 3: Comparison of maximum and upper confidence limit (UCL) PFOS+PFHxS concentrations

WE Group	Number of samples	Maximum PFOS+PFHxS concentration	95% UCL (ProUCL)	Defence PFAS Category
WE 1.10	34	0.0009	0.0006	Category 4 (max) Category 4 (UCL)
WE 2.1	22	1.4	0.524	Category 2 (max) Category 3 (UCL)
WE 2.2	12	0.0001	Insufficient number of samples	Category 4 (max)
WE 2.4	4	All non-detects	Insufficient number of samples	Insufficient number of samples
WE 2.5	8	0.83	Insufficient number of samples	Category 3 (max)
WE 2.6	9	0.39	Insufficient number of samples	Category 3 (max)
WE 3.1 / 3.2	2	0.0013	Insufficient number of samples	Category 4 (max)
WE 4.1	14	0.023	0.0139	Category 3 (max) Category 3 (UCL)
WE 4.2	25	0.0036	0.0015	Category 4 (max) Category 4 (UCL)
WE 7.1	44	0.0059	0.0019	Category 4 (max) Category 4 (UCL)

WE Group	Number of samples	Maximum PFOS+PFHxS concentration	95% UCL (ProUCL)	Defence PFAS Category
Kapooka Heritage Trail	6	0.0411	Insufficient number of samples	Category 3 (max)

44. Additionally, the vertical and lateral distribution of sampling and analytical data must reflect the specific construction area footprints where the spoil will be generated, to provide a reasonable estimate of the PFAS concentrations likely to be encountered as part of the redevelopment works. Having sample data from a WE but in areas that will not be excavated is not sufficiently location specific to inform the development of a robust risk assessment.

## C.2 Reuse location

45. A critical aspect of a Defence-compliant PFAS risk assessment is understanding the existing PFAS risk at the proposed reuse location(s). Without this knowledge, the assessment of potential change in PFAS risk due to the placement of the spoil cannot be undertaken.

### C.2.1 Soil quality

46. The locations proposed for reuse of construction spoil have not been finalised. Soil analysis may have previously been undertaken on samples collected from areas at or close to the reuse locations (once they are decided) and which may provide an initial indication of PFAS risk. However, further sampling and analysis is required to fully characterise the PFOS+PFHxS concentrations at the proposed reuse locations once they are selected.
47. Without a clear understanding of the existing level of PFOS+PFHxS in groundwater at the selected reuse locations and down gradient, it is not possible to assess the potential change in PFAS risk resulting from the placement of spoil.

### C.2.2 Groundwater quality

48. Like soil quality indicated above, the absence of defined areas for the reuse of construction spoil means that although existing groundwater quality at or close to the reuse locations may have been assessed previously, further targeted sampling and analysis of groundwater associated with the reuse locations (once determined) will be necessary to provide an accurate indication of PFAS risk to groundwater due to placement of PFAS contaminated spoil.
49. Without a clear understanding of the existing level of PFOS+PFHxS in groundwater at the selected reuse locations and down gradient, it is not possible to assess the potential change in PFAS risk resulting from the placement of spoil.

### C.2.3 Potential receptors

50. The risk assessment needs to account for potential PFAS risks to receptors that could be exposed to PFAS in or near the proposed reuse locations. The existing PFAS risk needs to be compared to the new risk once the reuse material has been placed to determine whether the risks have changed, and whether the risks are acceptable under the relevant Defence PFAS guidelines.

#### C.2.3.1 Human

51. Jacobs (2019) identify the on- and off-Base human receptors as:
- a Defence personnel and contractors who work on the Base
  - b maintenance and construction workers (on- and off-Base)

- c private property residents (off-Base)
- d recreational users of land (e.g. sporting ovals) off-Base.

52. Depending on the locations and methods used for reuse of construction spoil, any or all these human receptors could be exposed to PFAS associated with the spoil placement.

### C.2.3.2 Biota

53. Biota occurring on the Base and potentially at or near the spoil reuse locations are expected to comprise terrestrial flora and fauna (on and off-Base) and aquatic organisms in surface water bodies (on- and off-Base).

54. Depending on the locations and methods used for reuse of construction spoil, any or all these ecological receptors could be exposed to PFAS associated with the spoil placement.

## C.3 PFAS risk comparison

55. Given there are data gaps with regards to the analytical categorisation of both the source soil and the receiving area, EMM has developed a PFAS Calculator Tool (Attachment 3). This tool can be used to derive:

- a combined mass of PFHxS + PFOS after reuse
- b percentage change in mass of PFHxS + PFOS at the reuse location.

Once future sampling data become available for both the receiving area and the source material this information can be fed into the calculator as an initial step to aid in the assessment of change in PFAS risk, if any, associated with the reuse of spoil.

56. If the PFAS quality of the source material to be reused and the existing PFAS quality of soils at the reuse locations are similar, then there is a lower chance that the PFAS risk at the reuse location will change significantly due to the placement of construction spoil. However, until the quality of the source material and the intended reuse locations are known, the PFAS risk is also unknown.

57. Without understanding the anticipated spoil volumes and the specific PFAS quality (i.e. UCL concentration in mg/kg and mass in kg) of the spoil from the different source locations and existing PFAS quality of the surface soils in the proposed reuse locations, it is not possible to assess the potential change in PFAS risk due to the proposed placement of spoil.

58. A final decision on the precise location of the temporary stockpiles is yet to be made and no analytical data are available for the receiving area. Until analytical data for the soils in the receiving area are available, it is not possible to assess whether human and/or ecological receptors at and/or near the placement areas could be at greater risk of PFAS exposure as a direct result of spoil placement. Locations of proposed investigation areas are included in Figure 5.

59. During the construction phase, an approach that involves several stockpiles of varying soil quality will be managed and categorised using a sampling program. These analytical results will be used in the PFAS calculator tool provided in Attachment 3.

60. Without knowledge of the proposed locations and methods for the placement of construction spoil, it is not possible to assess whether groundwater at and/or near the spoil placement areas and receiving environments on-Base and off-Base could be at greater risk of PFAS exposure as a direct result of spoil placement.



Figure 5: Proposed stockpile investigation areas - BBK

## D. PFAS risk management measures

61. During the construction phase of the project a detailed construction environment management plan (CEMP) will be prepared and implemented across the site. It is expected that the CEMP considers risks associated with the potential PFAS concentrations in soils across the site and highlighted in Attachment 1 – Heat Maps. The following potential risks along with mitigation measures may be implemented to ensure that PFAS impacted soil does not create an unnecessary risk to human health and the environment.
62. PFAS substances are highly persistent and shown to bioaccumulate. These compounds have been shown to be toxic to fish and some animals. Some studies have shown human health impacts to humans.

### D.1 Potential PFAS associated risks

63. Table 4 below presents potential onsite PFAS associated risks that should be considered by the construction contractor and integrated into the CEMP.

Table 4: Potential PFAS related project risks and management measures

Risk / Management ID	Risk description	Potential management measures
01	<p>Historical use of PFAS has created several source areas at BBK and perched groundwater has been identified at some of the locations. There is potential for a clay layer to occur below the perched aquifer(s), as part of the Lachlan Formation, which limits the vertical migration of contaminants between the perched and deep aquifer. Jacobs (2018a) indicated that the hydraulic properties of the clay found on the Property are considered to substantially attenuate vertical hydraulic connectivity between the ground surface and the underlying permeable horizons. However, it is not known if this clay layer is continuous across the Property. Regional groundwater is understood to be located within the deep aquifer (from 48 m bgl) within the Lachlan and Cowra formations.</p> <p>If construction activities interact with regional groundwater and thereby exposing groundwater to PFAS contamination in shallow soils, there may be a risk of increased groundwater contamination.</p>	<p>It is understood that proposed construction excavation depths are not likely to contact the regional groundwater. However, there may be instances where perched groundwater is intersected during the construction phase. In the event that this occurs it is recommended that:</p> <ul style="list-style-type: none"> <li>works should be temporarily halted to determine the nature and extent of the intersection of groundwater</li> <li>further sampling and assessment should be undertaken of both the soil and groundwater to determine if the intersected groundwater poses a risk to workers onsite or if the disturbed soil might pose a risk of leaching into the perched groundwater</li> <li>local groundwater should not be used for construction purposes (i.e. dust suppression, concreting, other construction purposes)</li> <li>for proposed deep excavations, an understanding of the PFAS concentrations within the soil will be beneficial to inform the risk that PFAS impacted soil may interact with groundwater</li> <li>depending on the nature and extent of the groundwater intersected there may be a requirement for dewatering to occur.</li> </ul> <p>Overall, it is unlikely that construction activities will interact with groundwater; however, if deep excavations are required then there is the potential for perched groundwater to be intersected.</p>

Risk / Management ID	Risk description	Potential management measures
02	Movement of PFAS impacted soil to areas without PFAS (i.e. 'clean' areas) could increase the risk profile of the site and potentially pose a risk to nearby sensitive receptors.	<p>As outlined in the DCMM – Annex C, contaminated material should not be stockpiled in areas that have previously been identified as clean. No stockpiling should occur without a detailed sampling program that assesses:</p> <ul style="list-style-type: none"> <li>quality of the source material</li> <li>quality of the soil in areas within the footprint of stockpiles.</li> </ul> <p>To develop a Defence-compliant PFAS risk assessment, the potential change in risk associated with the placement of spoil in new areas (stockpile or reuse) is required. The PFAS risk assessment process can be informed using the PFAS calculator provided in Attachment 3. If PFAS impacted soil is placed in previously 'clean' areas, there may be an increased risk of impacts to surrounding receptors.</p>
03	During the construction phase, temporary stockpiles will be required as part of the cut and fill process. If the stockpiling process is not carried out under best practices the risk of PFAS leaching into the surrounding environment increases.	<p>Due to the long-term nature of the project, some soil may be stockpiled for extended periods and will likely suffer reduced viability due to loss of organic matter and nutrients, as often occurs when stockpiled for greater than 3–6 months. Most of the soils are expected to be stockpiled for 1–1.5 years and soils stripped from other areas would be stockpiled for the duration of the Project.</p> <p>Recommended measures to be included in the CEMP relating to soil stockpiling may include:</p> <ul style="list-style-type: none"> <li>soil materials of different quality should be stockpiled separately</li> <li>temporary soil bunds built up around stockpiles to prevent runoff and leaching of potentially contaminated stockpiles</li> <li>covering of stockpiles of contaminated soil may be required (particularly if hydrocarbon impacts are observed); the need will be determined on a case-by-case basis</li> <li>minimise trafficking and compaction of stockpiles</li> <li>maintain suitable stockpile height to avoid compaction</li> <li>minimise handling of soil</li> <li>vegetation cover of long-term topsoil stockpiles with native plant community types to minimise water logging and generation of anaerobic conditions within the stockpile, to help maintain topsoil biological viability and to create a seed store.</li> </ul>
04	PFAS contamination is a major reputational risk for the Defence estate currently and has widespread public documentation. Should PFAS contamination be increased or spread across the Defence estate, an increase in reputational risk is likely.	All PFAS related investigations and interactions should be in accordance with the relevant guidance documents. Provided works are undertaken in accordance with the applicable guidelines then the risks should be manageable.
05	Unexpected finds - interaction with Category 1 PFAS impacted soil/groundwater	Further remediation may be required where intrusive works encounter highly contaminated soil. It is understood that further sampling and analysis will be carried out during the construction phase. Should analytical data indicate high levels of PFAS (Category 1) a remediation action plan may be required to be developed which may include a requirement for stabilisation processes to be implemented.

## E. Next steps

64. Without sufficient spatial coverage of targeted PFAS sampling and analysis of soils in redevelopment areas where excavated soils will require reuse elsewhere on Base and of soils and groundwater in areas where excavated soils are proposed to be reused, it is not possible to assess the existing level of PFAS risk. Consequently, it is also not possible to specifically assess any potential change in PFAS risk at the proposed spoil reuse locations, which is the main objective of Defence compliant PFAS risk assessments. Notwithstanding, the existing data have been reviewed to evaluate the relevant Defence PFAS Category within specific WE areas (Table 2).
65. Several additional steps are required to inform a Defence-compliant PFAS risk assessment:
- a Conduct sufficient sampling and PFAS analysis on soils to be excavated during redevelopment activities at BBK to enable characterisation of the excess material to be beneficially reused. Sampling density should reflect the spatial extent and volume of soil to be reused.
  - b Use soil quality data (from bullet 1 above) and volumes of soil (Table 1) for each location to calculate the PFAS content (95% UCL in mg/kg and total mass in kg).
  - c Conduct sufficient sampling and PFAS analysis on surface soils at the proposed reuse location(s). Sampling density should reflect the spatial extent of the proposed reuse footprint, and critical areas adjacent to the reuse location, especially down gradient.
  - d Conduct sufficient sampling and PFAS analysis on groundwater within and down gradient of the reuse footprint to assess existing PFAS contamination (if any) and potential for increased risk from reused materials.
  - e Assess existing PFAS content (95% UCL in mg/kg and total mass in kg) for surface soils at the proposed reuse location and, together with the PFAS content of the material being reused (bullet 3), calculate the combined PFAS content (95% UCL in mg/kg and total mass in kg) of the reuse material added to the existing surface soils at the reuse location.
  - f Assess whether the additional PFAS content from the reused material will alter the existing PFAS risk at the reuse location. Assess whether sensitive receptors adjacent to and down gradient of the reuse location are at greater risk due to the reuse of material.
  - g Depending on the PFAS risk category of material to be reused, design appropriate control measures to adequately mitigate and manage the potential runoff, leaching and infiltration of PFAS into soils, groundwater and surface waters from the material being reused, with an overall aim of minimising impacts to the local environment.

## F. Limitations

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68. From a technical perspective, the subsurface environment at any site may present substantial uncertainty. It is a heterogeneous, complex environment, in which small subsurface features or changes in geologic and hydrogeologic conditions can have substantial impacts on water and chemical movement.
69. This preliminary assessment of PFAS risk is based on the documentation, information and data made available to EMM during the 5% MPFR, 30% CDR and 50% SDR design stages, as referenced in this report.
70. The site investigations conducted to support this preliminary assessment of PFAS risk were undertaken in September 2022 during the 30% CDR design stage and assessed scope items and proposed building footprints that were preferred at that time. As such, further investigation is required to address data gaps associated with changes in design that have occurred since the Stage 1A and Stage 1B site investigations.
71. EMM's professional opinions are based upon its professional judgement, experience, and training. These opinions are also based upon data supplied by third parties and data derived from the testing and analysis described in this document. It is possible that additional testing and analysis might produce different results and/or different opinions. EMM believes that its opinions are reasonably supported by the sampling and analysis that have been done, and that those opinions have been developed according to the professional standard of care for the environmental consulting profession in this area at the date of this document. That standard of care may change with advancements in professional practice, new methods and techniques of investigation, sampling, analysis and remediation, and changes in applicable statutes and/or guidelines may develop in the future, which might produce different results.
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83. Standards Australia AS/NZ 2005, Guide to the Sampling and Investigation of Potentially Contaminated Soil – Non-Volatile and Semi-Volatile Compounds, AS4482.1:2005, Standards Australia, Sydney.



## Attachment 1. Historical analytical results





	PFAS - Perfluoroalkyl Sulfonic Acids				PFAS	
	Perfluorohexane sulfonic acid (PFHxS)		Perfluorooctane sulfonic acid (PFOS)		Sum of PFHxS and PFOS	
	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L
EQL	0.0001	0.02	0.0001	0.01	0.0001	0.01
PFAS NEMP 2020 Residential with garden/accessible soil (HIL A)	0.007	-	0.007	-	0.007	-
PFAS NEMP 2020 Public open space (HIL C)	1	-	1	-	1	-
PFAS NEMP 2020 Industrial/ commercial (HIL D)	20	-	20	-	20	-
PFAS NEMP 2020 Ecological indirect exposure	-	-	0.01	-	-	-
Defence CMF 2021 Table 2 Soil Category 1	-	-	-	-	20	-
Defence CMF 2021 Table 2 Soil Category 2	-	-	-	-	1	-
Defence CMF 2021 Table 2 Soil Category 3	-	-	-	-	0.01	-
Defence CMF 2021 Table 2 Soil Category 4	-	-	-	-	0.01	-
PFAS NEMP 2020 Unlined Landfill Acceptance Criteria	20	0.07	20	0.07	20	0.07
PFAS NEMP 2020 Clay/Single Composite Lined Landfill Acceptance Criteria	50	0.7	50	0.7	50	0.7
PFAS NEMP 2020 Double Composite Landfill Acceptance Criteria	50	7	50	7	50	7

Site ID	Project ID	Field ID	WE	Source	Location Code	Date	Depth	Matrix Description	X Coord	Y Coord	Location Alt. Name	Location Type	Location Purpose	Sample Type	Perfluorohexane sulfonic acid (PFHxS) mg/kg	Perfluorohexane sulfonic acid (PFHxS) µg/L	Perfluorooctane sulfonic acid (PFOS) mg/kg	Perfluorooctane sulfonic acid (PFOS) µg/L	Sum of PFHxS and PFOS mg/kg	Sum of PFHxS and PFOS µg/L
0315		0315_BH78_0.1_221026	WE 7.1	EMM	BH78	26/10/2022	0 - 0.1		524292.9429	6108879.762		BH		Normal	0.0001	-	0.0012	-	0.0013	-
0315		0315_BH78_1.5_221026	WE 7.1	EMM	BH78	26/10/2022	1.4 - 1.5		524292.9429	6108879.762		BH		Normal	<0.0001	-	<0.0001	-	<0.0001	-
0315		0315_BH78_2.5_221026	WE 7.1	EMM	BH78	26/10/2022	2.4 - 2.5		524292.9429	6108879.762		BH		Normal	<0.0001	-	<0.0001	-	<0.0001	-
0315		0315_BH79_0.1_221024	WE 7.1	EMM	BH79	24/10/2022	0 - 0.1		524278.5026	6108622.845		BH		Normal	<0.0001	-	<0.0001	-	<0.0001	-
0315		0315_BH79_0.5_221024	WE 7.1	EMM	BH79	24/10/2022	0.4 - 0.5		524278.5026	6108622.845		BH		Normal	<0.0001	-	<0.0001	-	<0.0001	-
0315		0315_BH79_1.5_221024	WE 7.1	EMM	BH79	24/10/2022	1.4 - 1.5		524278.5026	6108622.845		BH		Normal	<0.0001	-	<0.0001	-	<0.0001	-
0315		0315_BH80_0.1_221024	WE 7.1	EMM	BH80	24/10/2022	0 - 0.1		524289.8303	6108703.882		BH		Normal	<0.0001	-	0.0016	-	0.0016	-
0315		0315_BH80_0.5_221024	WE 7.1	EMM	BH80	24/10/2022	0.4 - 0.5		524289.8303	6108703.882		BH		Normal	0.0001	-	<0.0001	-	0.0001	-
0315		0315_BH81_0.1_221025	WE 7.1	EMM	BH81	25/10/2022	0 - 0.1		524324.6494	6108749.147		BH		Normal	<0.0001	-	0.0004	-	0.0004	-
0315		0315_BH81_0.5_221025	WE 7.1	EMM	BH81	25/10/2022	0.4 - 0.5		524324.6494	6108749.147		BH		Normal	<0.0001	-	<0.0001	-	<0.0001	-
0315		0315_BH83_0.1_221025	WE 7.1	EMM	BH83	25/10/2022	0 - 0.1		524320.2371	6108835.661		BH		Normal	<0.0001	-	0.0006	-	0.0006	-
0315		0315_BH83_0.5_221025	WE 7.1	EMM	BH83	25/10/2022	0.4 - 0.5		524320.2371	6108835.661		BH		Normal	<0.0001	-	<0.0001	-	<0.0001	-
0315		0315_BH83_1.5_221025	WE 7.1	EMM	BH83	25/10/2022	1.4 - 1.5		524320.2371	6108835.661		BH		Normal	<0.0001	-	<0.0001	-	<0.0001	-
0315		0315_BH84_0.1_221025	WE 7.1	EMM	BH84	25/10/2022	0 - 0.1		524351.2851	6108866.852		BH		Normal	<0.0001	-	<0.0001	-	<0.0001	-
0315		0315_BH84_0.5_221025	WE 7.1	EMM	BH84	25/10/2022	0.4 - 0.5		524351.2851	6108866.852		BH		Normal	<0.0001	-	<0.0001	-	<0.0001	-
0315		0315_BH84_1.5_221025	WE 7.1	EMM	BH84	25/10/2022	1.4 - 1.5		524351.2851	6108866.852		BH		Normal	<0.0001	-	<0.0001	-	<0.0001	-



## Attachment 2. BBK PFAS Soil Heat Maps

# **Riverina Redevelopment Project Joint Venture PFOS + PFHxS Soil Category Heat Maps**

Blamey Barracks Kapooka

28 November 2023

## Assumptions for heat maps development

- Heat maps were based on all available data in the Defence Esdat system. Downloaded from Defence ESdat 15/10/2023.
- Concentrations below laboratory quantification limit (< LQ) were not considered in any category (areas indicated by the color white)
- The most conservative category was adopted at each borehole (BH) location, considering the highest concentration of PFOS + PFHxS.
- Interpolations have been made using kriging method and Surfer<sup>®</sup> software.
- Interpolation were made using all the data available, inside and outside the work elements (WE).
- Category 4 was considered from 0.0001 to 0.01 mg/kg of PFOS + PFHxS
- Constructions footprints are indicative, pending official plans.



## Limitations of use

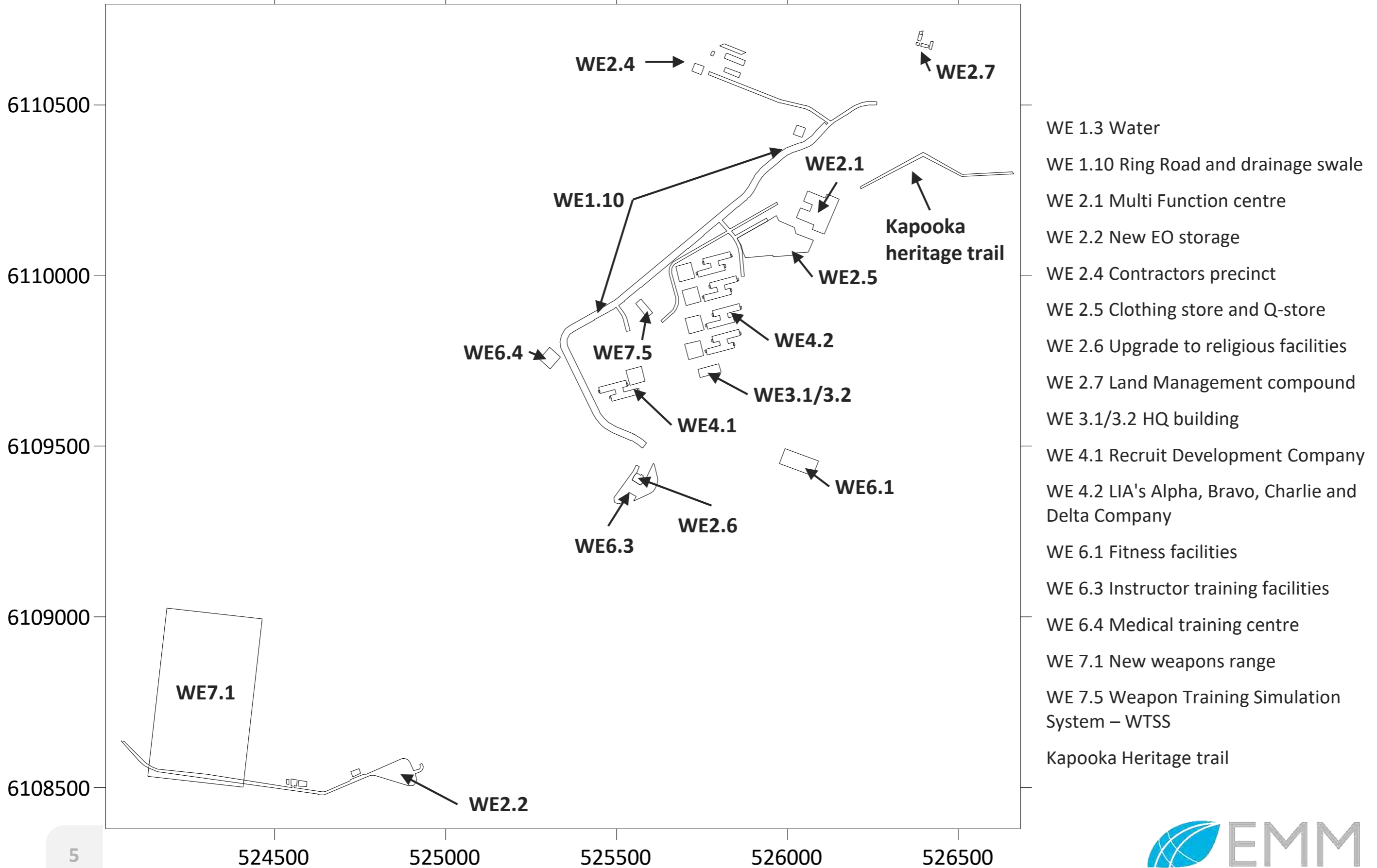
- Subsurface soils are an heterogeneous and anisotropic media and pollutant transport within this media is highly variable. Therefore, although the presented heat map illustrates the spatial variation of PFOs+PFHxS concentrations they will very possible not be an actual reflection of the real in-situ conditions.
- All interpolations have been based on available data. PFOs+PFHxS hotspots may be present in areas between boreholes where no data has been collected (areas indicated by the color grey).

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# **Blamey Barracks Kapooka (BBK)**

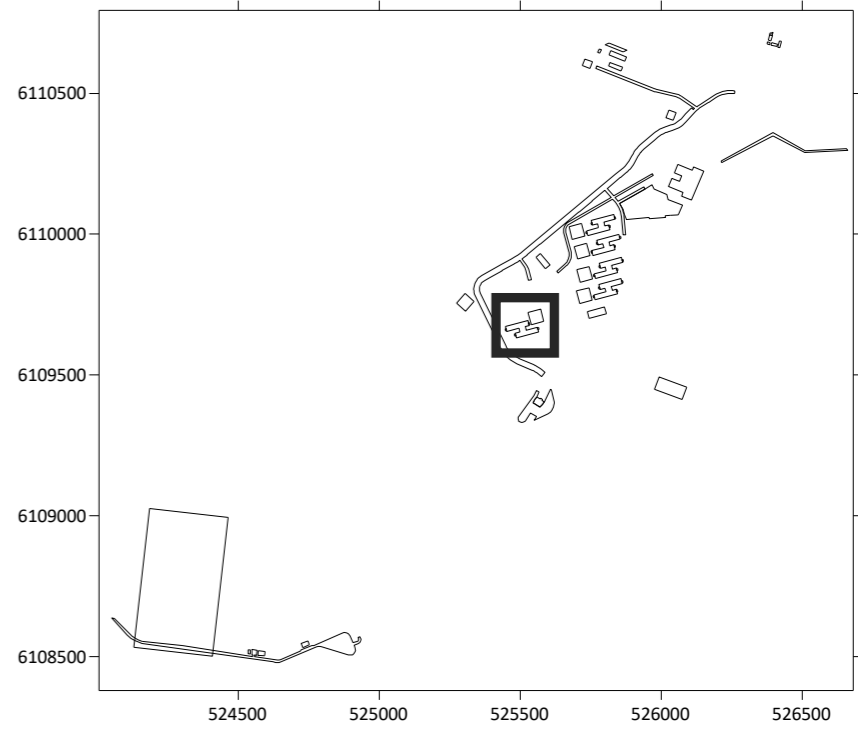
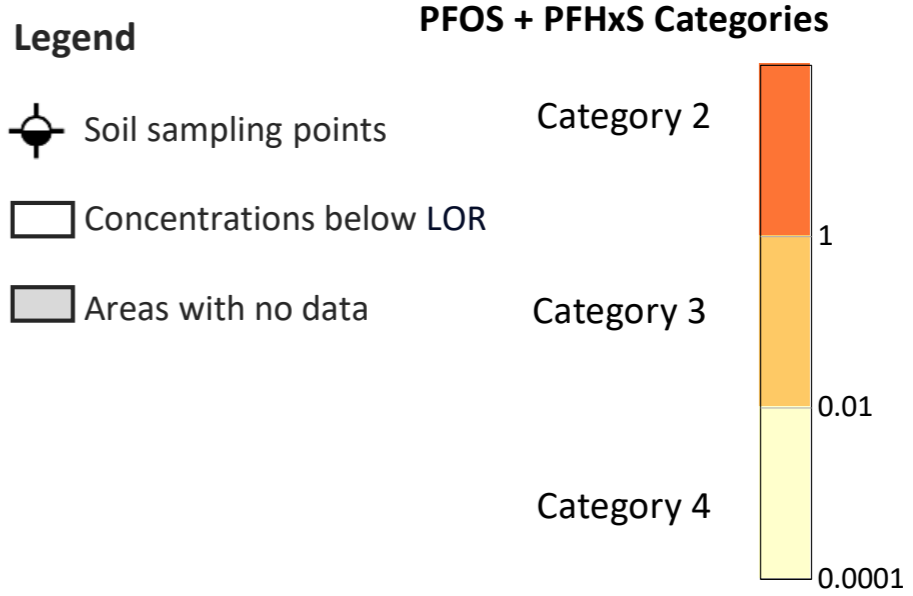
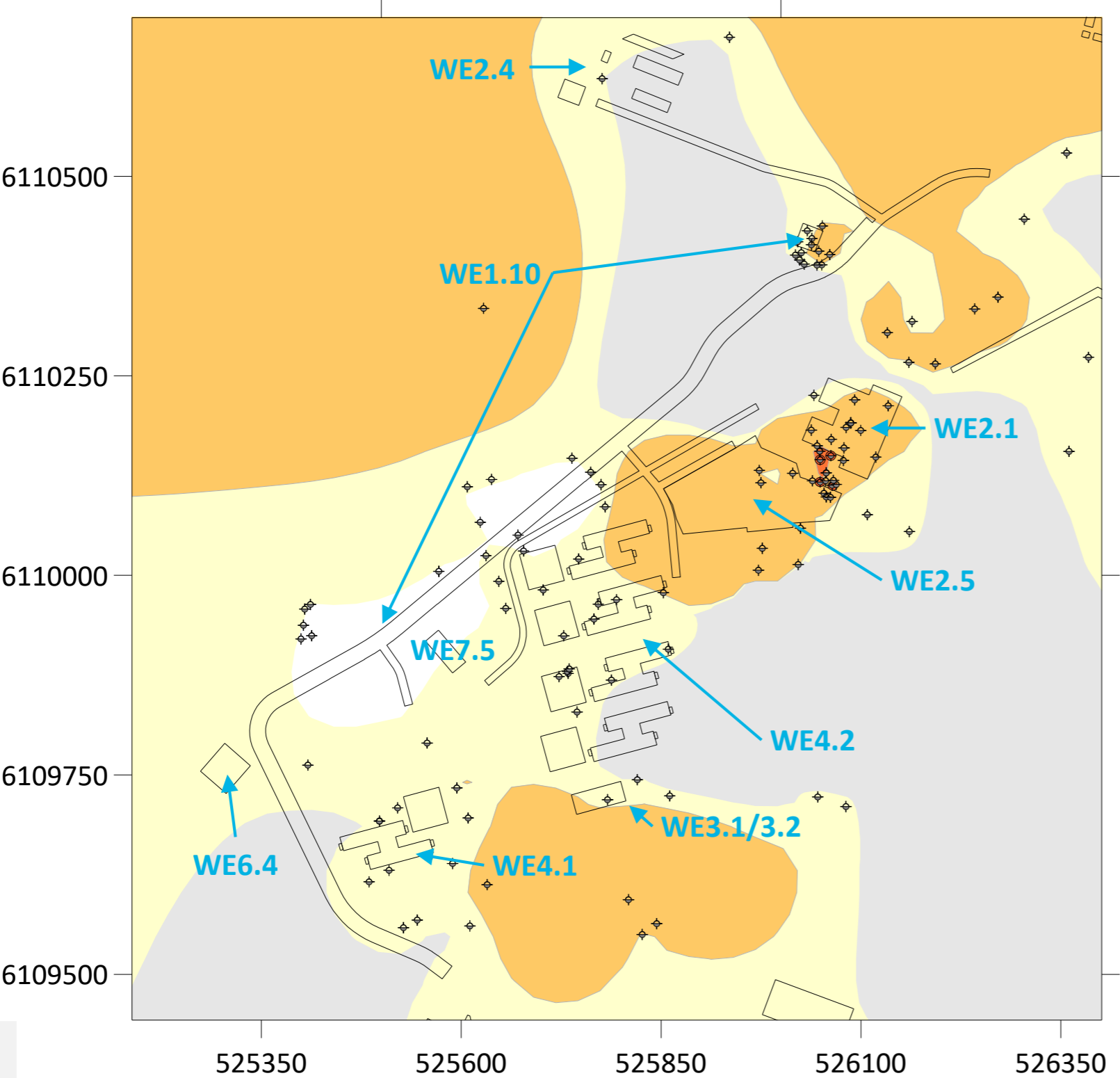
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# BBK - Construction footprint summary



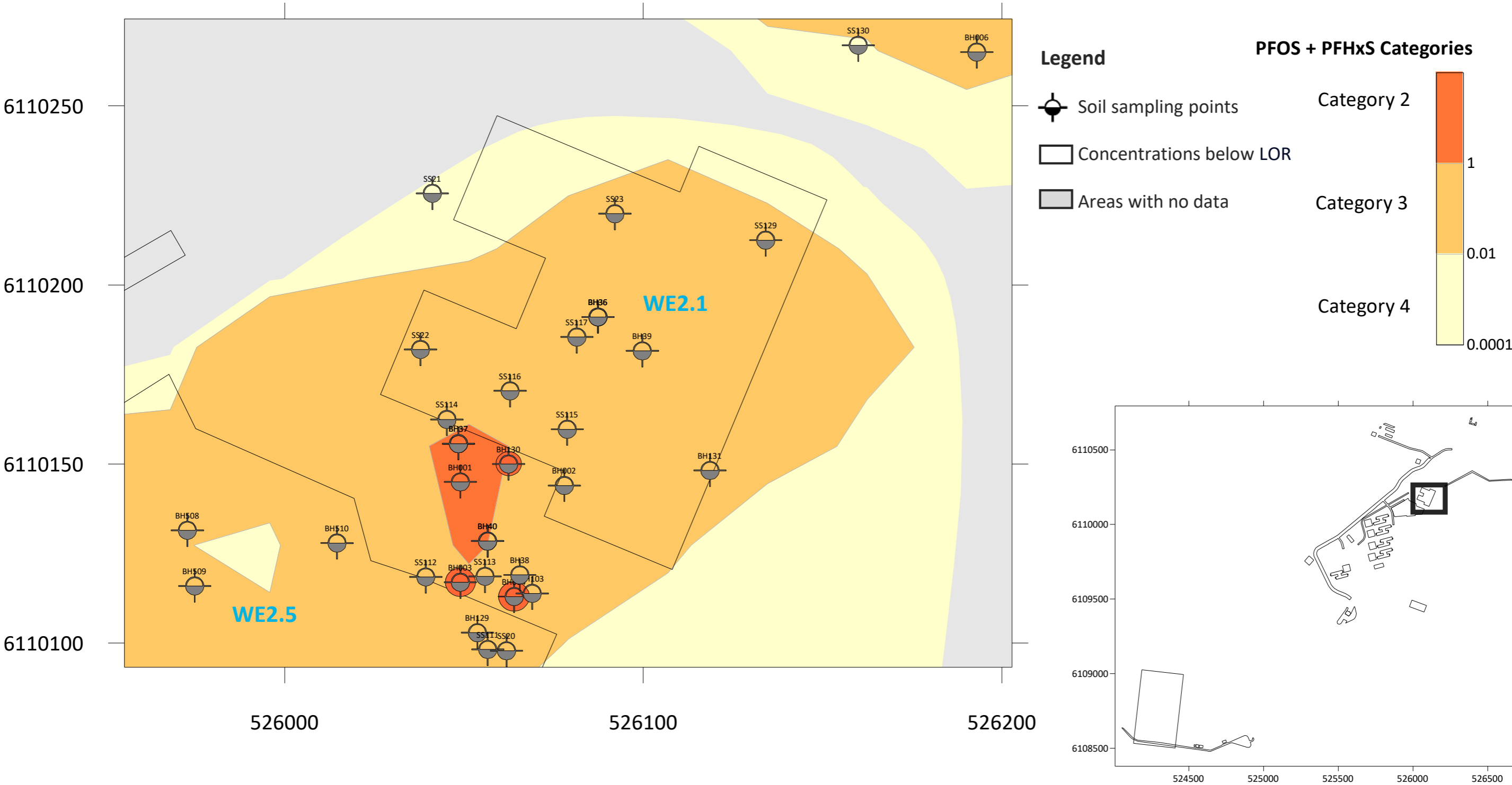
# BBK - PFOS + PFHxS Heat Map

## WE 1.10 Ring Road and drainage swale



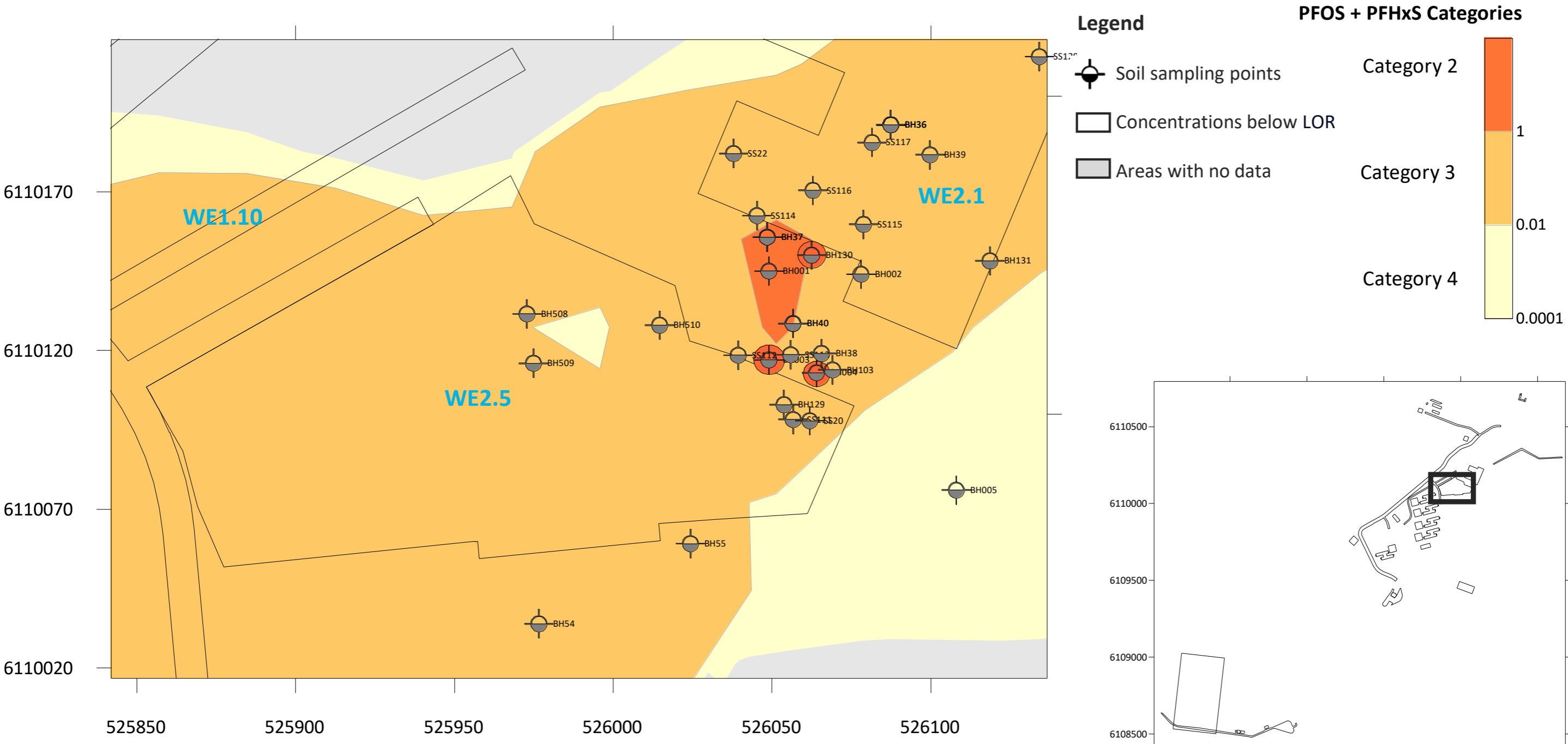
# BBK - PFOS + PFHxS Heat Map

## WE 2.1 Multi function centre



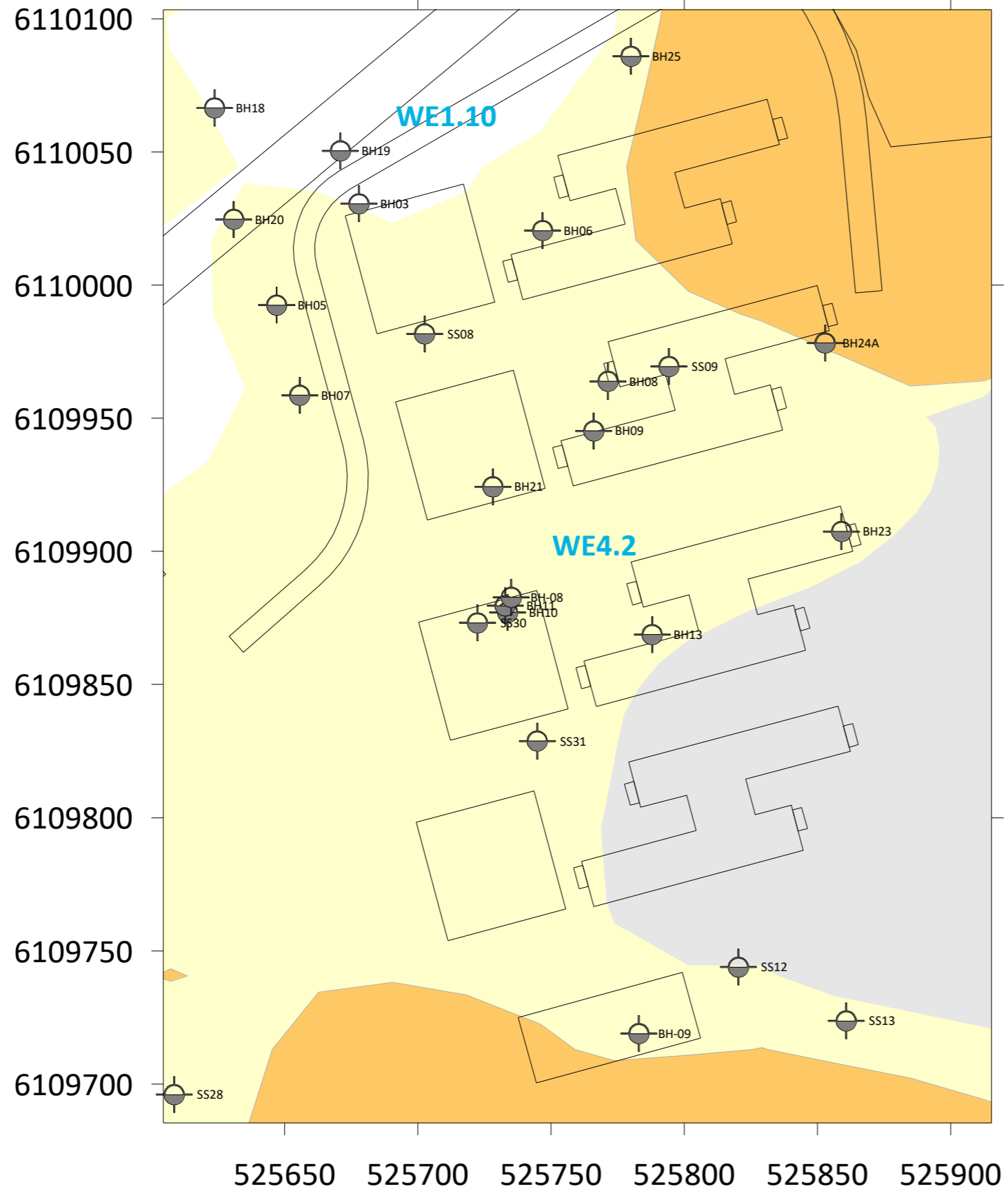
# BBK - PFOS + PFHxS Heat Map

## WE 2.5 Clothing store and Q-Store



# BBK - PFOS + PFHxS Heat Map

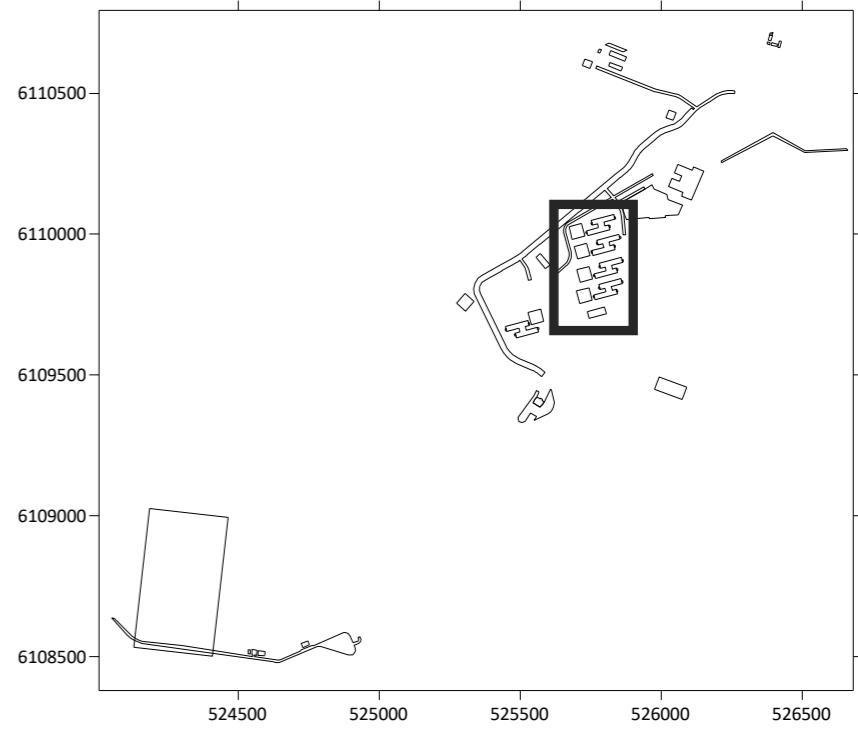
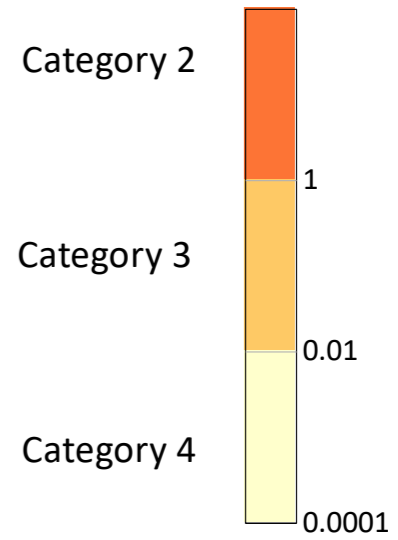
## WE 4.2 LIA's Alpha, Bravo, Charlie and Delta Company



### Legend

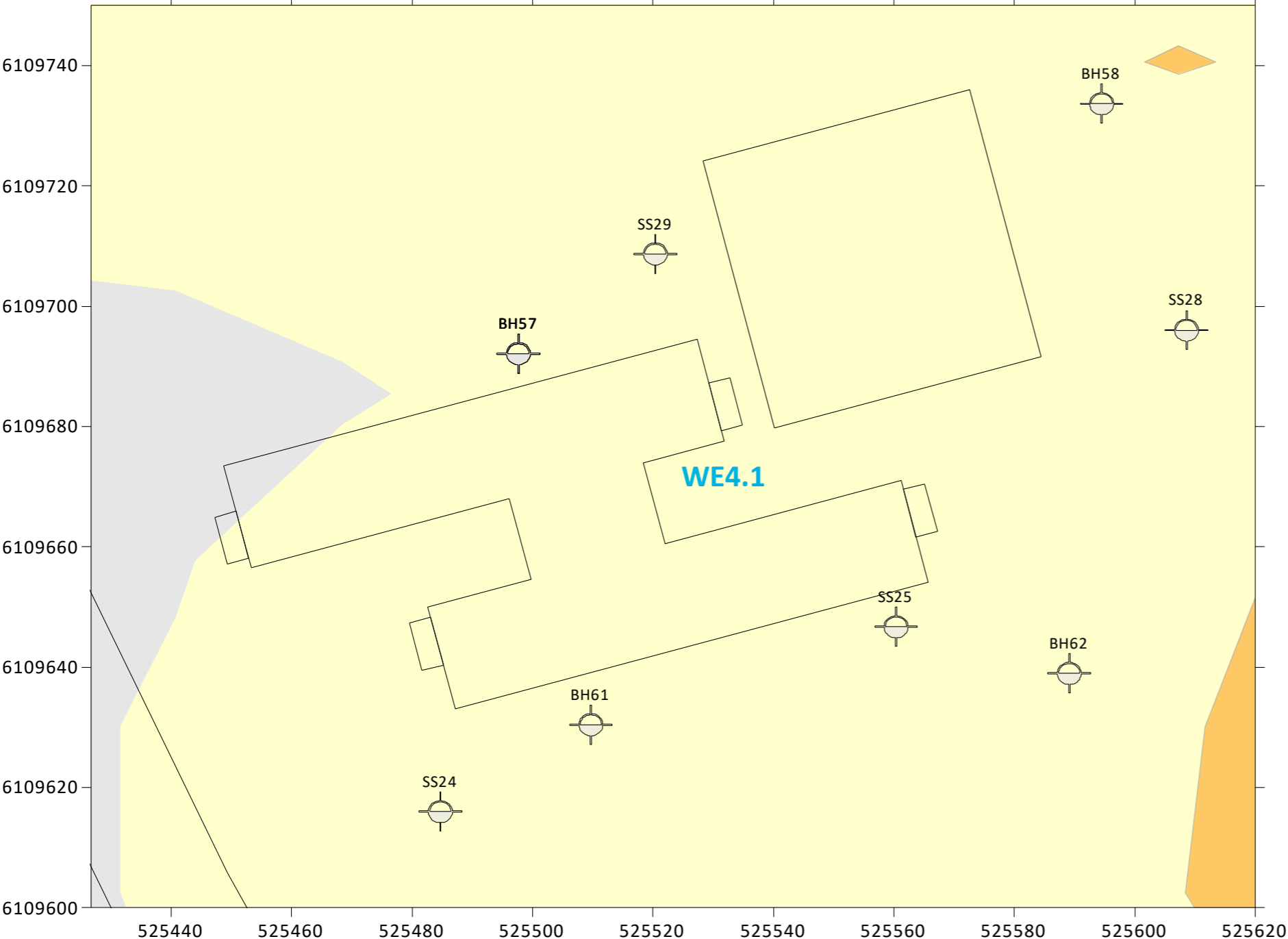
- Soil sampling points
- Concentrations below LOR
- Areas with no data

### PFOS + PFHxS Categories



# BBK - PFOS + PFHxS Heat Map

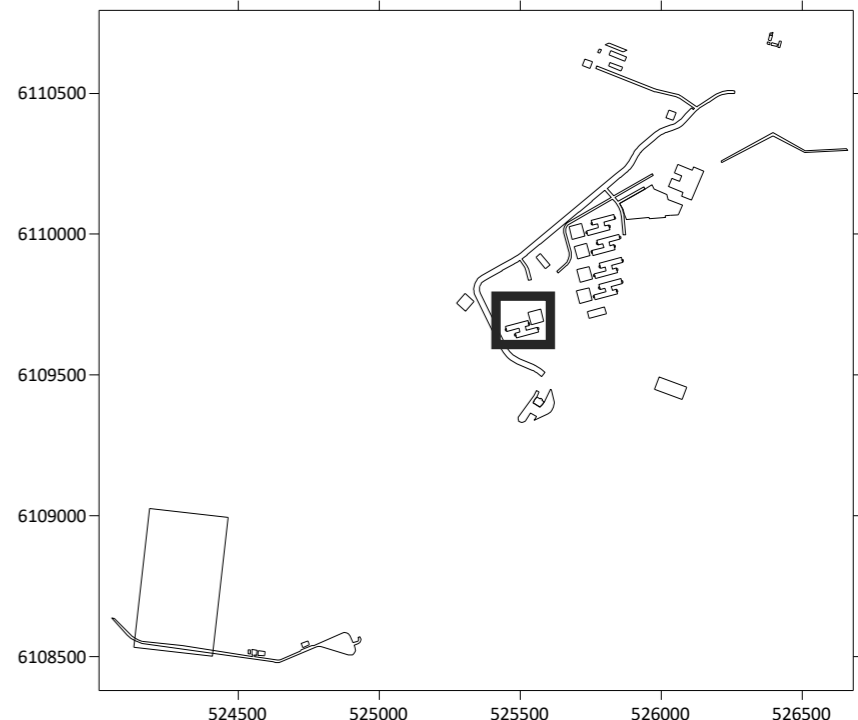
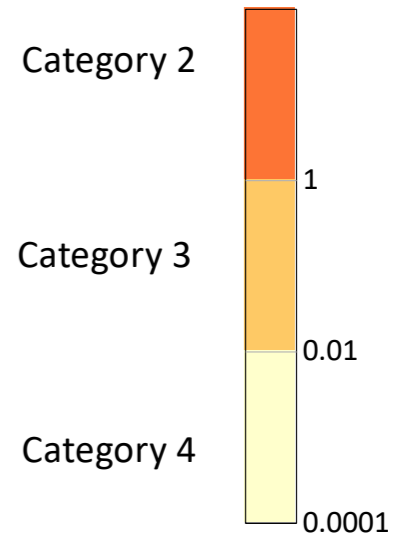
## WE 4.1 Recruit Development Company



**Legend**

- Soil sampling points
- Concentrations below LOR
- Areas with no data

**PFOS + PFHxS Categories**

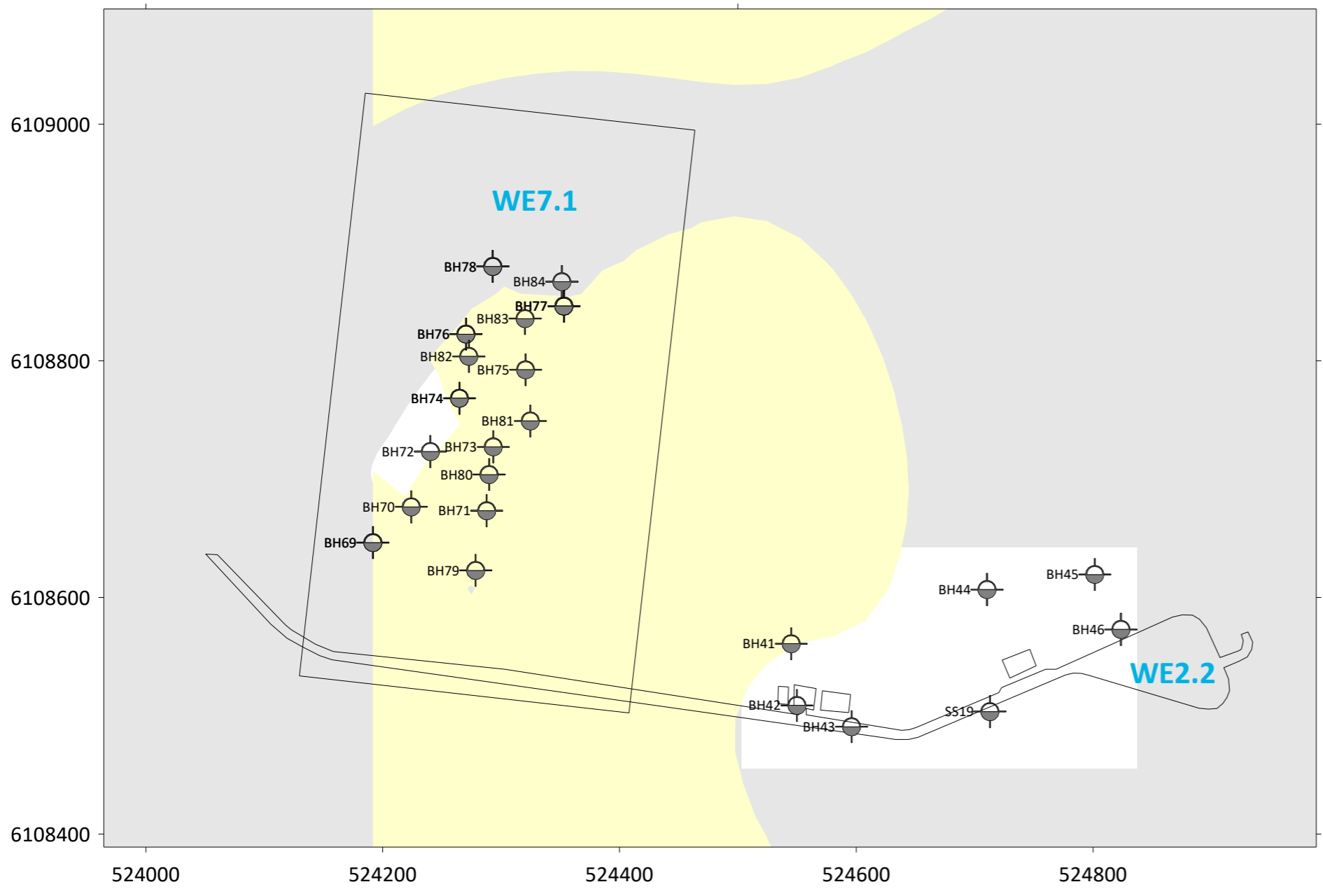




# BBK - PFOS + PFHxS Heat Map

WE 2.2 New EO storage

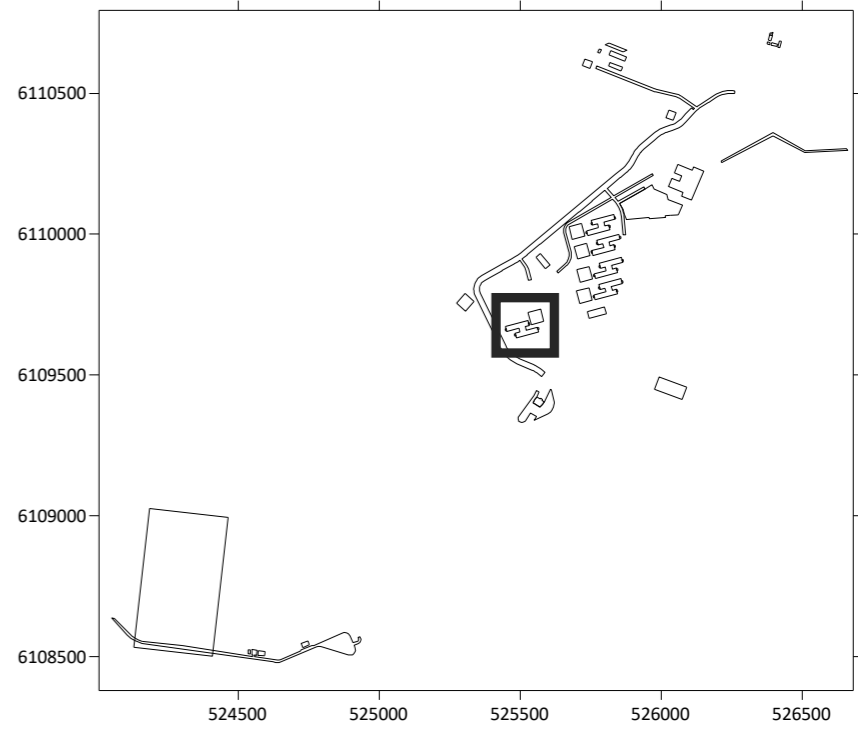
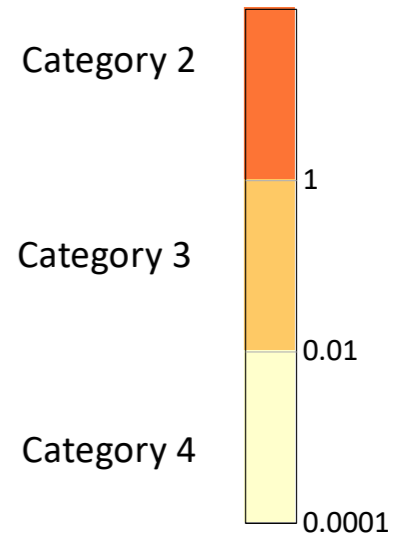
WE 7.1 New weapons range



### Legend

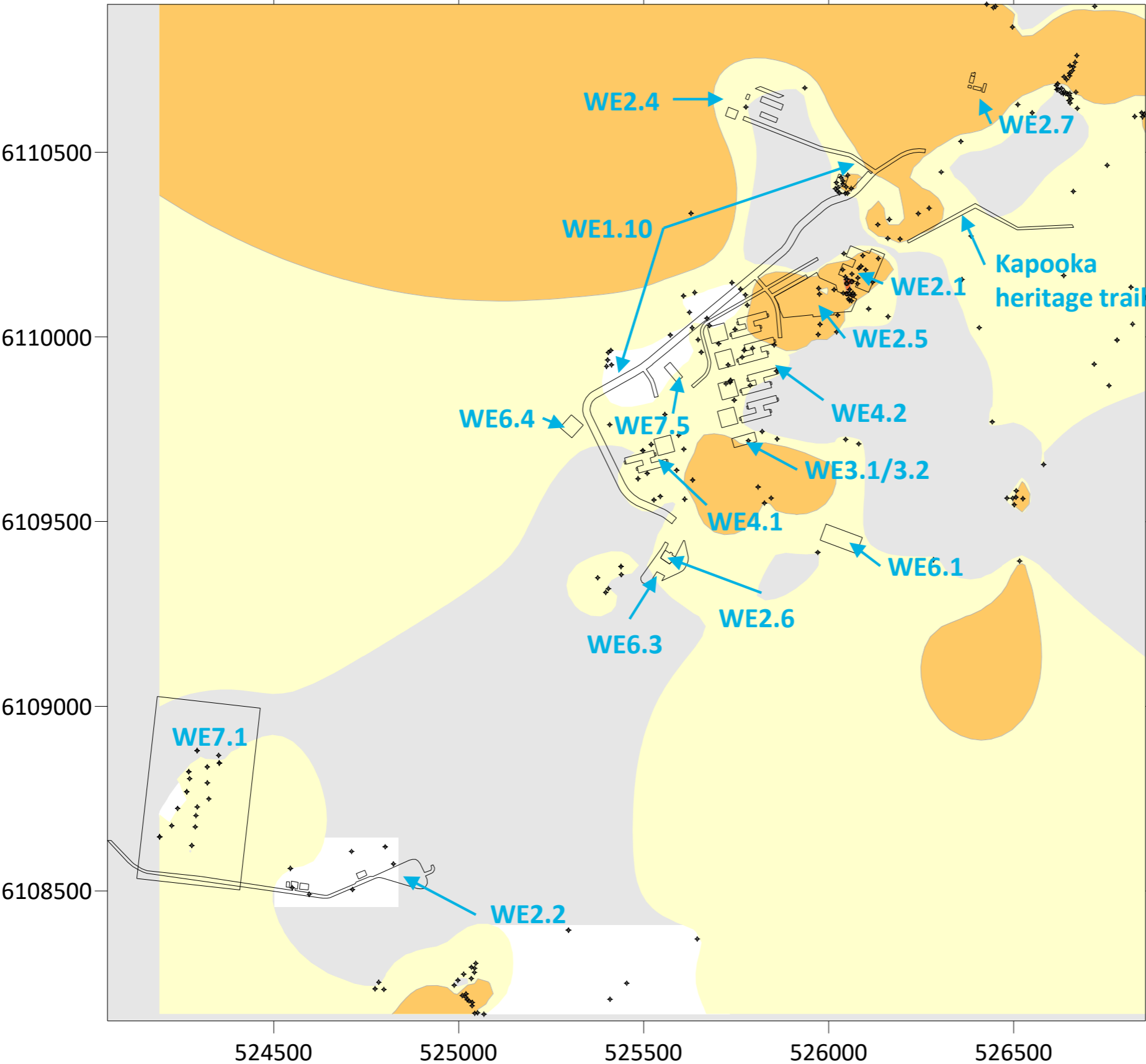
- Soil sampling points
- Concentrations below LOR
- Areas with no data

### PFOS + PFHxS Categories



# BBK - PFOS + PFHxS Heat Map

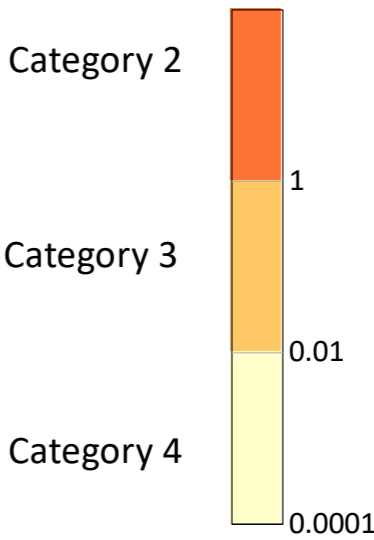
## Full property



**Legend**

- Soil sampling points
- Concentrations below LOR
- Areas with no data

**PFOS + PFHxS Categories**



## **BBK - Areas with no data or insufficient data within footprint**

- WE 1.3 Water
- WE 1.10 Ring Road and drainage swale WE 2.4 Contractors precinct
- WE 2.6 Upgrade to religious facilities
- WE 2.7 Land Management compound
- WE 3.1/3.2 HQ building
- WE 6.1 Fitness facilities
- WE 6.3 Instructor training facilities
- WE 6.4 Medical training centre
- WE 7.5 Weapon Training Simulation System – WTSS
- Kapooka Heritage trail

# Attachment 3. PFAS Calculator Tool

Provided separately as electronic file – excel document

PFAS Calculator Tool			
Sum PFHxS + PFOS			
<b>Source material:</b>			
spoil volume		m3	volume of soil excavated, area x depth
bulk density		kg/m3	specific to soil type, e.g. clay loam = 1500
soil weight	0	kg	spoil volume x bulk density
Sum PFHxS + PFOS concentration		mg/kg	calculated 95% upper confidence limit (UCL), based on recent testing
PFHxS + PFOS mass in spoil	0	mg	UCL Sum PFHxS + PFOS concentration x soil weight
PFHxS + PFOS mass in spoil	0	kg	convert mg/kg to kg
<b>Soil at reuse location:</b>			
depth of existing PFAS contamination		m	based on recent soil testing
footprint of existing PFAS contamination within reuse area		m2	estimate of reuse area with existing PFAS contamination, based on recent testing
volume of PFAS contamination	0	m3	depth x area of footprint
bulk density		kg/m3	specific to soil type, e.g. clay loam = 1500
soil weight	0	kg	spoil volume x bulk density
Sum PFHxS + PFOS concentration		mg/kg	calculated 95% upper confidence limit (UCL), based on recent testing
PFHxS + PFOS mass in reuse area	0	mg	UCL Sum PFHxS + PFOS concentration x soil weight
PFHxS + PFOS mass in reuse area	0	kg	convert mg/kg to kg
<b>Comparison:</b>			
combined mass of PFHxS + PFOS after reuse	0	kg	PFHxS + PFOS mass in source material + existing PFHxS + PFOS mass at reuse location
percentage change in mass of PFHxS + PFOS	#DIV/0!	%	PFHxS + PFOS mass in spoil compared to PFHxS + PFOS mass at reuse location
<p>*** Assess significance of percentage change in mass of PFHxS + PFOS at the reuse location.</p> <p>*** Assess implications of change in PFHxS + PFOS relative to sensitive receptors at, near and down gradient of the reuse area.</p> <p>*** Justify reuse of spoil relative to change in PFHxS + PFOS at the reuse location and any additional risk to receptors.</p> <p>*** Consider controls, mitigation and management strategies to minimise additional risks.</p> <p>*** Consider the need for ongoing monitoring to confirm conclusions regarding risks.</p>			

# Contamination Management Strategy

EST02036 Blamey Barracks Kapooka Redevelopment

Document issue:	90% DDR Final Issue	1 Dec 2023
Document no.:	RRP-GLO-GLO-EMM-CNT-RPT-0001	



Riverina Redevelopment Joint Venture



# Document Control

Distribution is centralised and controlled by the Contractor's Representative.

## Revision status

Rev	Date	Description	Changes since last revision	Prepared by	Checked by	Approved by
A	2/10/23	Draft for comment				
B	30/10/23	Incorporating JV comments	Incorporation of JV comments			
D1	01/12/23	Draft 90% DDR Submission (to PMCA)	Incorporation of JV comments	Anthony Davis (EMM)	Bryce Skarratt (EMM)	Mal Jacobsen (RRJV)



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## Acronyms and Abbreviations

Reference	Definition
ACM	Asbestos Containing material
ASC	Assessment of Site Contamination
ASL	Above Mean Sea Level
BBK	Blamey Barracks Kapooka
CDR	Concept Design Review
CEMP	Construction Environmental Management Plan
CoC	Chain of Custody
CSR	Contaminated Sites Record
DCARM	Directorate of Contamination Assessment, Remediation and Management
DCMM	Defence Contamination Management Manual
DCR	Desktop Contamination Review
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEHPD	Directorate of Environment and Heritage Policy Development
DEECA	Department of Energy, Environment and Climate Action
DFASIM	Directorate of PFAS Remediation
DPPM	Defence Pollution Prevention Management Manual
DoE	Department of the Environment
ENM	Excavated Natural Material
EO	Explosive Ordinance
EOW	Explosive Ordinance Waste
EPA	Environment Protection Agency
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESdat	Environmental data management, analysis and reporting software for environmental and groundwater data
GEMS	Garrison Estate Management System
HMRMT	Heavy Metals Risk Management Tool
LOR	Limit of Reporting
m	Metre(s)
MPFR	Master Plan Feasibility Review
NATA	National Association of Testing Authorities

Reference	Definition
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measures
NSW	New South Wales
NWQMS	National Water Quality Management Strategy
PCA	Pre-construction Contamination Assessment
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
PFOS	Perfluorooctane sulfonate
PMAP	PFAS Management Area Plan
RRJV	Riverina Redevelopment Joint Venture
RRP	Riverina Redevelopment Program
SAQP	Sampling, Analysis and Quality Plan
UPSS	Unidentified underground petroleum storage systems
UXO	Unexploded ordnance
VENM	Virgin Excavated Natural Material
WE	Work Element



## A. Introduction and Purpose

### A.1 Background

1. The Riverina Redevelopment Joint Venture (RRJV) was formed by CPB Contractors and Downer to undertake the Riverina Redevelopment Project (RRP) at:
  - b Blamey Barracks Kapooka (BBK)
2. The scope of the Riverina Redevelopment Project (RRP) comprises major upgrades and/or replacement of existing infrastructure and facilities. EMM Consulting Pty Limited (EMM) was engaged by RRJV to provide a range of services in support of the RRP, including contamination.
3. A Pre-construction Contamination Assessment (PCA) was prepared to present the outcomes of site investigations conducted during 30% Concept Design Review (CDR) within the preferred siting options selected following the Site Selection Board (SSB) workshop.
4. Site investigations were initially divided into two stages:
  - a Stage 1A: contamination sampling co-located with geotechnical investigations to provide a preliminary assessment of the contamination status of the various building siting areas.
  - b Stage 1B: main contamination investigation addressing building siting areas, supplementing data generated during Stage 1A investigations to address data gaps identified during the desktop contamination review, specifically gaps related to siting options presented in the RRJV 5% Master Plan and Feasibility Review (MPFR).
5. EMM proposed a third stage of contamination investigation (Stage 1C) for each Defence property in early 2023 to fill data gaps that were identified following completion of the Stage 1B assessment (EMM 2023). The primary objectives of the proposed Stage 3 investigations were the following:
  - a Refine the understanding and assessment of contamination risk at proposed services alignments and new work elements added since the Stage 1B investigation presented in the 30% CDR, utilising both existing data and data generated by the site investigation program.
  - b Address data gaps identified in the Stage 1A and 1B investigations reported in the 30% CDR.
6. To achieve those objectives the proposed investigation was designed to:
  - a target the footprints of the proposed services alignments, new siting options of buildings presented in the 30% CDR and areas with identified data gaps
  - b locate new boreholes to supplement contamination data from the existing borehole network and in accordance with the principles of sampling design provided within:
    - i Defence Contamination Management Manual (Defence 2021a) with specific reference to:
      - Annex C – Planning to minimise and manage stockpiling.
      - Annex K – Management of PFAS contamination.
    - ii Defence PFAS Construction and Maintenance Framework (Defence, 2021)

- iii National Environment Protection (Assessment of Contamination) Measure (ASC NEPM, 1999 as amended 2013)
- iv Heads of EPAs Australia and New Zealand (HEPA), 2020, PFAS National Environmental Management Plan (NEMP v2.0), January 2020 Guidelines for the NSW Site Auditor Scheme (3rd edition, 2017)
- v AS4482.1:2005 Guide to the Investigation and Sampling of sites with Potentially Contaminated Soil. Part 1: Non-volatile and Semi-Volatile Compounds
- vi AS4482.2:1999 Guide to the sampling and investigation of potentially contaminated soil. Part 2: Volatile substances

- 1 The proposed Stage 1C contamination investigation has not been completed to date, and the data gaps identified in Stage 1A and Stage 1B remain, resulting in some residual uncertainty around contamination risks which may be present at proposed services alignments and within new work elements, which will require consideration and management during the construction phase. Consequently, this Contamination Management Strategy (Strategy) for the Riverina Redevelopment Joint Venture (RRJV) has been prepared during the 90% Detailed Design Review (DDR) milestone of the Program's Planning Phase to assist with the understanding of requirements for the management of contaminated materials and associated risks during the construction phase. This overarching Strategy is applicable to BBK.

#### 7. The strategy has been informed by:

- a a desktop review of contamination issues at BBK and constraints analyses prepared during 5% MPFR
- b existing contamination data generated through other projects and programs that is available in Defence's Environmental Data Management System (EDMS) and reports held in the Garrison Estate Management System (GEMS)
- c PCAs undertaken by EMM at Kapooka during the 30% Concept Design Review (CDR)
- d PFAS Management Area Plans (PMAP's) prepared for BBK (Defence 2019, 2020 and 2021)
- e reference to relevant Department of Defence, State and Commonwealth legislation and regulations, standards and guidance documents.

#### 8. The purpose of this Strategy is to:

- a provide an overarching framework to guide decision making with respect to the management of contamination at BBK
- b support the delivery of DDR
- c inform the development of RRJV's suite of site-specific Delivery Phase management plans which will occur in the next phase of the project.

9. The Strategy is guided by a set of overarching principles that can be used as a reference to assist management decisions (refer to Section B.2).

10. This Strategy is designed to help inform the development of the management plans required for BBK. It is not intended that the Strategy provides detailed management recommendations. Such recommendations will be developed upon finalisation of the design and will be based on the proposed construction methodology, location specific data, contamination-based risk assessments and will be captured in RRJV's construction phase management plans in line with Defence and regulatory requirements.

## B. Proposed Objectives and Guiding Principles of the Contamination Strategy

### B.1 Proposed Contamination Management Strategy Objectives

11. The overarching objectives of this Strategy are to:
- a ensure the safety and health of Base personnel, contractors and the general public
  - b meet relevant regulatory requirements and Defence guidelines
  - c minimise potential contamination related risks to humans, the natural and cultural environment
  - d minimise impacts of contamination on Defence capability
  - e ensure a consistent approach to contamination management within and across the Base where relevant.

### B.2 Guiding Principles

12. The following guiding principles should be considered when managing contamination related aspects of the project.
13. All activities need to be undertaken in accordance with State and Commonwealth regulations and guidelines including, but not limited to, the following:
- a National Environment Protection Council (1999) National Environment Protection (Assessment of Site Contamination) Measure, Schedule B2: Guideline on Site Characterisation (as amended in May 2013) (ASC NEPM, 2013) [National Environment Protection \(Assessment of Site Contamination\) Measure 1999](https://www.epa.gov.au/nepm/guidelines/assessing-site-contamination).
  - b Heads of EPAs Australia and New Zealand (HEPA) PFAS National Environmental Management Plan Version 2.0 (2020) (PFAS NEMP) <https://www.dcceew.gov.au/sites/default/files/documents/pfas-nemp-2.pdf>
  - c NSW EPA (2022) Contaminated Land Guidelines: Sampling Design (Parts 1 and 2) <https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/contaminated-land/22p3915-sampling-design-guidelines-part1.pdf?la=en&hash=C12162FBB9438F9BF59782EE4E4A953AE569913D>
  - d NSW EPA 2014. Waste Classification Guidelines, Part 1: Classifying Waste. November 2014.
  - e Environment Protection Act 2017 (the Act) <https://www.epa.nsw.gov.au/~media/EPA/Corporate%20Site/resources/wasteregulation/140796-classify-waste.ashx>.
  - f EPA Victoria, 2009, Industrial Waste Resource Guidelines: Soil Sampling, IWRG702, June 2009 <https://www.epa.vic.gov.au/about-epa/publications/iwrg702>
  - g EPA Victoria, 2022. Groundwater Sampling Guidelines. EPA Victoria Publication 669.1 <https://www.epa.vic.gov.au/about-epa/publications/669>

- a Standards Australia AS/NZ 2005, Guide to the Sampling and Investigation of Potentially Contaminated Soil – Non-Volatile and Semi-Volatile Compounds, AS4482.1:2005, Standards Australia, Sydney <https://www.saiglobal.com/pdftemp/previews/osh/as/as4000/4400/4482.1-2005.pdf>
- b Standards Australia AS/NZ 1999, Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil – Volatile Substances, AS4482.2:1999, Standards Australia, Sydney <https://www.saiglobal.com/PDFtemp/Previews/OSH/As/as4000/4400/44822.pdf>

14. All activities need to be undertaken in compliance with relevant Defence Guidelines including, but not limited to, the following:
- a Department of Defence (2018) Defence Contamination Management Manual (as amended in June 2021) (DCMM) <https://www.defence.gov.au/business-industry/industry-governance/industry-regulations/defence-contamination-management-manual>
  - b Defence PFAS Construction and Maintenance Framework (v3.0, August 2021) <https://www.defence.gov.au/business-industry/industry-governance/industry-regulations/defence-pfas-construction-and-maintenance-framework>
  - c Defence Pollution Prevention Management Manual (June 2017) (DPPM) <https://www.defence.gov.au/business-industry/industry-governance/industry-regulations/pollution-prevention-management-manual>
  - d Defence Per- and Poly-fluoroalkyl Substances (PFAS) – Engineered Stockpile Facility Performance Specification (as appropriate) (v1.0, March 2018).
  - e Defence Contamination Management Manual (March 2018, amended June 2021), Annex C – Planning to Minimise and Manage Stockpiling <https://www.defence.gov.au/about/locations-property/pfas>
15. The waste management hierarchy will be employed to:
- a first, avoid interaction with contamination, then
  - b reuse contaminated materials where feasible and appropriate, then
  - c management options including treatment and remediation, then
  - d off-site disposal.
16. Wherever possible, any spoil material should be retained on-site if deemed suitable through risk assessment processes and endorsed by Defence. Where this is not possible or viable, it will need to be disposed of in a lawful place by an appropriately qualified contractor in accordance with the guidelines outlined in items 1 and 2 above.
17. Material segregation will be maintained at all times with respect to initial classification and/or source of material (e.g. stop butt material, PFAS category, presence of other contaminants, asbestos, inert waste, acid sulfate soil if relevant).
18. Monitoring requirements will be determined in accordance with relevant regulatory requirements and project obligations and approvals. Monitoring programs will be designed to be proportional to the potential exposure risks and the nature of contamination being managed onsite.
19. Activities will be undertaken with ongoing liaison with Defence technical authorities, i.e. the Directorate of Contamination Assessment, Remediation and Management (DCARM) and the PFAS Investigation and Management Program (PFASIM) with respect to concurrent activities under their respective programs.



20. All sampling data pertaining to remaining contamination onsite following the construction works will be required to be uploaded to the Defence Esdat database in accordance with Annex L of the DCMM - Data Management.

## C. Strategy Elements

### C.1 Management Plans

21. Contamination management and risk mitigation strategies need to be documented in RRJV's construction phase management plans including:
  - a Construction Environmental Management Plan (CEMP)
  - b Unexpected Finds Protocol (UFP)
  - c Materials Management Plan (MMP).
22. Some specific considerations for the CEMP may include:
  - a Surface water management, including restricting infiltration of PFAS contaminated surface water to sewer and stormwater, dewatering of excavations if surface water ingress is encountered.
  - b Groundwater management, including managing PFAS contaminated groundwater into the construction area, and dewatering of excavations. Due to the variability in soil waste classifications, it is recommended that material tracking and segregation protocols and stockpile management procedures are documented in the CEMP and implemented during the Delivery Phase.
  - c Procedures for the importation of materials (if required) such as Virgin Excavated Natural Material (VENM), Excavated Natural Material (ENM) and fill material to attain design levels, or for backfill in service trenches to ensure that the material is suitable prior to introduction to the Base.
  - d Elements which must be incorporated into RRJV's site-specific management plans are outlined in Sections C.2.2 to C.2.12 below.

### C.2 Management of Excavated Soil/Fill

#### C.2.1 Contaminated Soil Reuse and Disposal

23. As per Guiding Principle #3, *the waste management hierarchy will be employed to first avoid interaction with contamination, then reuse of contaminated materials where appropriate.*
24. Where spoil is intended to be retained on site as a resource, completion of a soil reuse risk assessment in accordance with the Defence PFAS Framework (Defence 2021b) and PFAS NEMP (2020) will be required. This would include assessment of the source material and the proposed reuse location (if not already assessed). Suitable beneficial reuse purposes and siting locations will need to be identified.
25. Potential risks associated with non-PFAS contamination (e.g. asbestos, hydrocarbons and metals) must also be considered in assessing the suitability of spoil for retention and beneficial reuse.
26. Beneficial reuse is defined in the PFAS NEMP Version 2.0. Examples include where there is an existing need for soil for purposes such as landscaping, construction works, roadworks etc. Putting contaminated soil in a location without such existing need is considered to be waste disposal. Waste disposal is not supported on the Defence Estate, except under exceptional circumstances, and is subject to approval by the BSM/ESM with supporting documentation. Other characteristics of the soil may preclude beneficial

reuse. Consultation and planning for reuse needs to occur in the early planning phases of the project to ensure budget allocation and prevent project delays.

27. All soil that is removed and temporarily stockpiled as part of the construction program is to be tracked and documented. The following information should be recorded:
  - a Soil quality information – based on sampling results and visual observations.
  - b GPS coordinates – where soil has been removed from and where the soil is placed.
  - c Soil volumes – to be provided by excavation contractors.

#### C.2.2 Off-site Transportation Requirement

28. If spoil requires off-site disposal as a waste:
  - a All contaminated materials are to be transported in accordance with the requirements of the relevant environmental and work, health and safety (WHS) regulatory authorities.
  - b BBK: spoil will need to be classified at an appropriate density (subject to the volume of material) and disposed of to a suitable facility in accordance with the NSW EPA Waste Classification Guidelines (2014) and PFAS National Environmental Management Plan (NEMP) (2020). A material characterisation/waste classification report should be prepared to accompany all material for disposal.
  - d Spoil must be transported and disposed of to a lawful place by a suitably experienced and licenced contractor.
29. The following processes should be adopted:
  - a Confirm disposal facility is approved to receive contaminated materials at the levels confirmed on site.
  - b All containers are to be managed as contaminated materials, until they have been appropriately cleaned. Truck decontamination is necessary prior to transporting non-contaminated materials.
  - c A single waste code has been established under the NEMP for the transport of PFAS contaminated material in all States and Territories, however, it will be necessary to establish what specific requirements need to be managed within the relevant jurisdiction.
  - d Waste classification letters must accompany all soil or groundwater proposed to be disposed of offsite.
30. Note that PFAS-contaminated materials, including PFAS containing waste products, are Dangerous Goods Class 9 products.

#### C.2.3 Spoil Stockpiles

31. The DCMM, Annex C Planning to Minimise and Manage Stockpiling sets out mandatory requirements when undertaking construction, demolition and excavation activities where excess soil (i.e. spoil) may be generated, and/or existing stockpiles are located within the project work area.

32. Materials stockpiling must be planned and implemented in accordance with a risk-based approach and designed to minimise the potential release of contamination into the environment.
33. To assist with the identification of suitable spoil stockpile locations, the following items should be considered by RRJV and incorporated into a site-specific Stockpile Management Plan:
- a All stockpiled materials must have a planned and agreed end point.
  - b Materials must not be stored in stockpiles beyond 2 years, if the stockpiled material is chemically suitable for re-use, treatment and/or disposal.
  - c Regular monitoring in the form of a visual inspection (conducted on a weekly basis at a minimum and immediately following unusual weather events such as storms, wind and heavy rainfall) by project personnel suitably trained in stockpile and erosion management protocols (as outlined in the project CEMP) must be conducted to ensure controls remain in place and are functioning according to the CEMP.
  - d Stockpiles should be segregated based on material type with consideration to initial material classification and/or source of material (e.g. stop butt material, PFAS category, presence of other contaminants, asbestos, inert waste, etc.).
  - e Mixing of materials will result in an entire stockpile being classified at the highest (i.e. most contaminated) classification of the stockpile's constituents (e.g. mixing of Category 2 and Category 3 PFAS material will render the whole stockpile classified as Category 2 material).
  - f Avoid locating stockpiles on uncontaminated 'clean' land. Validation sampling is likely to be required prior to placement and following removal of materials.
  - g Stockpiles to be located a minimum of 200 m from watercourses.
  - h Avoid areas prone to flooding and with reactive soil (Defence PFAS Construction and Maintenance Framework).
  - i Establish engineering mitigations such as a guard layer beneath stockpiles to minimise leaching into soil, bunding, erosion/sediment controls, covering (preferable to wetting down for dust suppression to minimise infiltration and generation of leachate), leachate collection system, diversion of stormwater and segregation of runoff/leachate from stormwater, water quality monitoring.
  - j Locations to consider the safety to Defence personnel, workers and others and the principles of Safety in Design, e.g. avoid highly trafficked areas.
  - k Avoid areas of remnant vegetation and minimise vegetation clearance. Consult with an arborist if required.
  - l Maintain buffer distances to known heritage sites as required by the Heritage Management Plan.
  - m Locate stockpiles in areas that can be secured, and access controlled to prevent additional dumping and non- project personnel entering the site.
34. As indicated above there are several different drivers for the establishment of stockpile locations.
35. Prior to stockpiling any soil within a location, a detailed sampling program would need to be undertaken to categorise the receiving environment and soil conditions. The scope of the sampling program should be detailed in a sampling and analysis quality plan (SAQP). The SAQP would outline sampling, analysis, monitoring and reporting requirements for the stockpile sampling program and would be prepared by a suitably qualified and experienced consultant, Any site assessment would also need to be consistent with Defence guidelines presented in Section B.2. Currently there is no available soil sampling data from

areas outside the WE's, therefore, there is not enough data to confirm the potential use for stockpile purpose in any location.

36. Prior to any soil stockpiling, a PFAS Risk Assessment should be developed that is compliant with Defence PFAS Construction and Maintenance Framework, Guidance for managing the risks of PFAS contamination for works on the Defence estate (Version 3.0, 2021). This document is designed to manage risks from PFAS contaminated soil, water and demolition waste in the context of construction and maintenance works on the Defence estate. Key considerations when assessing whether to reuse PFAS contaminated materials generated on a base include:
- a the concentration and total load of PFAS in the materials.
  - b whether the additional PFAS load at the proposed site changes the risk at or from the proposed reuse site.
  - c the characteristics of the reuse site, including consideration of: - pre-existing PFAS impacts; site drainage; groundwater flow, height of water table; proximity to the Defence property boundary and groundwater migration potential; possible cumulative effects of discharging or irrigating with PFAS contaminated water over time.
  - d future land use considerations.
  - e recognising that beneficial reuse does not include stockpiling.
  - f the outcome of consultation with Defence stakeholders for any additional considerations.
  - g Check GEMS EFM-CSR in the first instance. If the site has been the subject of a PFAS detailed site investigation (DSI).

## C.2.4 PFAS

38. PFAS was identified as the main contaminant of concern at BBK. Contaminated materials containing low concentrations of PFAS (refer below) may be considered for reuse on-site under certain circumstances, particularly for the purposes of resource recovery, however consultation with stakeholders (e.g. DCARM and DFASIM) is to be carried out before reuse can be proposed to ensure alignment and integration of the management actions identified within the PMAP's prepared for BBK (Defence 2019, 2020 and 2021) and the works delivered on the Base.
39. Adequate provision must be made for the characterisation and disposal management of existing stockpiles during the preparation of Defence property for disposal and leasing or when assessing properties for acquisition by Defence to minimise future liabilities. Refer to DCMM Annex A – Property Transactions, Redevelopment and Disposal for further information.
40. As per the Defence Construction and Maintenance Framework, soils disturbed during construction or maintenance work will fall into one of four categories for PFAS concentrations in soil, where Category 1 is the highest concern (refer to Table 1). Other contaminants of potential concern should be considered separately:

Table 1: Soil Categories

Soil Category	Concentration	Risk Assessment / Treatment options
Category 1	Excavated soils with PFOS + PFHxS concentrations of 20 mg/kg or more.	Unacceptable risk - offsite (destroy or landfill) or onsite (options identified through a RAP) Category 1 soil must be managed to address the risk. Options may include off-base disposal to an appropriately licenced facility or on-site management guided by a RAP. Soil at concentrations > 50 mg/kg should be sent for destruction at a licensed facility. DFASIM can provide advice. If the excavated soil is required to be temporarily stockpiled for later treatment (DCMM, Annex C)
Category 2	Excavated soils with PFOS + PFHxS concentrations less than 20 mg/kg but greater than 1 mg/kg.	High risk - treat and/or contain Category 2 soil can be reused within the works site provided that exposure to receptors is minimised. This should consider both direct exposure at the site and the potential for PFAS transport due to leaching. If reuse is not appropriate on the works site, then an assessment of risk should be undertaken by a suitably qualified person(s) to evaluate the following options: off-base disposal to an appropriately licensed landfill, or on-base encapsulation, containment and/or treatment. If treatment is required, this needs to be guided by a RAP.
Category 3	Excavated soils with PFOS + PFHxS concentrations less than 1 mg/kg but greater than 0.01 mg/kg .	Moderate risk - reuse with assessment and mitigation Category 3 soil can be reused within the works site with no additional mitigation procedures or on-base (subject to Base approvals) if the risk to human health or the environment, as determined by a suitably qualified person(s), is not increased or otherwise results in unacceptable risk. Some mitigation may be required if potential pathways exist and there are potential high sensitivity receptors. The overall load of PFAS in the total volume of soil should also be considered when assessing the risk.
Category 4	Excavated soils with PFOS + PFHxS concentrations less than 0.01 mg/kg.	Acceptable risk - reuse on site or on base without assessment or mitigation unless: <ul style="list-style-type: none"> <li>• a previous site assessment suggests otherwise</li> <li>• soil volumes &gt; 1,500 m<sup>3</sup>.</li> <li>• reuse is in a high-sensitivity area.</li> </ul>
Non-detect at standard limit	Excavated soils with PFOS + PFHxS	Acceptable risk - reuse on site or on base without further assessment or mitigation. If offsite disposal is needed, re-analysis

Soil Category	Concentration	Risk Assessment / Treatment options
of reporting (LOR).	concentrations less than the laboratory LOR.	at a lower LOR might be required by the jurisdiction or waste receiver.

41. Given the variable presence and proximity of sampling locations identifying Category 3 and Category 4 materials in-situ, a risk assessment for Category 4 materials in accordance with the Defence PFAS framework is required due to the likelihood of both categories being present in stockpiles of spoil.

## C.2.5 Asbestos

42. Widespread asbestos contamination was not identified during the investigation phase. Notwithstanding, asbestos containing material (ACM), asbestos fines (AF) and fibrous asbestos (FA) in soil have the potential to be disturbed during construction activity. Any such material must be managed in accordance with the DCMM and the Estate and Infrastructure Group Asbestos Management Plan (AMP, refer to Chapter 5 for management of asbestos in soil). Where ACM is identified, the area should be cordoned off and isolated to prevent access and advice sought from an appropriately qualified asbestos consultant.
43. Specific safe work procedures, control measures and monitoring programs must be included in the RRJV's CEMP and WHSMP in line with the Work Health and Safety Act 2011, Work Health and Safety Regulations 2011 and the AMP.
44. Procedures should include training, visual inspections, occupational hygiene and monitoring, stop work protocols and work practices that minimise the possibility of disturbance of asbestos in soil and that may release asbestos fines and/or asbestos fibres.

## C.2.6 Petroleum Hydrocarbons

45. Petroleum hydrocarbon hotspots were not identified during the investigation phase. Notwithstanding, petroleum hydrocarbon contaminated material may be disturbed during construction activity and must be managed in line with the DCMM, including Annex E Fuel Facilities and Annex M, the *Manual for the Management and Remediation of Petroleum Hydrocarbon Contaminated Soil and Sediments*. Unexpected finds identified during construction will be managed as outlined in Section 3.2.7.

## C.2.7 Firing Ranges

46. In accordance with the DCMM, the potential for contamination must be considered for any work that involves the development or excavation of areas on or within the vicinity of current or former firing ranges. Steps should be taken to identify contamination prior to the commencement of work so that:
- contaminated soil, water or sediment identified during design and redevelopment/intrusive works where spoil is produced can be appropriately managed
  - there is sufficient delineation of the nature and extent of contamination to identify whether the area is suitable for its current or intended future use, including as part of any Defence redevelopment
  - appropriate occupational hygiene measures are implemented to minimise exposure of site workers to contamination during works
  - appropriate management measures such as erosion control and appropriate dust mitigation activities as detailed in the CEMP are adopted during works to prevent mobilisation and movement of contamination to impact the surrounding environment. Where a recent

investigation report is unavailable, an environmental investigation completed in accordance with the ASC NEPM will be required. The level of investigation should be commensurate with the sensitivity of the current and intended future use of the land, the waste management options being proposed or sampling requirements for offsite disposal, and the anticipated extent and magnitude of contamination.

47. lead and other heavy metals (arsenic, copper, tin, zinc, iron) may be disturbed at active or former live firing ranges. These must be managed in accordance with the DCMM, including Annex G Firing Ranges. Defence's Heavy Metals Risk Management Tool (HMRMT) should be used to assess a range's potential environmental risks and appropriate environmental management actions.
48. Consistent with the guidance issued by VIC EPA (2019), physical and management controls can be implemented to manage contamination risks at rifle ranges. It is noted that the specific physical controls adopted will be based on considerations including existing and future use, surrounding environment, existing firing range infrastructure and presence of existing mitigation controls that can be maintained, enhanced or amended as part of the future range design. Physical controls that may be appropriate for adoption are summarised in the following table:

Table 2: Physical Controls

Physical Controls	Description
Controlling access and capping	Prevents people and animals from being exposed to contamination. Usually achieved with fencing and can be undertaken with other physical controls such as stop butt capping to further control access to metal impacted stop butt material.
Water management	Maintenance of vegetative ground cover to help control surface water contamination. Stormwater capture and treatment. Redirecting surface runoff to minimise flow onto the shooting range and runoff from the shooting range. Appropriate construction and maintenance of drains and sediment basins can be effective in controlling the migration and flow of contaminants and assist with future remediation requirements.
Vegetation management	Ground covering vegetation can reduce the spread of pollution through dust, surface water or erosion. Maintenance of appropriately landscaped and designed vegetation can result in a reduction in the risk of lead and other contaminants migrating via surface water entrainment and runoff and via wind, if dust is reduced or prevented.
Bullet traps	Bullet traps can be installed to capture and contain projectiles fired at rifle ranges to mitigate future contamination associated with the use of firing ranges.
Stop butt design	Stop butts can be designed to better manage contamination. Existing stop butts can be de-leaded (to remove lead via excavation and removal or sieving prior to reuse, for example) or capped to create a temporary infiltration barrier to minimise the potential for runoff and leaching of contamination into the surrounding environment.
Management plans	Preparation and implementation of a site specific EMP that ensures appropriate actions are undertaken to control and mitigate existing and future contamination present on firing ranges. Shooting range design and layout should always prevent any impact on sensitive environments or off-range areas. Overlapping shot fall areas may also improve the efficiency of future lead recovery.
Lead recovery	Lead recovery involves collecting and removing bullets and shot from the ground at a shooting range for recycling or appropriate disposal. Lead recovery may involve bulk excavation and de-leading of stop butts or other methods such as sieving, however residual contaminant may remain using this method that (if present) may require further management or remediation.

49. Specific safe work procedures and control measures should be included in the CEMP in line with the DCMM and the DPPM.
50. The off-site disposal of waste generated by live firing range activities, if required, must comply with applicable State legislation. Off-site disposal options for material contaminated by heavy metals may be

limited. All material requiring off-site disposal must be classified to identify a suitably licenced landfill for lawful disposal and transported by an appropriately experienced and licenced contractor.

## C.2.8 UXO/EO/EOW

51. Unexploded ordnance (UXO) risk assessments undertaken for Kapooka during the 5% MPFR stage of the program indicate that the potential for UXO, explosive ordnance (EO) and EO waste (EOW) in the project's proposed disturbance areas to be present is minimal based on the history of activities conducted in these areas.
52. Notwithstanding, the Base has a long history of military use and, as such, the potential presence of UXO/EO/EOW in soil (particularly in areas of fill) in the proposed disturbance areas cannot be discounted and could reasonably be considered an Expected Find. As such, RRJV's management plans should include appropriate protocols for the Base, with consideration to the type and location of UXO/EO/EOW potentially present within each specific work area. The Defence Unexploded Ordnance Management Manual (DUXOMM) detail Defence's approach to UXO risk management. It outlines detailed roles and responsibilities, guidance, standards, procedures and processes in which Defence personnel and authorised external service providers will undertake UXO and explosive ordnance materiel (EOM) management activities on the Defence estate.

## C.2.9 Other Contaminants and Unexpected Finds

53. Unexpected Finds should be managed in accordance with an appropriate protocol to be included in the CEMP for the Base. Potential finds may include however, not be limited to the following:
- Previously unidentified underground petroleum storage systems (UPSS) which may have been decommissioned (e.g. tanks and pipework) however contain residual product. Surrounding soil and/or groundwater may be contaminated and require management.
  - Other unidentified and/or abandoned subsurface infrastructure which may be sources of a range of contaminants, such as asbestos pits and pipes, sumps, inspection pits, sewer and stormwater drainage lines, waste disposal / storage tanks.
  - Unidentified filled or waste burial areas which may also be sources of a broad range of contaminants.

## C.2.10 Management of Contaminated Water

54. Water management on a works site must conform with the following:
- Defence Estate Water Policy 2014.
  - Defence Estate Water Strategy 2014-2019.
  - Heads of EPAs Australia and New Zealand (HEPA) PFAS National Environmental Management Plan Version 2.0 (2020) (PFAS NEMP) <https://www.dceew.gov.au/sites/default/files/documents/pfas-nemp-2.pdf>
  - Defence PFAS Construction and Maintenance Framework (v3.0, August 2021) <https://www.defence.gov.au/business-industry/industry-governance/industry-regulations/defence-pfas-construction-and-maintenance-framework>
  - Any conditions specified under environmental approvals for the works issued by Defence or the Commonwealth regulatory authority.
55. Human health and ecological criteria for contaminants, including PFAS, are generally established by the environmental regulator as part of the broader approach to managing water quality set out in each

- jurisdiction's environmental legislation. A common point of reference for water quality management, agreed by all jurisdictions, is the National Water Quality Management Strategy (NWQMS) (Australian Government Initiative, 2018) and the Australian and New Zealand Water Quality Guidelines (ANZWQG) (Australian Government 2018).
56. The NWQMS and the ANZWQG provide detailed guidance on the development and application of guideline values to protect environmental values. Management actions should be considered to ensure that they:
- do not increase contamination in the receiving environment; or
  - lead to an unacceptable risk to the receptors.
57. With respect to PFAS, the assessment of risk will consider the mass of PFAS in water (i.e. not solely the concentration) and the potential for bioaccumulation of PFAS in the receiving environment.
- As stated in the PCAs unidentified discontinuous, shallow perched groundwater may be present and intersected during excavation works. Characterisation of such groundwater will be required to determine management options.
58. Defence's PFAS framework provides the following principles and guidance for the management of all water on or from works (Defence, 2021b):
- The choice of management action should not pollute the environment
  - The assessment of risk should account for potential bioaccumulation of PFAS in the receiving environment.
  - The assessment should account for cumulative increases in PFAS where large volumes (>100,000 L) are discharged or used for irrigation of soil (including repeat discharge of smaller volumes in the same catchment).
  - In ecologically sensitive areas, a local catchment assessment may be required to demonstrate that the overall PFAS load within the catchment will not be materially increased
  - The choice of management action must comply with applicable State or Territory legislation with any required licences or permits to be obtained. For example, for water leaving the base, regulators may require management actions that substantively decrease PFAS concentrations or loads to the receiving environment.
  - If there is a reasonable expectation that water may contain PFAS, it should not be used in concrete batching.
59. Where possible construction activities should be undertaken with consideration to the anticipated depth to groundwater. Work should be planned to avoid groundwater interactions or the need for dewatering. If dewatering is required, it should be undertaken in accordance with consideration to the order of preference outlined in the Defence's PFAS framework, which states that discharge of extracted water may be carried out, subject to State or Territory regulations, in order of preference within the risk assessment process:
- Irrigation or infiltration on-works site.
  - Irrigation or infiltration off-works site but on-base.
  - Discharge to creeks or storm water drains (on-base or off-base).
60. Stormwater should be diverted around site excavations, to the extent possible, and managed in line with relevant stormwater practices for the Base. This will limit the volume of water required to be managed for the works. Dewatering should consider the potential risk of surface water flows taking up PFAS from contaminated surface soils and drainage channels.

61. When managing small amounts of PFAS contaminated water (<1000 L), water should be infiltrated near to the work site or in consultation with the ESM/ESO to another adjacent area. This exemption only applies when the water is removed from and returned to the environment in the same location and at the same time. If this is not the case, the environmental impact of infiltrating the water is required to be assessed by a suitably qualified professional.

### C.2.11 Monitor and Review

62. Monitoring requirements for the Base must be developed in accordance with relevant regulatory requirements at all levels of Government, Defence guidance, project obligations and conditions of approvals. Monitoring programs should be proportional to the potential human health and ecological exposure risks, and the types and concentrations of contaminants present within each work area.
63. Site-specific monitoring guidance is provided in the ASC NEPM as part of the nationally agreed process for characterising site contamination. This process is informed by robust conceptual site models, which consider the features of the surrounding land including other known or potential sources of contamination.
64. Project specific monitoring requirements are to be detailed in the Environmental Management Plans, Environmental Site Plans, Environmental Work Method Statements, WHS Management Plans and Inspection Test Plans as relevant.
65. Ongoing monitoring requirements may include:
- Groundwater monitoring programs of the groundwater monitoring network in the vicinity of the construction footprint.
  - Sediment and surface water sampling programs, particular in areas of known contamination, such as firing ranges.
  - Event based precipitation monitoring programs.

### C.2.12 Stakeholder Communication and Consultation

66. All stakeholder communication and consultation activities should be included in RRJV's stakeholder engagement plans for the Base.
67. A program of ongoing communication and consultation with relevant Defence stakeholders and technical authorities (e.g. DCARM, PMAP, ESM, BSM, EMOS and PFASIM) should be developed. Engagement should facilitate the regular exchange of information with respect to concurrent activities under respective programs. Consideration should be given to additional contamination data generated by other programs from sampling locations of relevance to the Riverina Redevelopment Project (RRP). Where relevant, this data should be incorporated into a updated version of the PFAS risk assessment to evaluate changes in the risk profile at the Site and to inform any changes to management options that may be required.



## D. Assumptions and Limitations

68. This Contamination Strategy has been developed at the request of the RRJV and is based on the assumptions and limitations provided below.
69. EMM Consulting Pty Limited (EMM) has prepared this document for the sole use of Riverina Redevelopment Joint Venture (RRJV) and for a specific and agreed purpose and scope, as expressly stated in this document. No other party should rely on this document without the prior written consent of EMM. EMM undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document. This document has been prepared based on the project Brief, the scope of work approved by RRJV and EMM's experience, having regard to assumptions that EMM can reasonably be expected to make in accordance with sound professional principles. EMM may also have relied upon information provided by the Department of Defence, the broader RRP design team, stakeholders and other third parties to prepare this document, some of which may not have been verified.
70. Subject to the above conditions, this document may be transmitted, reproduced or disseminated only in entirety. EMM accepts no liability of any kind for any unauthorised use of any of the content of this document and EMM reserves the right to seek compensation for any such unauthorised use. This document was prepared for the specific purpose described herein.
71. From a technical perspective, the subsurface environment at any site may present substantial uncertainty. It is a heterogeneous, complex environment, in which small subsurface features or changes in geologic and hydrogeologic conditions can have substantial impacts on water and chemical movement. The PCAs prepared by EMM which inform this Contamination Strategy are based on the documentation, information and data made available to EMM during the 5% MPFR and 30% CDR design stages, as referenced in those reports, which informed the constraints analysis and the scope of site investigations. The site investigations conducted to support the PCAs were undertaken in September 2022 during the 30% CDR design stage and assessed scope items and proposed building footprints that were preferred at that time. Recommendations made in the 30% CDR version of those reports remain extant and require further revision to address data gaps associated with changes in design during 50% SDR (e.g. building siting) which have occurred since the Stage 1A and Stage 1B site investigations were conducted. EMM understands that further site investigations, including contamination assessments, may be conducted by RRJV in future. The outcomes of those investigations, or any additional investigations conducted by other parties, may or may not have a bearing on this Contamination Strategy.
72. EMM's professional opinions are based upon its professional judgement, experience, and training. These opinions are also based upon data supplied by third parties and data derived from the testing and analysis described in the PCAs. It is possible that additional testing and analysis might produce different results and/or different opinions. EMM believes that its opinions are reasonably supported by the sampling and analysis that have been done, and that those opinions have been developed according to the professional standard of care for the environmental consulting profession in this area at the date of this document. That standard of care may change with advancements in professional practice, new methods and techniques of investigation, sampling, analysis and remediation, and changes in applicable statutes and/or guidelines may develop in the future, which might produce different results.

## E. References

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