

Detailed Ecological Assessment

Project Horizon

MABL CEV Location



VOCUS
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PROJECT NUMBER	2024/56		
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Executive Summary

Vocus Fibre Pty Ltd (Vocus) are planning the installation of a fibre optic cable (FOC) in central and northern Western Australia, which is to be installed starting in the south of the project area from a location near Beringarra-Pindar Road, East Murchison, and runs for the most-part along the Great Northern Highway via Cue, Meekatharra, Newman and then terminates near the Fortescue Dave Forrest Airport, near Nullagine. In addition to long runs of underground cable installations, there will also be controlled environment vault (CEV) installations at set distances along the alignment, generally located at each T-Section junction. The CEV structures will require an access track from the road/highway to be constructed to the CEV (10 metre wide impact zone with a length generally in the vicinity of 30 to 50 metres) and the CEV facility, including the perimeter fence, will be approximately 20 by 20 metres (0.002 hectares), where secure buildings and solar panels will be situated, all of which will be considered impacted and lost because of the development.

This report describes the results of a Detailed Vegetation Assessment of the MABL CEV Site at the junction of the T-14 and T-15 sections of the alignment. The survey was undertaken over a single day by a Senior Ecologist from Red-Gum Environmental Pty Ltd in June 2024. The aim of the targeted survey is to conduct a Detailed Vegetation Assessment of the CEV site and gather field data to build on that which was gathered as part of the rapid surveys, which were conducted in December 2022 and May 2023 by Red-Gum, prior to the roll out of the overall FOC installation.

Two (2) 50m x 50m quadrats were assessed with the aim of searching for the targeted flora and fauna that is recorded from the broader area, as well as any other significant species or communities which may be present in the small loss area. While the scale of the site was small (0.17 Ha), care was taken to place quadrats in each vegetation type and class, therefore two quadrats were surveyed. The survey took place in early June 2024. Shrub diversity and cover across the site was generally moderate to high, with diversity and cover higher within the ground layer in the better areas, further from the road. There were low groundcover levels within the Spinifex areas, and within the shrubby areas, a little more ground cover was persisting, but cover was still low overall. This is less a reflection of site quality, and more a reflection of seasonal conditions leading into the survey being dry.

The wider assessment area possessed occasional Desert Ghost Gum (*Corymbia candida*), scattered Mulga (*Acacia aneura*) and a variety of small to medium growing shrub species such as numerous Wattles (*Acacia* spp.), Walukara (*Hakea rhombales*), Rattle-pod Grevillea (*Grevillea stenobotrya*), and various Emu Bushes (*Eremophila* spp.) and Cassias (*Senna* spp.). The understorey was dominated by moderate to thick cover of Spinifex (*Triodia basedowii*), and scattered occurrences of Tall Mulla Mulla (*Ptilotus exaltatus*), Leafy Nineawn (*Enneapogon polyphyllus*) and Erect Kerosene Grass (*Aristida holathera*). No (zero) areas of mapped WA Priority Ecological Communities (PECs) occurred in or adjacent to the site assessment area.

The assessment involved detailed vegetation survey across two (2) quadrats, one (1) quadrat in each of the vegetation types present. The assessment detected a total of twenty-five (25) species or subspecies of flora, representing fourteen (14) genera. No (zero) exotic flora species was detected during the survey, although there were some exotic species on the immediate road verge, where were not included in the site assessment flora list. The site consists of two vegetation units (based on those described by Beard et al (1978), with those being *Low Woodland*, *Open Low Woodland and Sparse Woodland*; *Mulga*, where small to medium shrubs are dominating, and *Spinifex Grasslands*, *Shrub Steppe*, where shrubs are generally sparse or absent and Spinifex is dominant.

None of the vegetation in the study area is considered *regionally significant* when compared to the contiguous vegetation values surrounding the loss area and given that the vegetation represents a widely occurring vegetation association. None of the targeted flora or fauna were recorded during the study. Furthermore, there were no other WA priority flora recorded. Habitat for any threatened species that might be using the

area opportunistically, is likely to be present over a large area beyond the study area limits. Given the proposed development is very small, it is not expected that the development will have significant impacts upon flora or vegetation in the region. There are, however, a number of recommendations to ensure flora and vegetation impacts are minimised, including:

- If threatened species are located in the field by contract staff or the ecologists/botanists, then work must halt until an agreed approach can be determined via discussions with the appropriate authority involved (Department of Biodiversity, Conservation and Attractions (DBCA)).
- If threatened flora are detected prior to construction of the CEV, the appropriate approvals (via liaison with DBCA) and permits to conduct works (impacts) to the 50 m radius ESA (applied around threatened flora records) are required (given a 50 m ESA zone is not able to be avoided in a narrow road reserve corridor). If feasible, consideration should be given to altering the location of the CEV footprint to avoid the flora ESA.
- All staff involved with the construction project need to be tool-boxed (inducted) on the locations of known threatened species records, as well as any species that are located prior to the construction works. The induction should include basic advice on identifying the known species that have been recorded and the steps to take if unsure, or if threatened species or communities are encountered during works.
- Any EPBC Act listed threatened species or communities encountered during the works will need a Significant Impact Criteria assessment (SIC) to be completed by a suitably qualified person (ecologist). Liaison with the responsible Commonwealth department is also recommended if EPBC Act species or communities are found or suspected during construction.
- The management of exotic vegetation (weeds) must be conducted to best practice standards, ensuring machinery is decontaminated prior to works starting, and where any weed infestations are unavoidable, decontamination must be undertaken to ensure weeds are not pushed into clean parts of the construction area.

The survey effort recorded four (4) fauna species, including those identified via direct and indirect observations. None of the species targeted for survey were found. To minimise potential impacts on fauna, the following recommendations have been made:

- An ecologist or a suitable trained wildlife handler should be present when clearing the CEV site. Appropriate equipment needs to be on hand to ensure any animals that are displaced or injured as a result of the construction are adequately rescued and cared for until they are relocated to a safer area away from the development, or until they can be taken to the nearest veterinarian or wildlife rescue facility for treatment and eventual reintroduction.
- If threatened fauna species are located in the field by contract staff or the ecologists/botanists, work must halt until an agreed approach can be determined via discussions with the appropriate authority involved (DBCA).
- All staff involved with the construction project are to be tool-boxed (inducted) on the locations of known threatened species (if any) as well as any species that are located during the construction works. The induction should include basic advice on identifying the known species that have been recorded and the steps to take if unsure, or if threatened species are encountered during works.
- Any EPBC Act listed threatened fauna species encountered during the works will need a Significant Impact Criteria assessment (SIC) to be completed by a suitably qualified person (ecologist). Liaison with the responsible Commonwealth department is also recommended if EPBC Act species are found or suspected during construction.

As part of this report, the proposed development was assessed against the 10 Western Australian clearing principles. Red-Gum contends that, given the small size of the MABL CEV and its position in a well-represented vegetation community, the impacts at that site will also not be in significant conflict with any of the 10 vegetation clearing principles.

1 Project Overview

Vocus Fibre Pty Ltd (Vocus) are planning the installation of a fibre optic cable in central and northern Western Australia, which is to be installed starting in the south of the project area from a location near Beringarra-Pindar Road, East Murchison, and runs for the most-part along the Great Northern Highway via Cue, Meekatharra, Newman and then terminates near the Fortescue Dave Forrest Airport, near Nullagine.

In addition to long runs of underground cable installations, there will also be controlled environment vault (CEV) installations at set distances along the alignment, generally located at each T-Section junction. The CEV structures will require an access track from the road/highway to the CEV to be constructed (10 metre wide impact zone with a length generally in the vicinity of 30 to 50 metres). The CEV facility will include a perimeter fence with dimensions of approximately 20 by 20 metres (0.002 hectares), where secure buildings and solar panels will be situated. The entire footprint of the CEV and fence area will be considered impacted and lost because of the development.

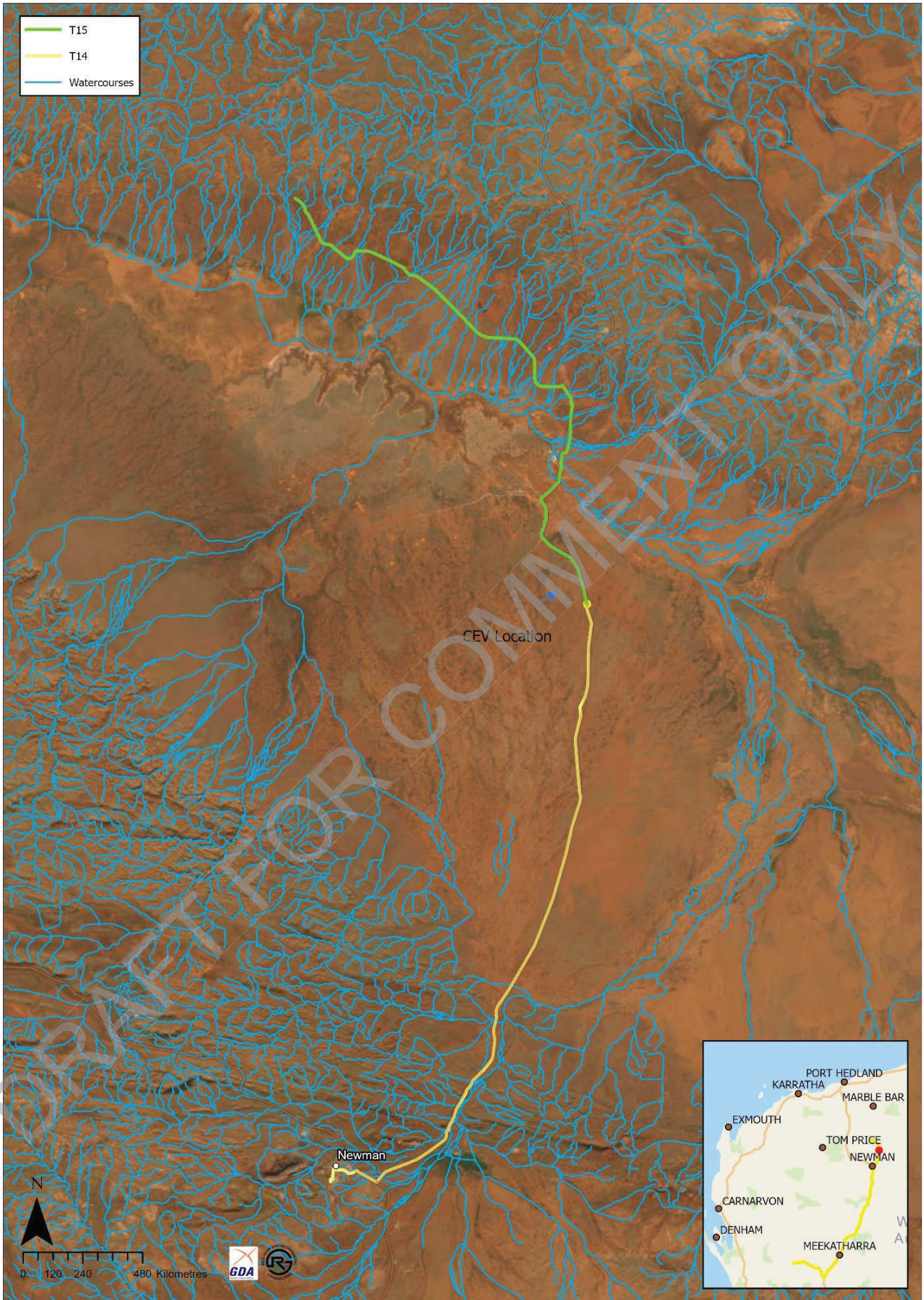
This report describes the results of an ecological assessment of the MABL CEV Site on the junction of the T-14 and T-15 sections of the alignment, undertaken over a single day, by Senior Ecologist Damian Wall of Red-Gum Environmental Pty Ltd in June 2024.

2 Scope of the Assessment

This report provides a description of the natural assets encountered within the bounds of the MABL CEV location (**Map 1 & 2**) and offers recommendations on impact minimisation where required, to help reduce the overall impact of the project on the receiving environment.

The survey took place on June 9th 2024 and included detailed surveying of the CEV site, targeted searches for Threatened Species and WA Priority Species that have previously been recorded within 10 km of the site (**Section 5.9**) and mapping of vegetation type and conditions. Two (2) 50m x 50m quadrats were assessed as part of the survey, with the aim of searching for flora, vegetation and fauna within the study area. The components of the survey are as follows:

- A detailed single-phase field survey of the MABL CEV site and access road (loss area) and immediate surrounds (study area).
- Data analysis and species identifications for species detected during field survey.
- Development of maps that show significant species records, vegetation types and vegetation condition classes across the study area.
- Preparation of a technical report (this report) detailing the aims, methodology and results of the field survey, as well as impact minimisation recommendations.



Map 1: Location of MABL CEV Site – T-14 & T-15 Section junction, Marble Bar Road.



Map 2: Site assessment area at MABL CEV.

3 Anticipated Impacts & Construction Method

The proposed CEVs will accommodate the necessary IT equipment to service the fibre route. The proposed works are for the earthworks including an access track, site preparation, installation, and commissioning of a CEV building, complete with (in the case of a solar powered site) a battery hut and solar array, supported by a self-contained, emergency diesel powered generator set on its own separate footing (Figure 1).

The site will be completed with a full-scale galvanised security fence surrounding the buildings and equipment. Construction of the development includes the placement of temporary site huts, delivery via semi-trailer and on site craneage into position of the CEV and the emergency generator.

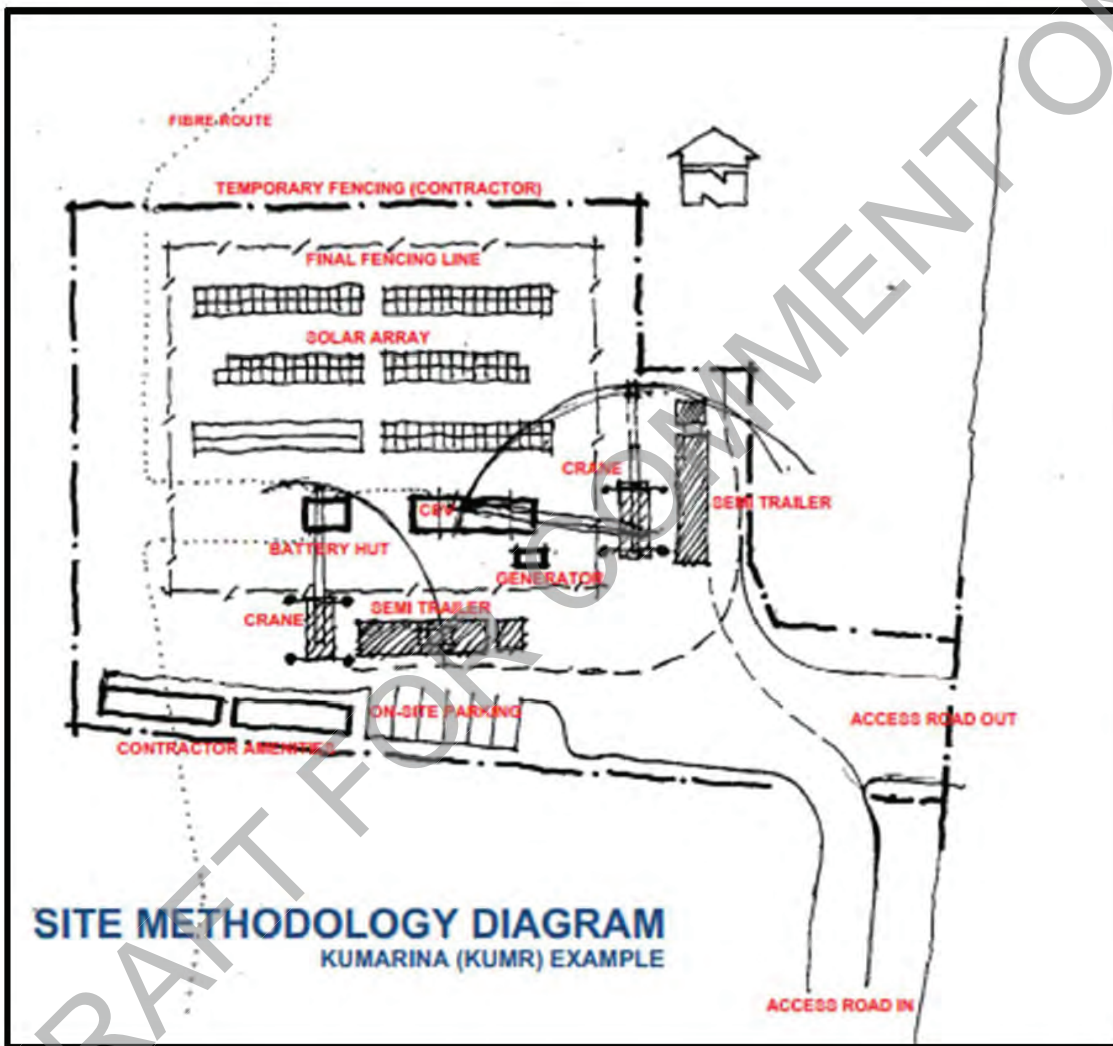


Figure 1: Example CEV Layout. Source: Vocus Pty Ltd, 2024

4 Environmental Legislation Relevant to the Proposal

4.1 Native Vegetation Clearing

Under the Western Australian *Environmental Protection Act 1986* (EP Act) it is an offence to clear native vegetation unless the clearing work is done in accordance with a clearing permit issued by the appropriate authority, or if an exemption applies to the land or type of clearing being undertaken. Schedule 6 of the EP Act contains the exemptions available under written laws or statutory processes, and exemptions do apply to ESAs. There are exemptions available for certain low-impact land management practices and works, with these being prescribed in the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (EP Regs).

It must be noted, however, that CEVs are not low impact facilities and therefore these exemptions DO NOT apply.

4.2 Low Impact Works Exemption

There are a number of exemptions to vegetation clearing under the EP Act and EP Regulations, however none explicitly refer to telecommunications installations. Under Part 4 of the Commonwealth *Telecommunications Act 1997*, there are exemptions for installation of underground facilities (for fixed line networks). These exemptions are available provided the cable is underground in a trench not more than 450 mm wide, or installed via direct burial, or bore directional drilled at least 600 mm below the surface, and where business premises access is not restricted between 8 am and 6 pm, and in residential areas where more than 200m of excavation is left open at any time and vehicle access to property is not lost for more than 8 hours. Cable location posts or markings are also exempt.

Underground optical splice enclosures are exempt provided they form part of (or are integrated with) a cable, and the substantive volume of the enclosure is not more than 0.046 m³. Underground optical fibre access terminals are exempt if the substantive volume is not more than 0.02 m³. Underground network equipment is also exempt, provided the substantive volume is not more than 0.23 m³, and that it is to be part of a national network used for the high-speed carriage of communications, on a wholesale only and non-discriminatory basis.

As referred to elsewhere in the report, it is important to note that the exemptions for vegetation clearing under the Telecommunications Act 1997 DO NOT apply in ESAs or for the installation of the CEV (non-low impact facility).

4.3 Threatened Ecological Communities (Western Australia)

There is a list of threatened ecological communities (TEC) which were endorsed under the *Biodiversity Conservation Act 2016* by the Minister for Environment in June 2018. There are currently 20 critically endangered TECs, 17 endangered TECs, 28 vulnerable TECs and 4 presumed destroyed TECs. Of these 69 WA TECs, 25 of them are concurrently listed as a threatened community under the Commonwealth's *Environmental Protection and Biodiversity Act 1999* (EPBC Act). Where the route alignment impacts a TEC (which is considered to be an ESA), a clearing permit is required and a permit to modify an occurrence of a TEC is also required under the BC Act.

There is also a Priority Ecological Community (PEC) list for Western Australian containing an additional 390 ecological communities which are not listed as threatened due to there being insufficient information on the communities to be considered a TEC. These communities are not considered to be currently threatened and are therefore not currently afforded the protection that TECs are given (DBCA 2021).

Despite their current non-listing as 'threatened', these PECs are still of high value, and some may go on to become TECs in the future, therefore some level of protection and avoidance should take place in the PECs to help preserve their values.

4.4 Threatened Species (Western Australia)

Clearing of any state-listed threatened flora species (or vegetation impacts within 50 m of that species in areas where vegetation is contiguous) will require a vegetation clearing permit and a permit authorising the take of or disturbance to threatened flora. If the CEV installation is likely to impact on threatened fauna habitat to a significant extent, then a permit may also be required.

4.5 National Threatened Species (EPBC Act)

Potential impacts to any EPBC threatened species will need to be assessed for their significance (Significant Impact Criteria (SIC) assessment) and a referral to the relevant Commonwealth department and offsets may be required if the impacts are deemed significant.

Impacts to EPBC Act listed species will require a SIC assessment. However, given the small impact area and efforts being made to avoid significant vegetation and habitats, it is unlikely that this level of clearing would constitute a significant impact to flora species or faunal habitats (as per the Significant Impact Guidelines).

4.6 National Threatened Ecological Communities (EPBC Act)

In addition to the 69 WA TECs, there are a number of nationally listed threatened ecological communities (TECs) which have been declared under the Commonwealth EPBC Act. Impacts to national TECs will need to undergo a SIC assessment to determine if the impact will be of a significant nature.

Any significant impacts to nationally listed TECs will be considered to be a matter of National Environmental Significance (MNES) and will require a referral to the Department of Climate Change, Energy, the Environment and Water (DCEEW). Impacts to MNES may require an offset to be generated to account for the losses being experienced by the receiving nationally listed TEC.

Impacts to EPBC Act listed TECs will require a SIC assessment. However, given the small impact area and efforts being made to avoid significant vegetation and habitats, it is unlikely that this level of clearing would constitute a significant impact to TECs.

4.7 Environmentally Sensitive Areas (ESAs)

The Western Australian Minister for the Environment can declare under section 51B of the EP Act that an area of Western Australia or a class of areas in the state is a declared Environmentally Sensitive Area (ESA). The ESAs are listed in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*.

This dataset was obtained from the relevant department and formed the basis of site maps and site inspections for where the route alignment intersected these mapped ESAs. According to DWER (2020), Environmentally Sensitive Areas (ESAs) are any of the following:

- A declared World Heritage property as defined in section 13 of the EPBC Act of the Commonwealth.
- An area that is included on the Register of the National Estate, because of its natural heritage value, under the *Australian Heritage Council Act 2003* of the Commonwealth.

- A defined wetland and the area within 50 m of the wetland (defined wetlands include Ramsar wetlands, conservation category wetlands and nationally important wetlands).
- The area covered by vegetation within 50 m of rare (threatened) flora, to the extent to which the vegetation is continuous with the vegetation in which the rare (threatened) flora is located.
- The area covered by a TEC.
- A Bush Forever site listed in Bush Forever volumes 1 and 2 (2000), published by the Western Australia Planning Commission.
- The areas covered by the *Environmental Protection (Gnangara Mound Crown Land) Policy 1992*.
- The areas covered by the *Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002*.
- The areas covered by the lakes to which the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* applies.
- Protected wetlands as defined in the *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998*.

From the above categories, the most relevant ESA types for this assessment are:

1. Designated wetlands (Ramsar, conservation category and nationally important wetlands) and areas within 50 m of a mapped designated wetland.
2. Areas within 50 m of threatened flora species.
3. Areas determined to be a state or national TEC.
4. The area covered by vegetation within 50 m of rare (threatened) flora, to the extent to which the vegetation is continuous with the vegetation in which the rare (threatened) flora is located.
5. Areas on the National Estate Register (i.e. Collier Range National Park).

As mentioned in the previous section, the usual exemptions for low impact works like installation of subterranean cables do not apply to ESAs. Where works are entering these ESAs (and any others listed above) a permit must be granted to allow works to take place and may consist of a vegetation clearing permit, and for TECs may require an additional permit to modify an occurrence of a TEC. Further information for impacts to ESAs and clearing permits can be obtained from the Department of Water and Environmental Regulation (the department) via their Native Vegetation Regulation Branch by phone on (08) 6364 7098 or via email to info@dwer.wa.gov.au

5 Desktop Assessment

5.1 Previous Surveys

A search for previous surveys was conducted within approximately 50km of the site on the IBSA system. A summary of these surveys is included below in **Table 1**. Survey reports were unavailable for some studies. Only those reports that were available are included in Table 1.

Table 1: Previous surveys conducted within 50 km of the MABL CEV site

REPORT 1: Title	Roy Hill Mine and Southern Borefields Targeting Fauna Survey
Author and Year	Biologic Environmental Survey, 2020
Report Type	Targeted Fauna Survey
Proponent	Roy Hill Iron Ore
Threatened species (EPBC Act 1999 or Declared Rare Flora Species)	NA
Priority Flora Species	NA
TEC (EPBC Act 1999)	NA
PEC (DEC)	NA
Threatened/Priority fauna	Nil
Threatened/Priority fauna habitat	Nil

REPORT 2: Title	Roy Hill Consolidated Vegetation Report*
Author and Year	Strategen JBS&GI, 2020
Report Type	Consolidated Vegetation Report
Proponent	Roy Hill Holdings Pty Ltd
Threatened species (EPBC Act 1999 or Declared Rare Flora Species)	Nil
Priority Flora Species	<i>Eremophila Pilosa</i> (P1) <i>Eremophila youngii</i> subsp. <i>Lepidota</i> (P4) <i>Goodenia nuda</i> (P4) <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3) <i>Stemodia</i> sp. Battle Hill (A.L. Payne 1006) (P1) <i>Triodia veniciae</i> (P1)
TEC (EPBC Act 1999)	NA
PEC (DEC)	NA
Threatened/Priority fauna	NA
Threatened/Priority fauna habitat	NA

*A consolidated report amalgamating and updating information from other 9 previous surveys, including some summarised in this table

REPORT 3: Title	Roy Hill Level 1 Targeted Vertebrate Fauna Assessment Update
Author and Year	Biologic Environmental Survey Pty Ltd, 2018
Report Type	Level 1 Targeted Vertebrate Survey
Proponent	Roy Hill Holdings Pty Ltd
Threatened species (EPBC Act 1999 or Declared Rare Flora Species)	NA
Priority Flora Species	NA
TEC (EPBC Act 1999)	NA
PEC (DEC)	P3 Fortescue Valley PEC Narbung LS PEC
Threatened/Priority fauna	<i>Dasyurus hallucatus</i> – Schedule 2 (WC Act); Endangered (EPBC Act) <i>Macrotis lagotis</i> – Schedule 3 (WC Act); Vulnerable (EPBC Act) <i>Macroderma gigas</i> – Schedule 3 (WC Act); Vulnerable (EPBC Act)

	<i>Potential - Trichosurus vulpecula subsp. arnhemensis</i> – Schedule 3 (WC Act) <i>Falco peregrinus</i> – Schedule 7 (WC Act) <i>Dasyercus blythi</i> – P4 (DBCA) <i>Pseudomys chapmani</i> – P4 (DBCA) <i>Dasyercus blythi</i> – P4 (DBCA) <i>Falco hypoleucos</i> - Schedule 3 (WC Act)
Threatened/Priority fauna habitat	Spinifex Sandplain Mulga woodland Cave – Ghost Bat maternity roost Two semi-permanent pools

REPORT 4: Title	Southern Borefield Study Area (L47/642 and L47/765) Detailed (Level 2) Flora and Vegetation Assessment (2017/2018)
Author and Year	Maia, 2018
Report Type	Detailed Level 2 Flora and Vegetation Assessment
Proponent	Roy Hill Holdings Pty Ltd
Threatened species (EPBC Act 1999 or Declared Rare Flora Species)	Nil
Priority Flora Species	<i>Goodenia nuda</i> (P4)
TEC (EPBC Act 1999)	Nil
PEC (DEC)	Nil
Threatened/Priority fauna	NA
Threatened/Priority fauna habitat	NA

REPORT 5: Title	Rhodes Ridge Priority Flora Searches June 2021
Author and Year	Ashton Environmental Services, 2021
Report Type	Reconnaissance flora and vegetation survey
Proponent	Hammersley Resources Ltd
Threatened species (EPBC Act 1999 or Declared Rare Flora Species)	Nil
Priority Flora Species	<i>Isotropis parviflora</i> (P2) <i>Acacia subtiliformis</i> (P3) <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3) <i>Grevillea Saxicola</i> (P3) <i>Rhagodia</i> sp. <i>Hamersley</i> (M. Trudgen 17794) (P3) <i>Goodenia nuda</i> (P4) <i>Lepidium catapycnon</i> (P4)
TEC (EPBC Act 1999)	Nil
PEC (DEC)	Nil
Threatened/Priority fauna	<i>Pseudomys chapmani</i>
Threatened/Priority fauna habitat	Nik

REPORT 6: Title	Rhodes Ridge Detailed Flora and Vegetation Survey- Field Visit 1 Summary Report
Author and Year	Ashton Environmental Services, 2020
Report Type	Reconnaissance flora and vegetation survey
Proponent	Hammersley Resources Ltd
Threatened species (EPBC Act 1999 or Declared Rare Flora Species)	Nil
Priority Flora Species	Nil
TEC (EPBC Act 1999)	NA
PEC (DEC)	NA
Threatened/Priority fauna	NA
Threatened/Priority fauna habitat	NA

REPORT 7: Title	Rhodes Ridge Targeted Flora Survey October 2019 and February 2020
Author and Year	Rio Tinto, 2020
Report Type	Targeted threatened flora survey
Proponent	Hammersley Resources Ltd
Threatened species (EPBC Act 1999 or Declared Rare Flora Species)	Nil
Priority Flora Species	<i>Acacia subtiliformis</i> (P3) <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3) <i>Indigofera gilesii</i> (P3) <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3) <i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739) (P3) <i>Acacia bromilowiana</i> (P4) Asteraceae sp. (P1?) <i>Themeda</i> sp. (indet) (P3?) <i>Euphorbia</i> aff. <i>Ferdinandi</i> PSI <i>Grevillea</i> cf. <i>berryana</i> PSI
TEC (EPBC Act 1999)	NA
PEC (DEC)	NA
Threatened/Priority fauna	NA
Threatened/Priority fauna habitat	NA

REPORT 8: Title	Vegetation Survey and Desktop Assessment Caramulla Creek
Author and Year	Onshore Environmental, 2018
Report Type	Flora and Vegetation Survey
Proponent	BHP
Threatened species (EPBC Act 1999 or Declared Rare Flora Species)	
Priority Flora Species	<i>Eremophila capricornica</i> (P1) <i>Rhagodia</i> sp. Hamersley (M Trudgen 17794) (P3)
TEC (EPBC Act 1999)	Nil
PEC (DEC)	Nil
Threatened/Priority fauna	NA
Threatened/Priority fauna habitat	NA

REPORT 9: Title	Caramulla Creek Flora and Vegetation Survey
Author and Year	Ashton Environmental Services, 2019
Report Type	Flora and Vegetation Survey
Proponent	BHP Western Australian Iron Ore
Threatened species (EPBC Act 1999 or Declared Rare Flora Species)	Nil
Priority Flora Species	<i>Crotalaria smithiana</i> (P3)
TEC (EPBC Act 1999)	Nil
PEC (DEC)	Nil
Threatened/Priority fauna	NA
Threatened/Priority fauna habitat	NA

REPORT 10: Title	Remote MAR Borefield Reconnaissance Flora and Vegetation
Author and Year	Biologic Environmental Survey Pty Ltd, 2018
Report Type	Reconnaissance Flora and Vegetation Survey
Proponent	Roy Hill Iron Ore

Threatened species (EPBC Act 1999 or Declared Rare Flora Species)	Nil
Priority Flora Species	<i>Eremophila pilosa</i> (P1) <i>Eremophila youngii</i> subsp. <i>lepidota</i> (P4) <i>Goodenia nuda</i> (P4)
TEC (EPBC Act 1999)	Nil
PEC (DEC)	Narbung LS
Threatened/Priority fauna	NA
Threatened/Priority fauna habitat	NA

REPORT 11: Title	Area C to Yandi Flora and Vegetation Assessment
Author and Year	Ashton Environmental Services, 2019
Report Type	Flora and Vegetation Survey
Proponent	BHP Billiton Iron Ore Pty Ltd
Threatened species (EPBC Act 1999 or Declared Rare Flora Species)	Nil
Priority Flora Species	<i>Eremophila</i> sp. Hamersley Range (K. Walker KW 136) (P3)
TEC (EPBC Act 1999)	Nil
PEC (DEC)	Nil
Threatened/Priority fauna	NA
Threatened/Priority fauna habitat	NA

REPORT 12: Title	Newman-Roy Hill Transmission Line Survey – Version 1.1
Author and Year	Ecoscope, 2013
Report Type	Level 2 Flora and Vegetation, Level 1 Terrestrial Vertebrate Fauna
Proponent	Alinta Energy
Threatened species (EPBC Act 1999 or Declared Rare Flora Species)	Nil
Priority Flora Species	<i>Goodenia ?nuda</i> potential only (P4) <i>Eremophila pilosa</i> (P1) <i>Eremophila youngii</i> subsp. <i>lepidota</i> (P4) <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3) <i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431) (P3)
TEC (EPBC Act 1999)	Nil
PEC (DEC)	Nil
Threatened/Priority fauna	<i>Dasyercus cristicauda</i> , EPBC VU, or <i>D. blythi</i> (P4) <i>Ardeotis australis</i> DEC (P4) <i>Burhinus grallarius</i> , DEC (P4) (<i>Merops ornatus</i> (EPBC Migratory))
Threatened/Priority fauna habitat	Mulga vegetation types

REPORT 13: Title	Pilbara Regional Ghost Bat Review
Author and Year	Morgan O'Connell – Biological Environmental / Bat Call WA, 2014
Report Type	Targeted
Proponent	BHP Billiton Iron Ore
Threatened species (EPBC Act 1999 or Declared Rare Flora Species)	NA
Priority Flora Species	NA
TEC (EPBC Act 1999)	NA

PEC (DEC)	NA
Threatened/Priority fauna	Ghost Bat
Threatened/Priority fauna habitat	10 caves containing evidence of habitation

REPORT 14: Title	Targeted Flora Survey <i>Acacia</i> sp. East Fortescue
Author and Year	Onshore Environmental, 2015
Report Type	Targeted Flora Survey
Proponent	BHP Billiton
Threatened species (EPBC Act 1999 or Declared Rare Flora Species)	NA
Priority Flora Species	<i>Acacia</i> sp East Fortescue (now <i>Acacia corusca</i>) (P1)
TEC (EPBC Act 1999)	NA
PEC (DEC)	NA
Threatened/Priority fauna	NA
Threatened/Priority fauna habitat	NA

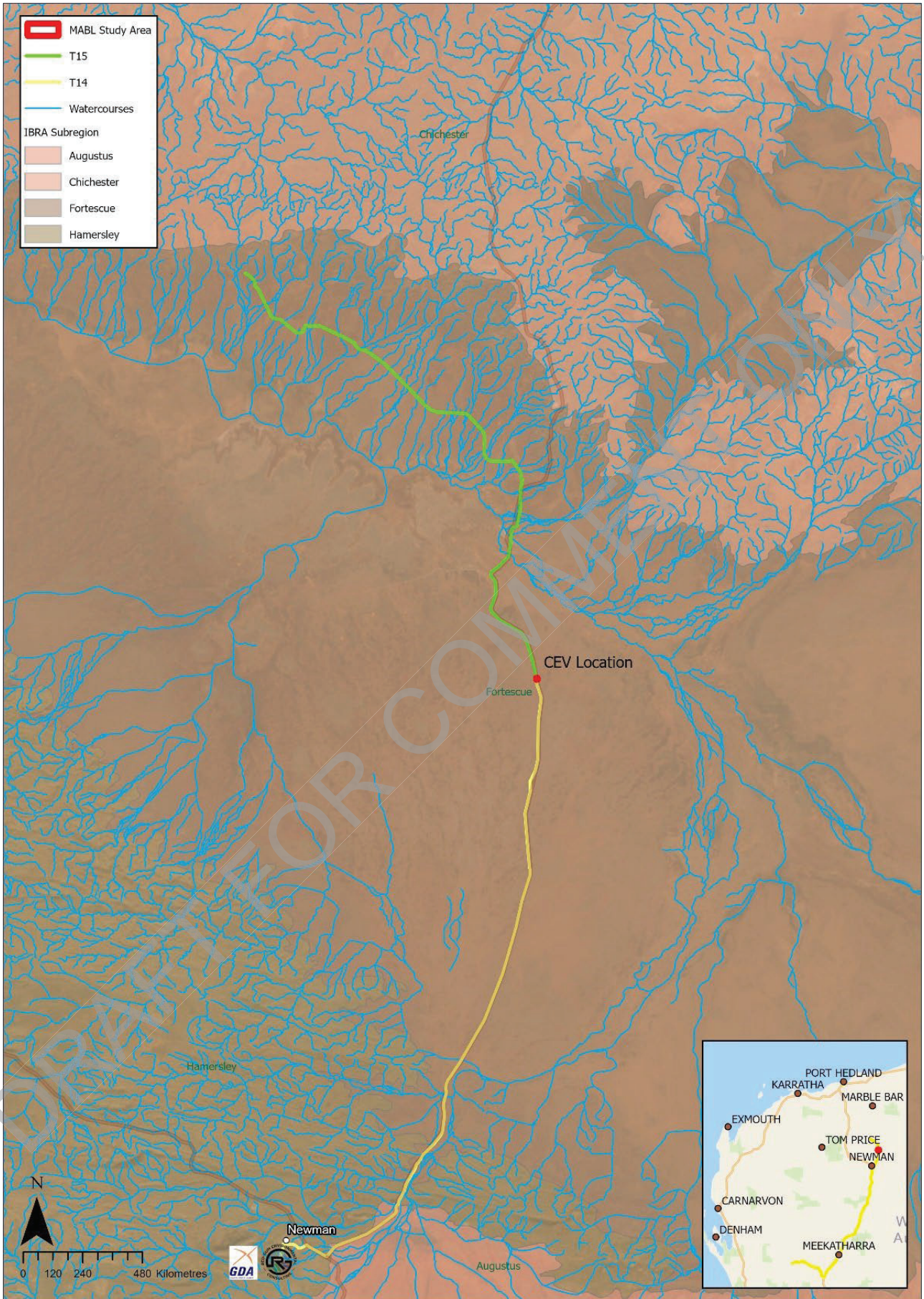
REPORT 15: Title	Fortescue Marsh Tenement E46/684 Level 1 Targeted Vertebrate Fauna Survey
Author and Year	Biologic Environmental Survey, 2014
Report Type	Targeted Vertebrate Fauna Survey
Proponent	BHP Biliton Iron Ore
Threatened species (EPBC Act 1999 or Declared Rare Flora Species)	NA
Priority Flora Species	NA
TEC (EPBC Act 1999)	NA
PEC (DEC)	NA
Threatened/Priority fauna	<i>Ardeotis australis</i> (P4)
Threatened/Priority fauna habitat	Fortescue Marsh Samphire

5.2 Disturbance History

There is no data available on disturbance history for the study area. Field assessment did reveal the presence of fire scarring through some of the local landscape, with fires likely to have occurred within the last one to two years in some parts of the study area. Unfortunately, the DBCA fire history data does not show any recent fire events in the study area, so estimates of fire history were made in the field based on fire scars and regrowth heights of fire susceptible perennial species. Disturbances associated with historical road/track and clearing for fencing are the most obvious and significant of the disturbances that are or have been in operation in the study area.

5.3 IBRA Region and Subregion

The study area is within the Pilbara IBRA Region, and the IBRA Subregion of Fortescue (**Map 3**). The Fortescue Subregion is characterised by alluvial plains and river frontage, with extensive salt marsh, mulga-bunch grass, and short grass communities on alluvial plains in the east and deeply incised gorge systems in the western (lower) areas where river gum woodlands fringe the drainage lines. It is the northern limit of Mulga (*Acacia aneura*). There are numerous permanent springs in the central Fortescue, supporting large permanent wetlands with extensive stands of river gum and cadjeput Melaleuca woodlands (Desmond et al. 2001).



Map 3: IBRA Subregions.

5.4 Land Systems

The study area intersects the Divide Land System (**Map 4**), which is described in **Table 2**. The land system mapping is relatively accurate, as the boundaries of the land systems closely resembled those vegetation changes experienced on the ground.

Table 2: Description of Land Systems intersected by the MABL CEV site

Land System	Land System Description	Area (ha)	% of Study Area
Divide Land System	Gently undulating sandplains with minor dunes, supporting hard spinifex hummock grasslands with numerous shrubs.	0.17	100%

5.5 Environmentally Sensitive Areas

The study area does not intersect any Environmentally Sensitive Areas (ESAs).

5.6 Soils & Geology

Limited data on soils and geology is available for the area, with mapping imprecise and broadscale. Site assessments revealed consistent soils which aligned with the mapped land systems. The dominant soils were compact red sands to red loam, with some ironstone pebbles, with these soils aligning with the mapped Divide Land System (van Vreeswyk et al. 2004).

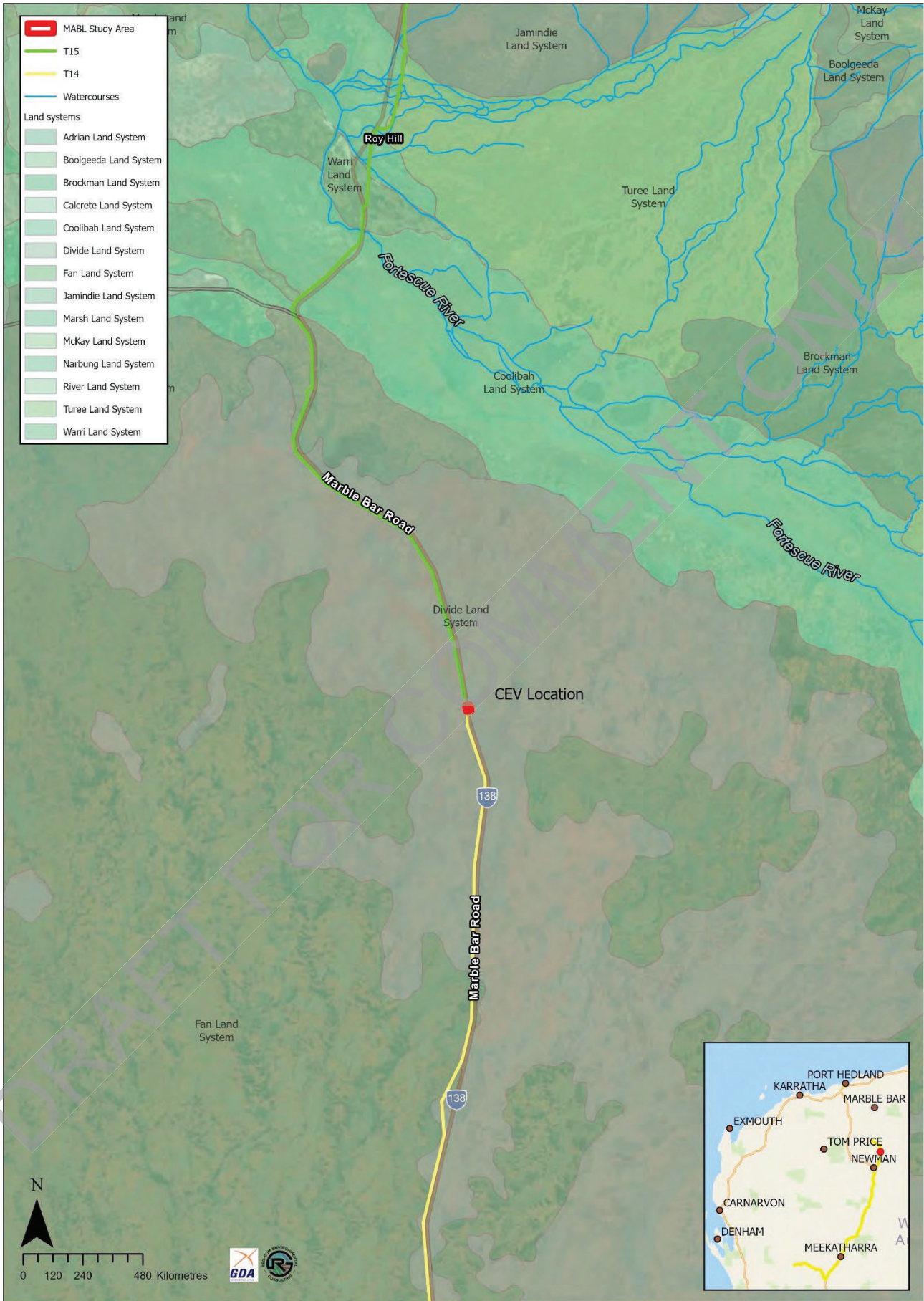
5.7 Vegetation & Community Structure

The site consists of two vegetation units (based on those described by Beard et al (1978)), with those being Low Woodland, Open Low Woodland and Sparse Woodland; Mulga, where small to medium shrubs are dominating, and Spinifex Grasslands, Shrub Steppe, where shrubs are generally sparse or absent and Spinifex is dominating.

Shrub diversity and cover across the site was generally moderate to high, with diversity and cover higher within the ground layer in the better areas, further from the road. There were low groundcover levels within the Spinifex areas, and within the shrubby areas, a little more ground cover was persisting, but cover was still low overall. This is less a reflection of site quality, and more a reflection of seasonal conditions leading into the survey being dry. The wider assessment area (**Map 2**) possessed occasional Desert Ghost Gum (*Corymbia candida*), scattered Mulga (*Acacia aneura*) and a variety of small to medium growing shrub species such as numerous Wattles (*Acacia* spp.), Walukara (*Hakea rhombales*), Rattle-pod Grevillea (*Grevillea stenobotrya*), and various Emu Bushes (*Eremophila* spp.) and Cassias (*Senna* spp.). The understorey was dominated by moderate to thick cover of Spinifex (*Triodia basedowii*), and scattered occurrences of Tall Mulla Mulla (*Ptilotus exaltatus*), Leafy Nineawn (*Enneapogon polyphyllus*) and Erect Kerosene Grass (*Aristida holathera*). Vegetation type is discussed further in **Section 7**.

5.8 Variation & Microhabitats

There is little variation in the vegetation and habitats across the site, given its small size (0.17 Ha). There are no mapped waterways within the study area, and there is little distinguishable difference between flora in the proposed CEV impact area compared to that beyond the boundaries of the site. There is no significant rock or major elevation changes throughout the study area. Two quadrats was able to effectively capture the variation across the site. Beyond the quadrats, traverses were also conducted to search for targeted flora and fauna.



Map 4: Land Systems in the vicinity of the MABL CEV Survey Area.

5.9 Local & Regional Populations of Significant Flora & Fauna

5.9.1 WA Priority Species Within 10 km of the CEV location

There were seven WA Priority Species within 10 km of the CEV site, including five (5) flora and two (2) fauna species: *Eremophila pilosa* (P1, 7 records) (**Photo 1**), *Eremophila youngii* subsp. *Lepidota* (P4, 2 records) (**Photo 2**), *Eucalyptus rowleyi* (P3, 9 records) (**Photo 3**), *Rhagodia* sp. Hamersley (M. Trudgen 17794) (P3, single record) (no photo), *Swainsona thompsoniana* (P3, single record) (no photo), and *Dasycercus blythi* (Brush-tailed mulgara, P4, single record) (**Photo 4**). There were two (2) records of Greater Bilby (*Macrotis lagotis*), which is listed as Vulnerable under the EPBC Act and the WA BC Act (discussed in the next section).

Eremophila pilosa is a shrub to 0.8 m high with purple flowers in June to July (WAH, 2024a). *Eremophila youngii* subsp. *Lepidota* is a dense, spreading shrub, 1-3 m high with purple-red-pink flowers in January, March, June, August or September, occurring on stony red sandy loams in flat plains, floodplains or semi-saline clay flats (WAH, 2024b). *Eucalyptus rowleyi* grows to 5 m tall forming a lignotuber, with whitish, pale grey to pale orange/tan bark in broad floodplains or in open mallee vegetation (Atlas of Living Australia, 2024a). *Swainsona thompsoniana* is a prostrate annual herb with mauve and cream coloured to yellow flowers, growing on open flood plains (Atlas of Living Australia 2024b). *Rhagodia* sp. Hamersley (M. Trudgen 17794) *Rhagodia* sp. Hamersley (M. Trudgen 17794) is commonly recorded from hardpan plains dominated by mulga shrubs and trees, but individuals have also been recorded from low hillslopes, stony plains, gullies, low hills, floodplains and claypans (Biologic, 2021).



Photo 1: Example photo of *Eremophila pilosa*. Photo: A.P. Start. Source: WAH, 2024a



Photo 2: Example photo of *Eremophila youngii* subsp. *Lepidota*. Photo: B Buirchell & M.J Start. Source: WAH, 2024b



Photo 3: Example photo of *Eucalyptus rowleyi*. Photo: N Dean. Source: Atlas of Living Australia 2024a

There are believed to be two Mulgara species in Western Australia. The tail variation is the distinguishing feature (**Photo 4**), however, there is some discussion on which species of *Dasyercus* are actually in WA, with confirmation of *D. blythi* presence, but scarce records of *D. cristicaudata* being available (Terrestrial Ecosystems 2013). The species occupy very similar habitats and produce similar burrows (**Photo 5**); therefore the same monitoring approach can be taken for both species, however distinguishing the different species from indirect observation only (burrows and tracks) is not possible. In terms of guidance for surveys, monitoring and studies completed by Terrestrial Ecosystems (2013) recommend the following:

- Searches for burrows should only occur when the height of Spinifex (*Triodia* spp.) or shrubs is less than 500mm.
- The percentage cover of vegetation is less than 40% cover.
- The search effort is greater than two (2) persons per hectare per hour.
- Areas of taller (>500mm) grasses or shrubs, or where vegetation cover is greater than 40%, trapping is recommended over grid searching for burrows.



Photo 4: Tail variations in the two Mulgara species (Source: Terrestrial Ecosystems)

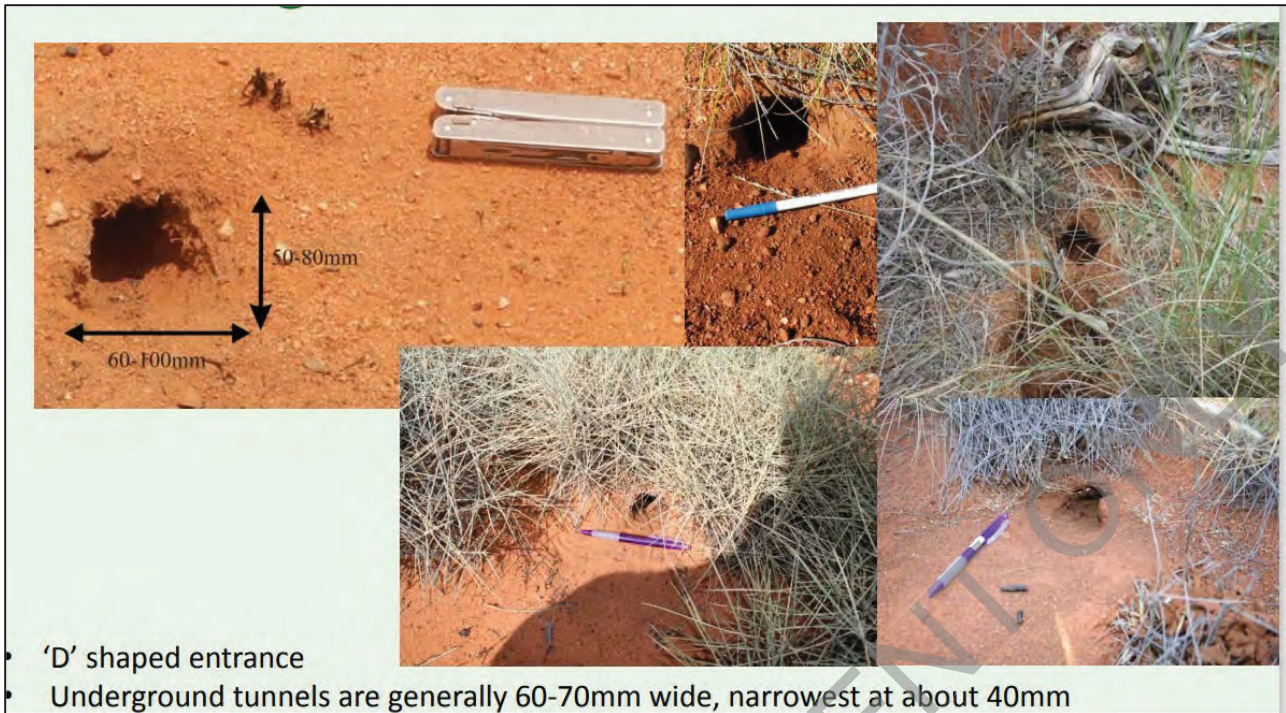


Photo 5: Mulgara burrows with a typical D-shaped entrance (top left) (Source: Terrestrial Ecosystems)

Species that may be confused with Mulgara, when basing their presence solely on the detection of burrows, is the Spinifex Hopping Mouse (*Notomys alexis*), shown in **Photo 6**. The latter tend to have mounds of excavated dirt at the entrance to their burrows, and burrows lack the D-shape of Mulgara burrows. According to Terrestrial Ecosystems (2013) fauna experts, it is easy to misidentify Mulgara burrows. Therefore, any potential burrow of an appropriate size and configuration were photographed and discussed with fauna experts to ensure species presence / absence is accurate. Some of the unidentifiable burrows may have also belonged to native rodents, known to be present (via scat DNA analysis) and which are known to burrow as well as build nests.



Photo 6: A Spinifex Hopping Mouse, while unlikely to be confused with Mulgara, their burrows are often misidentified as being Mulgara burrows.

According to Mulgara survey recommendations from the 'Survey Guidelines for Australia's Threatened Mammals: Guidelines for Detecting Mammals Listed as Threatened Under the EPBC Act' (DCEEW 2011 p. 62-64), based on five hectare search areas, the techniques that are recommended are listed in **Table 3** below.

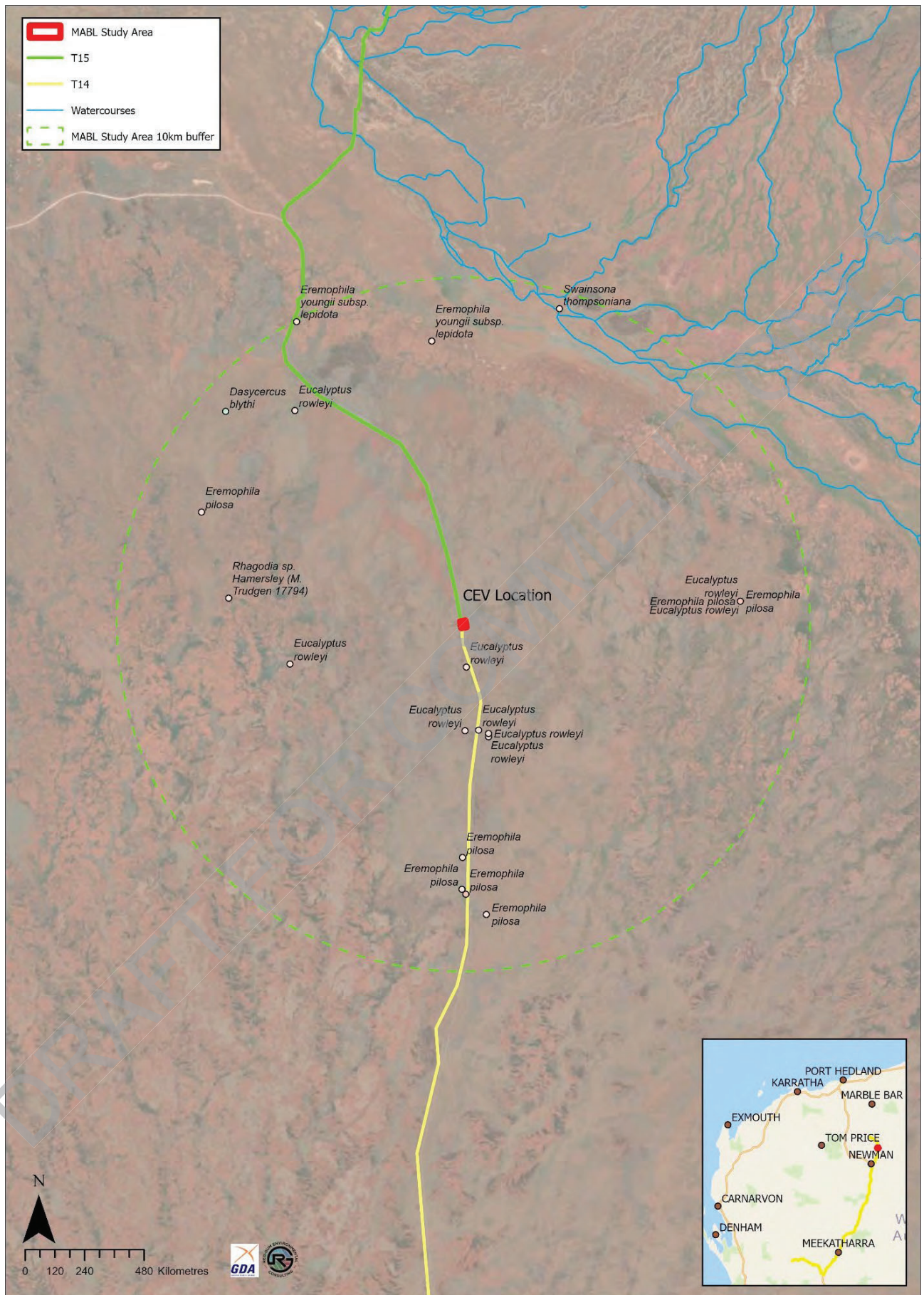
The appropriateness of these techniques are described and where methods are not used, justification for the decisions are provided. It must be noted that the DCEEW recommendations are based on a five hectare survey area. Given that the study area is small, survey effort for such an area will be significantly less than a large five (5) hectare study area would require.

Table 3: DCEEW recommended survey techniques for Mulgara over a 5 hectare area

Survey technique	Appropriate for this survey	Justification
Daytime habitat searches	Yes	Included in methodology.
Daytime searches for burrows, scats, pop-holes.	Yes	Included in methodology.
Collection of predator scats or owl casts or remains.	Yes	Included in methodology.
Hair tube sampling	No	Not suitable in a linear style survey that is progressively moving along a very long linear study area.
Elliot trapping	No	Not suitable in a desert when daytime temperatures are averaging over low to mid forty degree Celsius.
Pitfall trapping	No	Not suitable in a linear style survey that is progressively moving along a very long linear study area.
Spotlighting for active individuals	No	Not safe operating near a major highway or in sand dune terrain and unlikely to be a productive use of survey effort.
Baited camera traps	No	Unlikely to be a productive use of survey effort. Close proximity to main highway would significantly increase the risk of camera theft.

None of these Priority Species were located after targeted searches in the assessment area. All of the flora species are conspicuous, and given that conditions leading into the survey were reasonable, it would be expected that these species, if present, would be identifiable given their unique vegetative characteristics.

It is noted that species with the WA 'Priority' status are not declared threatened species and are *not* afforded the same protections as declared WA and EPBC threatened species under WA and Commonwealth legislation (i.e. a flora 50m ESA is not required around Priority flora species). No tracks, scats or burrows were located in the survey area.



Map 5: Records of WA Priority Species within 10km of the MABL CEV.

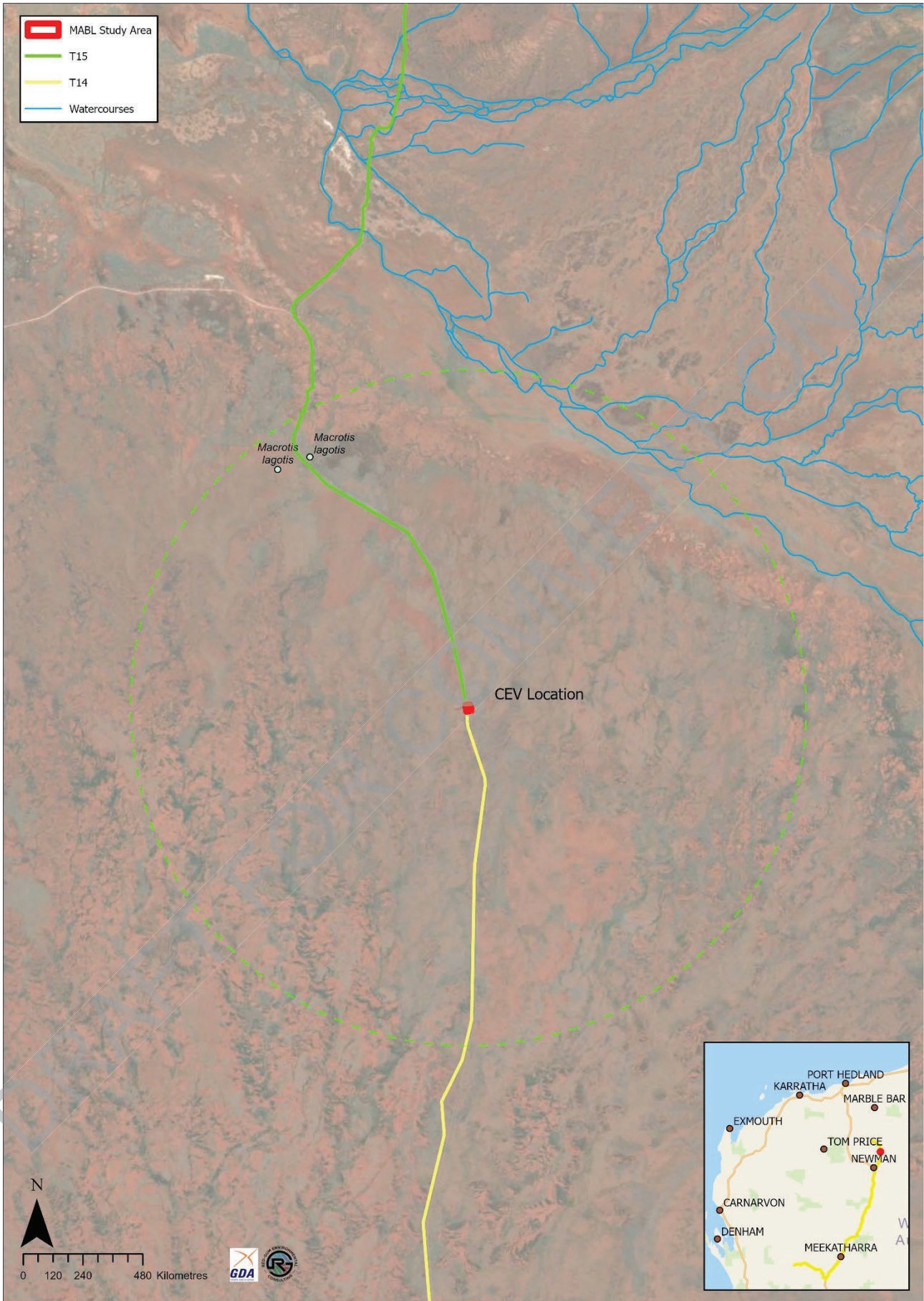
5.9.2 Threatened Species Within 10 km of the CEV location

There were two (2) records of Greater Bilby (*Macrotis lagotis*), which is listed as Vulnerable under the EPBC Act and the WA BC Act. The records are approximately 9 km north of the site and dated from 2017.

Bilbies are a small to medium sized mammal with grey fur, long ears and a long tapered snout, with a white-tipped tail and an exceptional digging ability (**Photo 7**). They live in a variety of habitats including high quality grasslands, stony downs country, desert sandplains and dunefields. Formerly believed to occupy around 70% of mainland Australia's land area, fox and cat predation have had a catastrophic impact on the species, which has vanished from more than 80% of its former range. On top of that reduction, it is thought that **numbers in the wild are now less than 10,000 individuals (AWC 2023)**. None of these Priority Species were located after targeted searches in the assessment area. No burrows, tracks or scats were located in the CEV site.



Photo 7: Greater Bilby (*Macrotis lagotis*) (Photo: Bernard Dupont/Atlas of Living Australia)



5.10 Likelihood of Occurrence Summary

Table 4 summarises the likelihood assessment findings for each species described in **Section 5.9** and provides justification for the likelihood category selected.

Table 4: Overview of species likelihood of occurrence assessment

Species name	Common name	Likelihood rating	Preferred habitat	Justification
Flora				
<i>Eremophila pilosa</i>	NIL	Low	Prefers red-brown clay loam soils on sandy plains, and is known from the area between Jigalong and Roy Hill.	This species is a large and unique looking Eremophila. Although it is known from the area, including new records detected during Red-Gum's broader T14 and T15 assessments, it is not present within the site or the nearby vicinity.
<i>Eucalyptus rowleyi</i>	NIL	Low	Prefers hard red soil (hardpan) on flat lowland sites, and is known from just south of the CEV site.	This species is a large conspicuous gum which, although known to occur nearby, was not detected during surveys.
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	NIL	Low	This species is found of flat plains, floodplains and clay flats, some of which are semi-saline.	All the Eremophila on site were readily identifiable, therefore the presence of this species can confidentially be ruled out.
<i>Rhagodia sp.</i> <i>Hamersley</i>	NIL	Low	Species occupies areas that gravelly silt and sands in sheet-flooding fan areas, as well as areas with red-brown silty clay loam soils, on undulating plains.	This species is a large conspicuous shrub which was not located during the surveys. There were very few chenopods discovered in the area.
<i>Swainsona thomsoniana</i>	NIL	Negligible	Data deficient. Where found, tends to occur on open flood plains of northern WA.	This annual was not detected, and is only known from one local record to the north of Fortescue River, well to the north of the site. No suitable floodplain present. If present, given the suitable wet season experienced, it would have been observed in the site.
Fauna				
<i>Dasycercus blythi</i>	Brush-tailed Mulgara	Low	Spinifex grasslands, sand plains and gibber plains in arid regions. D-shaped burrows are a key indicator of the presence of Mulgara.	Suitable habitat, although a thorough inspection revealed none of the distinctive burrows, nor where there any scats, tracks or other sign.
<i>Macrotis lagotis</i>	Greater Bilby	Low	Occurs in a wide variety of habitats in arid regions, including scrubland, grasslands and woodlands.	Thorough inspection revealed no burrows, tracks or other signs of this species being present. The proximity to the road is likely a deterrent to this species utilising these areas for permanent habitat.

6 Climate and Weather Leading up to & During Survey

The climate of the study area is arid, with hot daytime temperatures and patchy and generally unreliable rainfall, with the potential for significant daily rainfall totals during the wet season (over the summer months). A survey conducted six to eight (6-8) weeks post wet season (usually March – June) is the recommended timing of surveys in the *Eremaean Botanical Province*, according to EPA (2016). The weather history for the four months leading up to the study for the station at Newman Airport, WA, is provided in **Figure 2**.

The average maximum temperature in the period of March to June 2024 was 35 degrees Celsius. A suitable weather event passed through the region on the in January and March, with Newman Airport receiving 175 and 88 millimetres of rain respectively. It must also be noted that the study area is 70 kilometres north of Newman, and establishing whether the rainfall extended that far and was of a similar quantity to the weather station readings is difficult to determine. Nevertheless, the weather systems in the wet season are generally far-reaching and it is assumed that some rainfall likely fell in the study area around the same time. The weather in the period leading up to the survey was dry with temperatures ranging from the low 30s to the low 20s as winter progressed, however, suitable rain events occurred toward the end of the wet season with conditions for the survey being reasonable.

While this is within the ideal time to conduct floristic surveys according to the EPA (2016) guidelines, which is March to June, the weather leading up to the survey was dry, with the rain events passing through a least three months before the survey. A reasonable number of species encountered had flowers, seeds, pods or fruit present on at least some of the specimens, allowing identifications to be made for the majority of flora species encountered. There were, however, some species that were sterile and therefore unable to be accurately identified to species level. Conditions during the survey were mild.

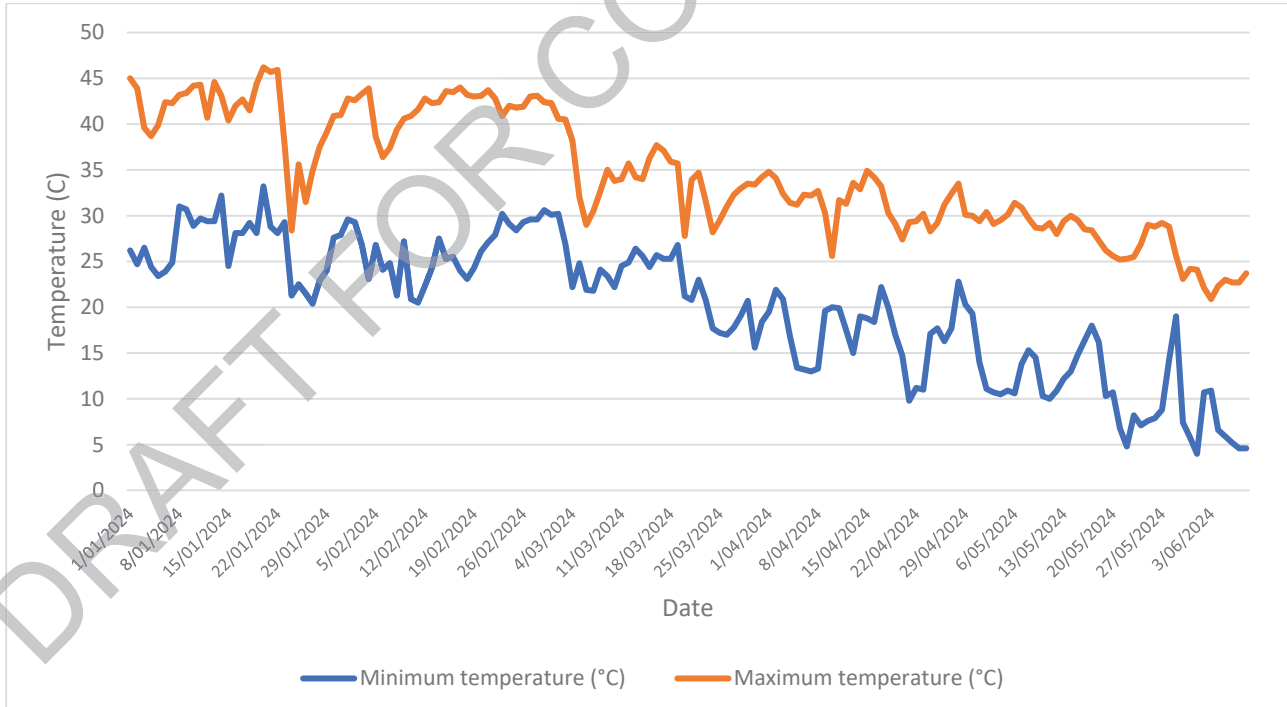


Figure 2: Minimum and maximum temperature observations for Newman Airport from 1 March 2024 to 8 June 2024 (Source: BOM 2024)

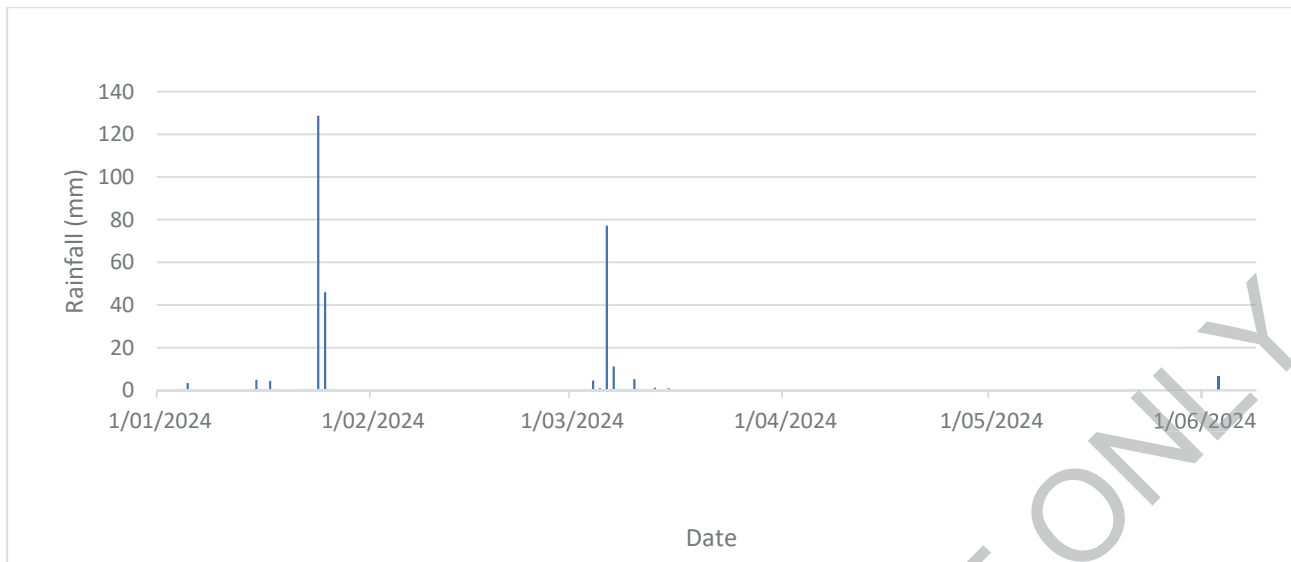


Figure 3: Daily rainfall observations for Newman Airport from 1 March 2024 to 8 June 2024 (Source: BOM 2024)

7 Field Survey Method

The section below provides an overview of the methodology used for the study and explains the overarching principles upon which the vegetation and flora survey for the MABL CEV site were based.

7.1 Desktop Review

A desktop review was conducted to ascertain information about the local and regional environment using a number of Western Australian and Commonwealth government resources, and covered items such as searches for previous surveys conducted in the area, disturbance history for the study area, as well as land classification systems such as bioregions, land systems, soils and geology. Species searches were also conducted using WA databases to determine what threatened flora and fauna and vegetation communities were located (previously recorded or modelled as likely to occur) in the vicinity of the study area. Where relevant, maps were produced to spatially represent some of the relevant items identified from the background search.

7.2 Data Standards

Data captured in field has been transcribed into the data package format required by the WA EPA's 'Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments (IBSA)', and once collated, will be submitted via the EPA's online IBSA Submissions Portal. The provision of the data in this format will support an assessment of compliance under the Environmental Protection Act 1986 and provide information required for the EPA and DWER to conduct an environmental impact assessment (EIA) on the proposed development through the ESA. The survey methodology and the specific data to be captured during the surveys has been based on the requirements outlined in the EPA's 'Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment'.

7.3 Survey Type

The type of survey conducted is a flora and vegetation survey as per the EPA guidelines. The survey gathered comprehensive information on the presence or absence of threatened and priority ecological communities, fauna and recorded all flora located during the quadrats survey of the CEV site. The survey also mapped vegetation types and quality across the study area. Where a population of significant flora or fauna extend beyond the quadrat boundary, the full extent of the population was to be mapped. The following sections describe more detail about the survey effort.

7.4 Flora Survey

The predominant survey type was a flora and vegetation assessments (floristic composition) conducted within two 50 metre x 50 metre quadrats. The quadrats were placed where vegetation types and vegetation quality changed to ensure adequate coverage. According to EPA (2016) *“Floristic composition vegetation classification is the preferred classification system for a detailed survey as the method is repeatable and is considered more suitable for identification of significant vegetation as it focuses on the suite of species present within a quadrat”*.

Two (2) quadrats were deemed effective given the small size of the CEV unit and the vegetation types within the study area. Finer detail vegetation assessment uses the NVIS system, defining the three dominant species from each of the three strata, being the upper, mid and lower stratum. It is considered that this survey method was sufficient to gather in-depth data on the plants, animals and vegetation types present in the study area.

7.5 Fauna Survey

Locations of scats, tracks and burrows were recorded during surveys. To supplement visual searches, any predator scats observed were to be collected and sent to fauna experts (Enviro DNA) for analysis. Where burrows were located, photographs were taken with scale (standard ruler) and burrows were GPS recorded.

7.6 Vegetation Units

The vegetation types (units) encountered were mapped according to the visible structural units and main species composition of the dominant strata (as per NVIS Level III vegetation association), as captured during field observations. **Table 5** outlines the data to be collected at each quadrat, providing sufficient information to map the vegetation units in the quadrats. The vegetation types will then be mapped using ArcGIS Pro by plotting the boundaries captured in field onto aerial photos.

Table 5: Data to be recorded in the site surveys

Data to be captured	Details of data
Date	Date of quadrat survey
Quadrat Code	Unique identifier i.e. Q001, Q002
Coord (NW corner)	GPS coordinate taken in quadrat's NW corner
Size/shape	50 x 50 metres as per IBSA and EPA standards
Photos from NW corner	Photo taken from quadrat's NW corner, looking SE across the quadrat
Landform	Landform description i.e. stony plain, creek, sand dunes
Soil description	Description of surface soil type
Rock type	Description of surface rock type
Litter - percent cover	Estimated percentage cover of detached litter
Fire history	Estimated time since last fire (where known)

Data to be captured	Details of data
Vegetation condition	A condition rating for the vegetation based on the condition scales outlined in Keighery (1994) and Trudgen (1988) for the Eremaean Botanical Province
Slope	Average percent slope for the quadrat
Aspect	Aspect of the quadrat
Disturbances	Describe any of the major disturbances that are visible in the quadrat, such as fire, grazing, vehicles, linear installations etc.
Quadrat marking method	The method used to mark the location of the quadrat (GPS recording in NW corner), or other, as necessary
Vegetation type (NVIS - dominants for upper, mid and lower stratum)	Description of vegetation based on broad formation and height classes as per NVIS, listing the three dominant species in each stratum (upper, mid and lower)
Species	Full species list of every flora species within the quadrat, plus status (weed/native), average height, and abundance (count or estimate). Identifications via WA Florabase, reference material and other online resources.

7.7 Vegetation Condition Mapping

The Trudgen (1988) scale is used for the assessment of vegetation condition within the *Eremaean Botanical Province*. The vegetation condition relates to vegetation structure observed, the level of disturbance noted within each of the three structural layers, and the likely ability of the vegetation to self-regenerate in the absence of further disturbance (Table 6).

Table 6: Vegetation condition scale used to classify vegetation condition (Source: EPA 2016)

Trudgen (1988) Vegetation Condition Categories (Eremaean Botanical Province)	
Pristine	Not applicable to Eremaean Botanical Province.
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

7.8 Personnel

The survey of MABL CEV location took place on 9th June 2024 by Senior Ecologist Damian Wall of Red-Gum Environmental Consulting Pty Ltd (**Table 7**). The CEV site was inspected on foot. Flora, fauna and important habitat zones within the survey area were recorded, including the location of any ESAs and areas of environmental sensitivity, where applicable.

Table 7: Contact Details and Qualifications of Assessor

Assessor name	Contact details	Relevant experience
<p>Damian Wall</p> <p>Bachelor of Applied Science (Parks, Recreation & Heritage), Master Environmental Management & Restoration, Graduate Certificate Cultural Heritage Management.</p>	<p>E: damian.wall@red-gum.com.au</p> <p>P: 0402 344 574</p>	<p>Damian is Managing Director and Senior Ecologist at Red-Gum Environmental Consulting Pty Ltd. Damian has authored 107 Cultural Heritage Due Diligence Assessments, 83 Cultural Heritage Management Plans across 4 states including WA and the NT. Damian has personally negotiated Native Title Agreements for large Petroleum Exploration companies for 6 years in QLD, NT, NSW & WA and is an accredited Biodiversity and Native Vegetation assessor in both NSW and VIC. Damian has 20 years in the environmental industry and has conducted field work throughout the NT, WA and eastern states to author 96 Ecological Assessments (VIC), 49 Assessment of Significance (NSW) reports and 21 Review of Environmental Factor (NSW) documents. Damian is also a Geographic Information Systems (GIS) specialist proficient in all aspects of field data capture and presentation via ArcGIS.</p>

7.9 Survey Effort & Timing

Ecological surveys provide a sampling effort for flora and fauna present at a given time and season. There are several reasons why not all species will be detected at a site or along a linear alignment during a survey, such as low species abundance, patchy species distribution, species dormancy, the influence of seasonal conditions, and due to migration and breeding behaviours for more mobile species. In many cases these factors do not present a significant limitation to assessing the overall biodiversity values of a project site or alignment.

The flora and fauna assessment for the site was conducted in early June, which is within of the optimal time for survey (March to June) in the arid zones of Western Australia. The weather station at Newman received a suitable rain event in the wet season. The weather leading up to the survey was dry, however despite this, sufficient numbers of flora were in flower or were retaining sufficient vegetative material to aid in their identification.

7.10 Survey Limitations

The timing of the survey was within the ideal time for survey of flora in the arid zone of Western Australia. The optimal survey time is usually 6 to 8 weeks post wet season, which normally coincides with the months of March through to June. The survey took place in early June, which is usually towards the end of the optimal survey period when annual species are present, and the perennial vegetation is generally actively growing and not in water-saving mode. Care was taken to identify the key species present within the survey site, however, the species list should be considered a 'snapshot in time' and is not considered a complete list of the species occurring at the site.

8 Results

8.1 General Vegetation Condition

According to the Trudgen (1988) scale, which is used for the assessment of vegetation condition within the *Eremaean Botanical Province*, the majority of the study area was in very good condition, with some areas deteriorating to good condition closer to the road, where more obvious signs of human disturbance persists. The main disturbances were vehicle tracks, cleared tracks and construction damage from past road construction and associated drainage works. A reasonable number of species encountered had flowers, seeds, pods or fruit present on at least some of the specimens, allowing identifications to be made for the majority of flora species encountered. There were, however, some species that were sterile and therefore unable to be accurately identified to species level.

The assessment involved detailed vegetation survey across two quadrats, one quadrat in each of the vegetation types present. The assessment detected a total of 25 species or subspecies of flora, representing 14 genera. No exotic flora species was detected during the survey, although there were some exotic species on the immediate road verge, where were not included in the site assessment flora list. The site consists of two vegetation units (based on those described by Beard et al (1978)), with those being Low Woodland, Open Low Woodland and Sparse Woodland; Mulga, where small to medium shrubs are dominating, and Spinifex Grasslands, Shrub Steppe, where shrubs are generally sparse or absent and Spinifex is dominating.

Shrub diversity and cover across the site was generally moderate to high, with diversity and cover higher within the ground layer in the better areas, further from the road. There were low groundcover levels within the Spinifex areas, and within the shrubby areas, a little more ground cover was persisting, but cover was still low overall. This is less a reflection of site quality, and more a reflection of seasonal conditions leading into the survey being dry. The wider assessment area (**Map 2**) possessed occasional Desert Ghost Gum (*Corymbia candida*), scattered Mulga (*Acacia aneura*) and a variety of small to medium growing shrub species such as numerous Wattles (*Acacia* spp.), Walukara (*Hakea rhombales*), Rattle-pod Grevillea (*Grevillea stenobotrya*), and various Emu Bushes (*Eremophila* spp.) and Cassias (*Senna* spp.). The understorey was dominated by moderate to thick cover of Spinifex (*Triodia basedowii*), and scattered occurrences of Tall Mulla Mulla (*Ptilotus exaltatus*), Leafy Nineawn (*Enneapogon polyphyllus*) and Erect Kerosene Grass (*Aristida holathera*) (see **Appendix 1** for the flora species recorded and **Photos 8** and **9** for examples of vegetation encountered).

No (zero) areas of mapped WA Priority Ecological Communities (PECs) occurred in or adjacent to the site assessment area, however the Narbung Land System was noted as being closest to the site, approximately 6.5km to the north.



Photo 8: South east corner of MABL CEV site Quadrat 1 Location, north-west orientation. Photo: D.Wall, 2024



Photo 9: North west corner of MABL CEV site Quadrat 2 Location, south east orientation. Photo: D.Wall, 2024

8.2 Environmentally Sensitive Areas (ESA) – Vegetation Communities

There were no (zero) ESAs located within the site and therefore and ESA vegetation clearing permit is NOT required.

8.3 WA Priority Ecological Communities (PECs)

PECs are not afforded the same protection as TECs, yet they are listed for their potential to become TECs in the future (**Section 4.3**). No (zero) PECs were identified within the assessment site nor in the vicinity of the CEV location itself, hence they are not considered in detail further in this report (**Map 7** for the location of the nearby PECs).

8.4 Environmentally Sensitive Areas (ESA) – Threatened Flora & Fauna Records

In addition to the mapped sensitive areas in the Western Australian and Commonwealth datasets, according to DWER, the area within 50 m of an existing threatened flora species record is also to be considered an ESA and afforded the appropriate protections, including a requirement for a permit if disturbance is to occur within that 50m zone. No flora listed as targeted flora species (**Section 5.9**) were detected at the MABL CEV site and there were also no (zero) threatened flora species or WA Priority flora species recorded in the wider study area. Furthermore, there were no unidentifiable plants detected that resembled or possessed the characteristics of any of the WA Priority species that were recorded within 10 km of the CEV.

There were no (zero) threatened flora or fauna within the MABL CEV site and therefore there were no (zero) threatened flora species 50m radius ESAs that need to be applied for this section.

8.5 Public Land (Crown Reserves & National Estate)

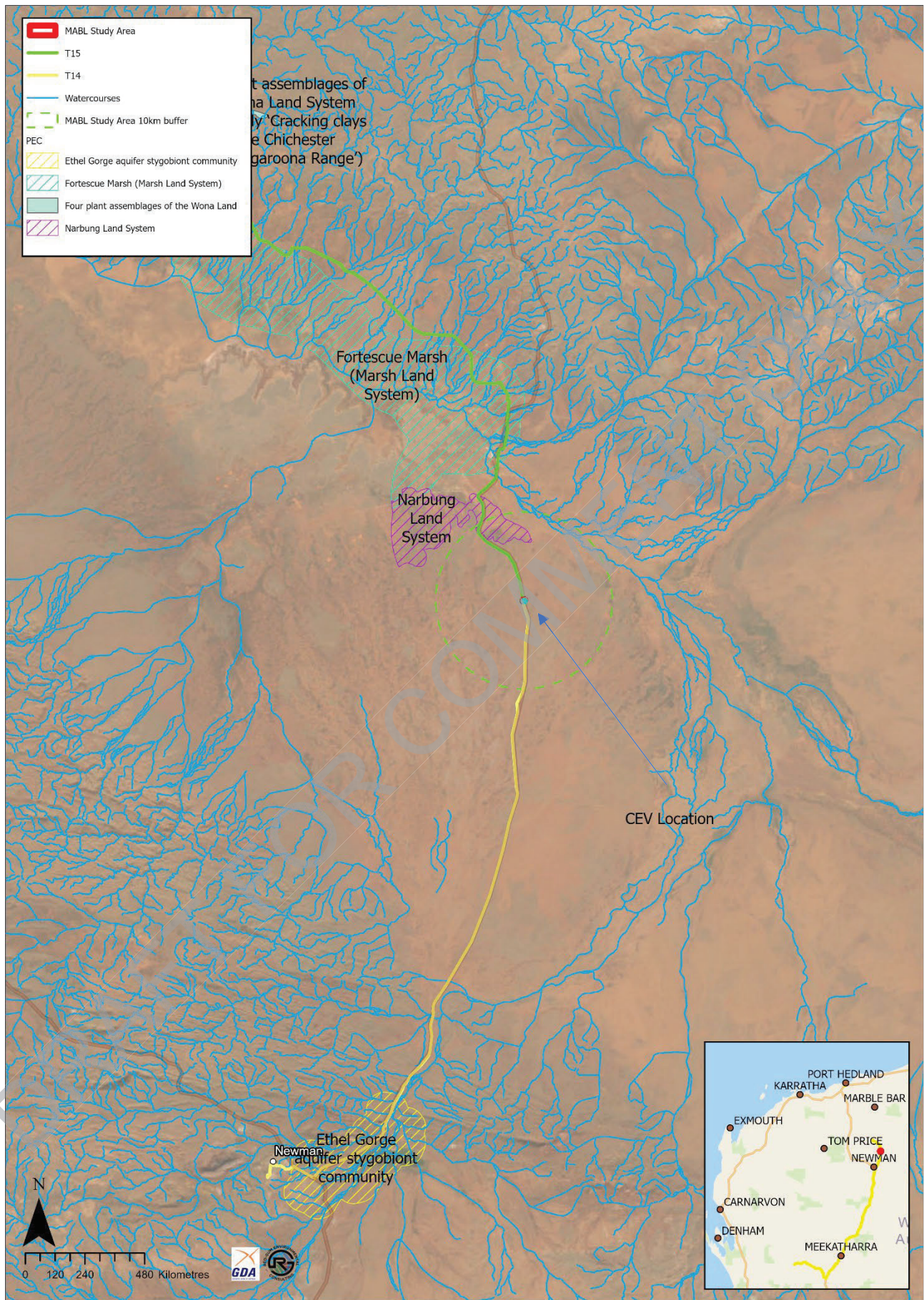
The method for assessing these areas is the same method used for inspecting the vegetation communities, however they are being addressed separately as they are of a different land tenure / classification. There are no (zero) areas of public land (Crown reserves and national estate) located nearby or being intersected by the MABL CEV assessment area.

There are no Crown Reserves or National Estate areas located within or adjacent to the MABL CEV site.

8.6 Weeds

There were very low numbers of weed species identified within the MABL CEV assessment area. This is likely a reflection of the inhospitable conditions that occur in the rangelands of Western Australia, the remoteness of the subject area. It must be noted that the field assessment has only provided a snapshot of species present at the MABL CEV location and inevitably, there will be weed present that have not been identified as part of this assessment. It is important that contractors are made aware of the key high threat weed species which may be encountered during the construction (**Table 8**). Where high threat weeds are seen, they must be avoided, or the weed infestations should be removed prior to machinery entering the area. Once an infestation of weeds has been intersected and machinery is advanced clear of where the weeds are located, machinery must be adequately cleaned down and inspected for weed seeds/propagules prior to work continuing, to prevent further spread of the weeds.

Machinery should be decontaminated when leaving towns and disturbed sites and prior to entering the MABL CEV location.



Map 7: Overview of PECs in the T-14 and T15 Sections showing the MABL Site.

Table 8: High Threat Weed Species Which May Be Encountered in the Pilbara

Weed Name	Brief Description	Management Approach
Mesquite – <i>Prosopis spp.</i>	Weed of National Significance (WoNS). Can resemble Acacia species but has distinctive zig-zag branches and very long spikes in pairs at base of leaves, catkin flowers.	Avoid. Manually remove prior to work. Wash down machinery prior to continuing. Caution needed to avoid contact with spines.
Parkinsonia – <i>Parkinsonia aculeata</i>	WoNS. Large yellow flowers, its many branches are lined with two rows of tiny oval-shaped leaflets. Leaflets drop off plant in dry weather. Thorns are present at the base of leaf stems.	Avoid. Manually remove prior to work. Wash down machinery prior to continuing. Caution needed to avoid contact with spines.
Mimosa Bush – <i>Vachellia farnesiana</i>	Many branched shrub with bi-pinnate feathery leaves, bright yellow globular flowers (pom-poms), cigar-like pods, thorns on zig-zag branches.	Avoid. Manually remove prior to work. Wash down machinery prior to continuing. Caution needed to avoid contact with spines.
Prickly Pear / Cactus – <i>Opuntia spp.</i> and <i>Cylindropuntia spp.</i>	WoNS. Very distinctive cactus plants which grow in segments. Segments covered in spines. Spreads easily if fruit or segments are moved on machinery.	Avoid. Manually remove prior to work. Manually check machinery for cactus segments and remove prior to continuing. Caution needed to avoid contact with spines.
Athel Tree – <i>Tamarix aphylla</i>	WoNS. She-oak like shrub or tree which prefers waterways, often grows in thickets. Leaves resemble pine tree leaves. Pinkish-white flowers on ends of branches.	Avoid. Manually remove prior to work. Wash down machinery prior to continuing.
Castor Oil Plant – <i>Ricinus communis</i>	Reddish brown stems, green leaves, plant to 3 m high, with large palmate (Cannabis-like) leaves, distinctive spikey flowers/seeds on the ends of flower stalks. Seeds are poisonous.	Avoid. Manually remove prior to work. Wash down machinery prior to continuing. Caution needed to avoid contact with sap.

8.7 Range Extensions

There were no range extensions for any of the flora species identified during the assessment.

8.8 Unidentifiable Flora

There are several unidentified flora species which were unable to be identified fully, as they lacked appropriate vegetative material to facilitate correct identifications.

8.9 Survey Limitations

The limitations and their potential/actual impact upon the survey results are outlined in **Table 9**.

Table 9: Potential limitations and their effect on the study

Limitation	Impacted the study (Y/N)	Comments
Competency / experience of survey personnel	No	The field assessment staff and report authors have adequate experience with terrestrial flora and fauna surveys in arid regions of Australia and across the Pilbara region of WA.
Permits and licences required for the assessment	No	Given the results of the desk top and the very small site, it was deemed that a Permit would not be required and therefore one was not applied for prior to the survey.
Scope and completeness of study	No	Two (2) 50 x 50m quadrats adequately covered the CEV site.
Survey intensity/effort	No	As above. The survey effort is considered appropriate for the objectives of the survey, the survey area being assessed, and the species being targeted.
Data available on targeted species	No	A number of the WA Priority Species being targeted for survey lacked sufficient detailed descriptions to assist with the identification of the species in the field, with several also lacking any adequate pictures of the plant or plant parts which would otherwise aid in the identification of the species.
Proportion of flora identified	No	Weather leading into the survey was favourable and a reasonable number of plants were in flower or contained sufficient material to aid identifications.
Availability of adequate contextual information	No	The rapid assessment surveys conducted prior to this detailed survey, as well as the background assessment conducted as part of this survey, provided adequate contextual information for the study.
Timing of survey and weather conditions	No	There was suitable weather leading up to the survey, including a rain event in January and March. Survey conditions were therefore acceptable.
Remote location and site access	No	The whole of the study area was accessible by foot and had easy access by vehicle. The methodology used for fauna survey is considered adequate for the purposes of the detailed flora and vegetation study.
Disturbances which may affect the results	No	No disturbances occurred during the survey which would have impacted the results.

9 Discussion

9.1 Presence of Targeted Flora

None of the targeted flora or fauna (Section 5.9) were encountered during the survey. However, given seasonal variations, species lifecycles and climatic preferences, the presence of some of these species across the wider study area cannot be completely ruled out.

9.2 MABL CEV - Vegetation Condition & Extent

The vegetation in the MABL CEV is considered to have relatively low regional conservation significance, as the vegetation resembles that which is adjacent to the study area, and which is adequately represented throughout a significant area of the regional landscape. Furthermore, the vegetation that exists beyond the study area is of higher quality and is less disturbed than the vegetation within the study area, which has had historical disturbances from vegetation clearing for road and drainage construction.

There were no (zero) state or Commonwealth listed TECs or PECs identified during the survey, with the vegetation encountered being representative of the broad vegetation associations of Low Woodland, Open Low Woodland and Sparse Woodland; Mulga in the shrub dominated areas, and Spinifex Grasslands, Shrub Steppe, where shrubs are generally small, sparse or entirely absent and Spinifex is dominating.

It is considered that, based on the above, the vegetation within the study area is an example of two widespread vegetation communities that are both well represented across large parts of the Fortescue region. Habitat for potential threatened or priority flora is present, but is more extensively available and likely to be even higher quality beyond the boundaries of the study area, given the lower levels of disturbance in those areas further away from roads and other human disturbances.

Some commentary around the ten clearing principles are provided in **Table 10**, with the aim of describing the potential for native vegetation impacts (from FOC installation & CEV construction) within the study area to be at variance with any of the clearing principles. Red-Gum contends that, given the small size of the MABL CEV and its position in a well-represented vegetation community with no threatened species or communities considered present, the impacts at that site will also not be in significant conflict with any of the 10 vegetation clearing principles.

Table 10: Assessment of proposed study area impacts against the 10 clearing principles

Clearing Principle	Assessment of project against principle
A) Native vegetation should not be cleared if it comprises a high level of biological diversity	<ul style="list-style-type: none"> Vegetation in the study area is generally moderate to high diversity Woodland and Spinifex Grassland, Shrub Steppe. The vegetation in the study area is representative of vegetation types that are extensive throughout the Divide subregion. There are no PECs or TECs located within the study area Suitable habitat is present for a number of threatened and WA Priority entities, however, there are no threatened flora or WA Priority flora known to be present within the study area. Native vegetation clearing is small (<1 ha). The biological diversity is not likely to be permanently reduced as a result of the proposed development actions.
B) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia	<ul style="list-style-type: none"> The study area contains suitable habitat for a variety of native fauna. There were no signs present of the targeted species, which have large home ranges and there is abundant adjoining habitat available for these species either side of the study area. Measures are to be put in place to minimise impacts to fauna and faunal habitats, including pre-construction surveys for fauna and habitats at the CEV location.
C) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora	<ul style="list-style-type: none"> There are no known rare flora present within the study area. There are no flora habitats within the study area which are not present immediately adjacent to the study area.
D) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a Threatened Ecological Community (TEC)	<ul style="list-style-type: none"> The vegetation in the study area is representative of vegetation types that are extensive throughout the Divide subregion. There are no PECs or TECs located within the study area.
E) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared	<ul style="list-style-type: none"> The proposed clearing is not significant (0.17 ha). The study area is not a significant and isolated remnant patch of native vegetation.

Clearing Principle	Assessment of project against principle
F) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland	<ul style="list-style-type: none"> • There are no waterways or waterbodies in the study area. • There are no minor man-made drains present in the study area. • There are no wetlands present in the study area.
G) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation	<ul style="list-style-type: none"> • The impacts associated with the CEV are small and isolated within a much larger contiguous patch of native vegetation. • Measures are to be put in place to ensure the development footprint is strictly adhered to during construction. • The CEMP has actions in place to ensure that works are not completed if high winds or significant rain events are expected during or a short time after construction takes place. • As a result of the above factors, it is highly unlikely that the clearing of vegetation is likely to cause any appreciable land degradation.
H) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area	<ul style="list-style-type: none"> • The impacts are not near a National Park, gazetted crown land or road reserve. • There are measures to be put in place via the project CEMP to ensure weeds, erosion and other construction issues are adequately managed to ensure there are no direct or indirect impacts on adjoining areas.
I) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water	<ul style="list-style-type: none"> • There are no significant waterways in the study area. • There are measures to be put in place via the project CEMP to ensure sediment, erosion and other construction issues are adequately managed to ensure there are no direct or indirect impacts on the adjoining or nearby waterways. • The works are shallow and are not expected to impact or affect groundwater storages within the study area.
J) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding	<ul style="list-style-type: none"> • The proposed works are not likely to contribute to or exacerbate flooding risks or associated flood damage from future rain events.

9.3 Fauna

No evidence of the presence of the targeted fauna were identified in the study area. There are numerous strategies that can be implemented to minimise potential impacts to fauna with a focus on *impact minimisation* including:

- An ecologist or a suitable trained wildlife handler should be present when the initial clearing of the CEV site is being conducted. Appropriate equipment needs to be on hand to ensure any animals that are displaced or injured as a result of the construction are adequately rescued and cared for until they are relocated to a safer area away from the development, or until they can be taken to the nearest veterinarian or wildlife rescue facility for treatment and eventual reintroduction.
- If threatened fauna species are located in the field, then work must halt until an agreed approach can be determined via discussions with the appropriate authority involved (Department of Biodiversity, Conservation and Attractions).
- All staff involved with the construction project need to be tool-boxed (inducted) on any species that may be located during the works. The induction should include basic advice on identifying the known species that have been recorded and the steps to take if unsure, or if threatened species or communities are encountered during works.

10 Recommendations to Minimise Biodiversity Impacts

The suggested recommendations from the above sections to help minimise the impacts of the development and are summarised in **Table 11**.

Table 11: Summary of recommendations to reduce impacts from the development

Topic	Recommendation source	Recommendation
Targeted / threatened flora	2023 T-14 Ecological Assessment / This report	The potential impacts are to be minimised as much as possible via pre-construction surveys and micro-siting of the final alignment to avoid targeted or other threatened flora, wherever possible.
	This report	Targeted flora – Despite low likelihood of detection, it is recommended that the targeted species be included on the list of species to avoid during pre-construction inspections and micro-siting efforts through the area.
	2023 T-14 Ecological Assessment	The areas within 50 metres radius of a threatened flora record (where the vegetation in that 50-metre zone is contiguous with that around the species record) is considered to be an ESA and afforded the same protection. No threatened flora was identified within the study area, however, if detected during construction, the appropriate approvals and permits to conduct works (impacts) to the 50 metre radius ESA are required. A permit may also need to be sought if a threatened flora species is listed in legislation as one of the classes of threatened species (i.e. NOT a priority 1, 2, 3 or 4 species) and the impact area will be in contiguous vegetation within 50 metres of the threatened flora species record. If the threatened flora species is not able to be avoided, consultation with the appropriate authority must be undertaken.
Targeted / threatened fauna	This report	The potential impacts are to be minimised as much as possible via pre-construction inspections.
Threatened species (general)	2023 T-14 Ecological Assessment	If threatened species are located in the field by contract staff, then work must halt until an agreed approach can be determined via discussions with the appropriate authority involved (Department of Biodiversity, Conservation and Attractions).
	2023 T-14 Ecological Assessment	If threatened species are identified, then the species locations are to be flagged and recorded with a GPS, a more suitable route is to be determined to avoid impacting the species, and a temporary exclusion fence is to be erected around the species to prevent any inadvertent impacts during construction works.
	2023 T-14 Ecological Assessment	All staff involved with construction project need to be tool-boxed (inducted) on the locations of known threatened species records on the route, as well as any species that are located during the construction works. The induction should include basic advice on identifying the known species that have been recorded and the steps to take if unsure, or if threatened species or communities are encountered during works.
EPBC Act TECs or species	2023 T-14 Ecological Assessment	Any EPBC Act listed threatened species or communities encountered during the works will need a Significant Impact Criteria assessment (SIC) to be completed by a suitably qualified person (ecologist). Liaison with the responsible Commonwealth department is also recommended if EPBC Act species or communities are found or suspected during construction.
Waterways	2023 T-14 Ecological Assessment / this report	The study area does not possess any significant waterways, floodways or drainage lines.
Weeds	2023 T-14 Ecological Assessment / this report	Machinery must be thoroughly decontaminated prior to entering the CEV location.

Topic	Recommendation source	Recommendation
	2023 T-14 Ecological Assessment	Where high threat weeds are seen, they must be avoided or the weed infestations should be removed prior to machinery entering the area. Once an infestation of weeds has been intersected and machinery is advanced clear of where the weeds are located, machinery must be adequately cleaned down and inspected for weed seeds/propagules prior to work continuing, to prevent further spread of the weed.
	2023 T-14 Ecological Assessment	Machinery operators should be trained in identifying the key high threat weeds likely to be intercepted by machinery in the rangelands region of Fortescue. The CEMP is to list some of the main and highly visible weed species to be on the lookout for.
	2023 T-14 Ecological Assessment	Machinery operators need to be wary of any species which are unfamiliar, and methods be put in place to identify any unknown and weed-like plants that are encountered along the route. This is not only important for avoiding high threat weeds which may be present but is also important for identifying any rare or threatened species of plants which may also be encountered on site.
Impact minimisation & management	2023 T-14 Ecological Assessment	A CEMP should contain details of key contacts for responsible authorities, wildlife rescuers and handlers, and flora experts, and need to contain more detail on the impact minimisation approach and the step-by-step process if threatened species or threatened communities are found or suspected of being present on site.
Aboriginal cultural heritage	This report	The CEMP must include an unexpected finds protocol to adequately deal with European or Aboriginal cultural values or artefacts that are discovered during the construction process.

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12 Appendices

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Appendix 1: Flora List (Quadrat Species)

Scientific Name	Common Name	Status
<i>Abutilon octocarpum</i>	Abutilon	Native
<i>Acacia ancistrocarpa</i>	Fitzroy Wattle	Native
<i>Acacia aneura</i>	Mulga	Native
<i>Acacia inaequilatera</i>	Baderi	Native
<i>Acacia pteraneura</i>	Wattle	Native
<i>Acacia sp. sterile</i>	Acacia	Native
<i>Acacia tetragonophylla</i>	Dead Finish	Native
<i>Acacia victoriae</i>	Bardie Bush	Native
<i>Acacia xiphophylla</i>	Snakewood	Native
<i>Aristida holathera</i>	Erect Kerosene Grass	Native
<i>Corymbia candida</i>	Desert Ghost Gum	Native
<i>Enneapogon polyphyllus</i>	Leafy Nineawn	Native
<i>Eremophila cuneifolia</i>	Pinyuru	Native
<i>Eremophila forrestii</i>	Eremophila	Native
<i>Eremophila maculata</i>	Fuchsia Bush	Native
<i>Grevillea stenobotrya</i>	Rattle-pod Grevillea	Native
<i>Hakea rhombales</i>	Walukara	Native
<i>Monachather paradoxus</i>	Mulga Oats	Native
<i>Ptilotus exaltatus</i>	Tall Mulla Mulla	Native
<i>Scleroaleana cornishiana</i>	Cartwheel Burr	Native
<i>Senna artemesiodies</i> subsp. <i>oligophylla</i>	Bloodbush	Native
<i>Senna artemesiodies</i> subsp. <i>helmsii</i>	Blunt-leaf Cassia	Native
<i>Senna notabilis</i>	Cockroach Bush	Native
<i>Solanum lasiophyllum</i>	Flannel-bush	Native
<i>Triodia basedowii</i>	Lobed Spinifex	Native

Appendix 2: Fauna List (Quadrat Species & Incidental Species from Traverses)

Common Name	Scientific Name	Status	Notes
Australian Crow	<i>Corvus orru</i>		
Wedge-tailed Eagle	<i>Aquila audax</i>		
Willie Wagtail	<i>Rhipidura leucophrys</i>		
Little Crow	<i>Corvus bennetti</i>		

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Appendix 3: Quadrat Survey Results

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Date	9/6/2024
Quadrat Code	Q001 – Spinifex Grassland
Coord (NW corner)	Lat: 7478592; Long: 807947
Size/shape	50x50
Photos (SE corner)	Yes
Landform	Sandy to sandy loam plain
Soil description	Red sand to compact sandy loam with occasional ironstone pebbles
Rock type	Areas of ironstone and quartz pebbles
Litter % cover	1%
Fire history	None observed
Vegetation condition	Very Good condition vegetation dominates, with some Good condition nearer disturbed areas
Slope	Flat
Aspect	Flat



Disturbances	Existing vehicle tracks, road and drainage works				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVS - 3 x dominants for upper, mid and lower stratum)	Acacia inaequilatera, Hakes rhombales and Grevillea stenobotrya over Eremophila forrestii over Triodia basedowii, Senna notabilis and Ptilotus exaltatus.				
	Species	Status (E/N)	% cover	Av height (m)	Abundance
1	<i>Abutilon octocarpum</i>	N	0.2	0.25	10
2	<i>Acacia inaequilatera</i>	N	0.5	1.3	5
3	<i>Aristida holathera</i>	N	0.3	0.4	25
4	<i>Enneapogon polyphyllus</i>	N	0.2	0.45	15
5	<i>Eremophila forrestii</i>	N	0.1	0.8	1
6	<i>Grevillea stenobotrya</i>	N	0.2	1.4	1
7	<i>Hakea rhombales</i>	N	0.4	1.8	2

8	<i>Monachather paradoxus</i>	N	0.1	0.2	10
9	<i>Ptilotus exaltatus</i>	N	0.8	0.15	20
10	<i>Scleraleana cornishiana</i>	N	0.1	0.35	2
11	<i>Senna notabilis</i>	N	1	0.2	50
12	<i>Solanum lasiophyllum</i>	N	0.1	0.4	3
13	<i>Triodia basedowii</i>	N	30	1.1	300

Date	9/6/2024										
Quadrat Code	Q002 – Low Woodland										
Coord (NW corner)	Lat: 7478672; Long: 807953										
Size/shape	50x50										
Photos (NW corner)	Yes										
Landform	Sandy to sandy loam plain										
Soil description	Red sand to compact sandy loam with occasional ironstone pebbles										
Rock type	Areas of ironstone and quartz pebbles										
Litter % cover	2%										
Fire history	None observed										
Vegetation condition	Very Good condition vegetation dominates, with some Good condition nearer disturbed areas										
Slope	Flat										
Aspect	Flat										
Disturbances	Existing vehicle tracks, road and drainage works										
Quadrat marking method	GPS and taped, not permanent.										
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Acacia aneura</i> , <i>Acacia victoriae</i> and <i>Hakes rhombales</i> over <i>Senna artemesiodies</i> subsp. <i>oligophylla</i> , <i>Senna artemesiodies</i> subsp. <i>helmsii</i> and <i>Eremophila forrestii</i> over <i>Triodia basedowii</i> , <i>Ptilotus exaltatus</i> and <i>Enneapogon polyphyllus</i> .										
1	<table border="1"> <thead> <tr> <th>Species</th> <th>Status (E/N)</th> <th>% cover</th> <th>Av height (m)</th> <th>Abundance</th> </tr> </thead> <tbody> <tr> <td><i>Abutilon octocarpum</i></td> <td>N</td> <td>0.1</td> <td>0.25</td> <td>4</td> </tr> </tbody> </table>	Species	Status (E/N)	% cover	Av height (m)	Abundance	<i>Abutilon octocarpum</i>	N	0.1	0.25	4
Species	Status (E/N)	% cover	Av height (m)	Abundance							
<i>Abutilon octocarpum</i>	N	0.1	0.25	4							



2	<i>Acacia ancistrocarpa</i>	N	0.3	1.8	2
3	<i>Acacia aneura</i>	N	1	2.4	5
4	<i>Acacia inaequilatera</i>	N	0.5	1.4	3
5	<i>Acacia pteranera</i>	N	0.6	1.6	3
6	<i>Acacia sp. sterile</i>	N	0.1	1.7	1
7	<i>Acacia tetragonophylla</i>	N	0.3	1.5	2
8	<i>Acacia victoriae</i>	N	0.8	1.8	3
8	<i>Acacia xiphophylla</i>	N	0.1	1.2	1
10	<i>Aristida holathera</i>	N	0.6	0.3	35
11	<i>Corymbia candida</i>	N	0.1	1.6	1
12	<i>Enneapogon polyphyllus</i>	N	0.8	1.2	25
13	<i>Eremophila cuneifolia</i>	N	0.2	0.35	15
14	<i>Eremophila forrestii</i>	N	0.2	0.8	3
15	<i>Eremophila maculata</i>	N	0.1	1.2	1
16	<i>Grevillea stenobotrya</i>	N	1	1.2	6
17	<i>Hakea rhombales</i>	N	1	1.4	5
18	<i>Monachather paradoxus</i>	N	0.2	0.25	15
19	<i>Ptilotus exaltatus</i>	N	0.8	0.25	25
20	<i>Sclerodaleana cornishiana</i>	N	0.1	0.4	2
21	<i>Senna artemesiodies</i> subsp. <i>oligophylla</i>	N	0.2	0.7	2
22	<i>Senna artemesiodies</i> subsp. <i>helmsii</i>	N	0.2	0.9	3
23	<i>Senna notabilis</i>	N	0.3	0.2	7
24	<i>Solanum lasiophyllum</i>	N	0.2	0.35	4
25	<i>Triodia basedowii</i>	N	27	1	250